POWER HAWKS ROBOTICS
2015 Awards Portfolio

FRC TEAM 1111

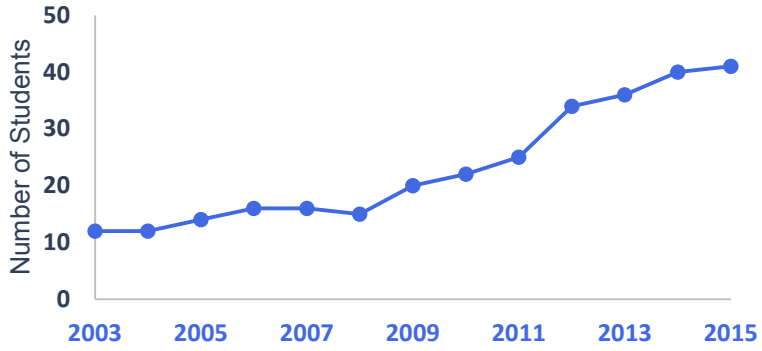
Who we are makes us the Power Hawks
We can see our futures and what it will do for us.
We are Gracious Professionals and innovative individuals.
We love to share our passion and experience with other teams and our community.
We continue to grow our impact each year with new FIRSTers under our wings.
We are and forever will be Branching Out

Power Hawks Robotics 2015 Awards Portfolio

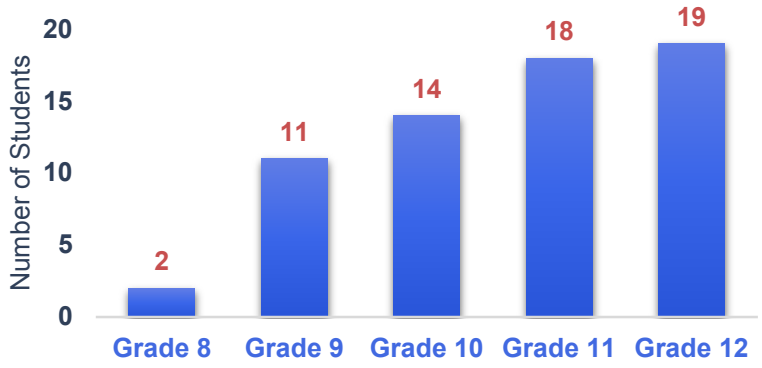
POWERHAWKS ROBOTICS

By The Numbers

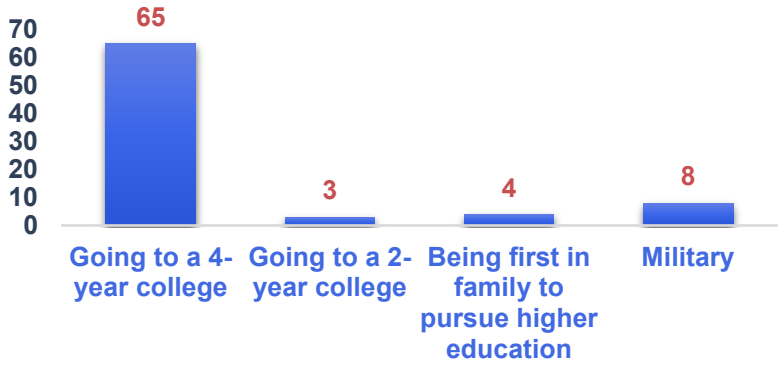
STUDENTS ON TEAM



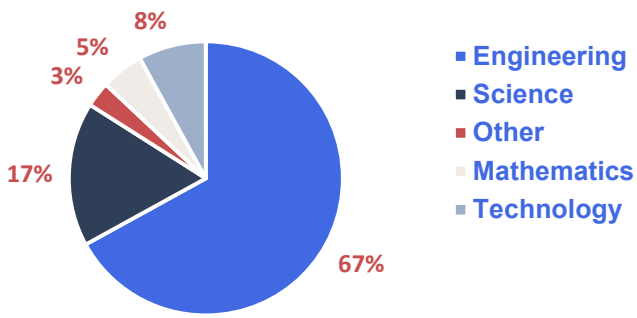
STUDENT GRADE LEVEL



PLANS AFTER SCHOOL



CAREER PLANS



Outreach

30+ events in the last year
80+ events in the last three years
3,200+ volunteer hours a year

People Reached in 2014

450,000 people exposed to FIRST

Hours Worked This Year

3,250 Outreach hours
2,000 tutoring hours
1,315 Team volunteer hours
23,330 hours worked by students
8,500 hours worked by mentors
31,830 total hours worked

Yearly Program Value

$255,000 mentor value @ $30/hr
$86,000 operating budget
$341,000 team value

Scholarships Offered

Over **$650,000** each year

Average GPA

3.7/4.0 Average GPA

Academic Achievements

95% honor roll
50% Prinicpal's honor roll
19% Superintendent's honor roll

Total Number of Graduates

185 graduates
150 currently in STEM fields

Power Hawks Robotics Team

Power Hawks Chairman's Award

2015

SOUTH RIVER
POWERHAWKS
ROBOTICS

Team 1111

2015 Chairman's Award Essay

All trees old and new, start as tiny seeds that grow and expand to become strong, essential pillars of their natural community. The history of the Power Hawks has modeled the life of a tree year after year becoming a living, dynamic legacy. When the Power Hawks were founded in 2003, the team only had eight members and was exclusively FRC®. Twelve years after our founding, The Power Hawks have grown to a huge organization, including an FRC team, 3 FTC® teams, 4 FLL® teams, as well as 4 Jr. FLL® teams and a community nonprofit to support the program. With growth comes change, and as our size increased, our team management evolved as well. In 2003, we focused solely on building a robot. In 2005, we began developing our business side, extending our meeting times and community outreach to be year round continuing to where we are today. The Power Hawks are constantly expanding, pushing to improve our team and the community, leading us to our 2015 Chairman's theme: Branching Out.

The Power Hawks are a guiding force for Science, Technology, Engineering and Mathematics (STEM) in Anne Arundel County, Maryland. South River High School, our host school, is home to a STEM magnet program. At STEM information nights, we expose students to the ideas of STEM careers and incorporating them into the *FIRST*® program. THis allows the STEM students to learn more about the program while team members advocate for robotics and *FIRST* values, actively recruiting potential Power Hawks for all levels.

The Power Hawks umbrella organization houses 4 Jr. FLL, 4 FLL and our 3 sister FTC teams: 3583 Power Hawks, 3796 Talons and 5178 Mech Hawks in addition to FRC Team 1111. However, our helpfulness doesn't stop with our younger *FIRST* teams. Two years ago, Team 4541, a rookie team at Archbishop Spalding High School, approached us for advice. We took them under our wing and with our help they went on to win Rookie All Star at the Chesapeake Regional in 2013. More recently, we have been collaborating with Team 836, The RoboBees, from Leonardtown, Maryland, to learn from each other in areas such as game strategy, increasing awareness for *FIRST* in our communities and fundraising. From trips to visit each other to weekly conference calls, Coopertition® is evident in every aspect of our teams.

Power Hawks is rooted in cooperation, drawing our strength from each other. Within the two sides of the team, build and business, there are various subteams that create opportunities to work collaboratively. The most common form of teamwork exists within the subteams: the members of a subteam function as though they are a single unit and it is not uncommon for multiple subteams to collaborate on the same project. On the business side of the team we exchange information, media and ideas to complete projects as a root system. For example,

public relations take pictures and videos to document our work, provides logos for our pit and updates our engineering notebook. On the build side of the team, subteams communicate comprehensively and adjust their work accordingly in order to stay on schedule with our target timeline and project Gantt chart. We incorporate systems engineering and agile methodologies into our design and fabrication processes in order to ensure all aspects of the robot and control system work together properly.

Creative thinking is critical to the design process and is promoted in every aspect of the team to encourage us to branch out and try something new, something different. These ideas don't always work, but they help us grow and provide opportunities to learn from our mistakes. Power Hawks learn that failure is a product of the agile design process and can be overcome to make something we are proud of. We would not be able to do any of this without outside help from our engineering and technology education teachers as well as our volunteer mentors.

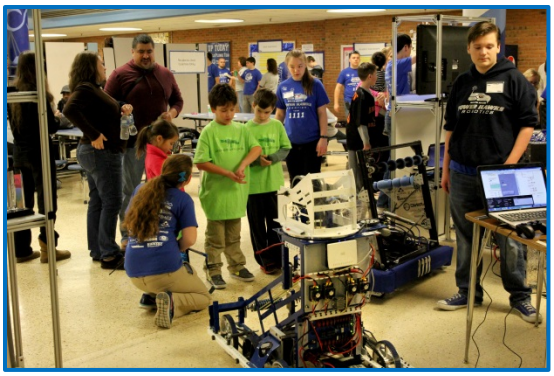
The Power Hawks hold ourselves to high standards in regards to education and hard work. For many Power Hawks members, this involves taking AP and dual-enrollment classes at Anne Arundel Community College. This year, our team members are enrolled in four college level classes and three honors classes on average. This dedication to learning is reflected by the achievements of our members, resulting in a median grade point average of 3.7. Over 90% of our team members have earned Honor Roll, Principal's Honor Roll (earning straight A's in one marking period), or Superintendent's Honor Roll (earning straight A's the entire year) in the past year. After college, more than 72% of our team intends to pursue a career path in engineering while another 23% wishes to pursue a career in other STEM fields. In addition to our normal build schedule during January and February, we meet weekly during the off season. During these meetings we set up community outreach events and fundraisers, as well as learn how to operate new machinery safely and accurately. We also host summer enrichment workshops for our students to gain experience on all the subteams.

One of our creative fundraising strategies involves a group of team members filling a selected homeowner's yard with a flock of plastic flamingos, a method the team calls "Flocking". Within 48 hours of the flocking, the homeowner can choose to either make a small donation to move the flock to another home of their choice, or request they be removed free of charge. This unique method, along with being a lot of fun, has helped us spread the message of *FIRST* and befriend members of the community and other teams. At the competitions we attend, our team gains recognition among other teams by "Flocking" their pits.

Our team goals are never fulfilled until we spread our passion and impact others in a positive way. Community is an important part of *FIRST* values and the Power Hawks actively seek involvement in ours. We attend events throughout the year, informing others about *FIRST* and

drawing attention to other STEM-related opportunities for students. In 2014, we participated in more than 20 community service and outreach projects throughout the season logging over 3,200 volunteer hours and are well known in the local *FIRST* community for our work with FTC, FLL and Jr. FLL teams. One of the community service projects we completed this year was providing board games and LEGO® to our local library and elementary school to promote positive social skills and literacy for children. In addition, our team members volunteer twice a week at our neighboring middle school to provide tutoring in a variety of subjects for at-risk students, totaling over 2,000 hours each year.

Every year we coordinate and host an FLL qualifier, the South County Showdown, for southern Anne Arundel County, Maryland. This event is completely planned and led by Power Hawks students. Team members are in the thick of it all, from publicity to logistics, judging and cheering on the middle schoolers in the heat of competition. This year our qualifier had 32 enthusiastic FLL and Jr. FLL teams compete, impacting more than 250 students, along with their parents and mentors and numerous members of the community. In addition, we host an FTC qualifier at the United States Naval Academy. This qualifier is student-staffed with referees, field resetters and control workers. These events are major sources of fundraising for the team and have a widespread influence on *FIRST* in our area. During this past summer we organized and developed the curriculum for our first summer camp designed to introduce middle school students to robotics. Over the course of four days, Power Hawks worked with sixth to eighth grade students on building intermediate level robots while teaching Coopertition and Gracious Professionalism®.



Robotics serves as a branch to bigger and better things. Last year, one of our team members attended a congressional hearing at the United States House of Representatives to testify on the positive impacts of *FIRST* Robotics, both personally and in the community, alongside Dean Kamen and three other students. We were also privileged to be invited by Lockheed Martin to demonstrate at the company's exhibition booth at the 2014 USA Science and Engineering Festival, which spread the ideas of *FIRST* throughout the national capital region. At this event, we reached over 350,000 people, many of whom were students.

As Power Hawks, everything we do revolves around our Power Hawk Values: embracing teamwork, creative thinking, hard work and service to the community, as well as the *FIRST* values of Gracious Professionalism and Coopertition. These values have shaped our behavioral patterns by giving us the ability to flourish and grow, both as individuals and as a team. First and foremost, the Power Hawks are a team; forty unique components coming together to accomplish a common goal. The work of each individual is essential to our team, intertwining branches and creating strong bonds among our members.

The Power Hawks have cultivated our team members' growth and watched them become leaders, learning to think critically and take initiative. When we step back and look at our past, our present and our future, an image of a growing tree comes to mind. We are rooted in the *FIRST* core values, and our strong organization fosters collaboration among our team members and supporters to form our sturdy trunk. We continue to grow and branch out with summer camps, demonstrations, and increased political involvement. While embracing *FIRST* Robotics and forging new friendships, the Power Hawks are equipping the next generation with the necessary skills and encouragement to branch out and improve our world today and in the future.

2015 Chairman's Award Executive Summary

Describe the impact of the *FIRST* program on team participants with special emphasis on the current season and the preceding two to five years.

For more than 12 years, our program has enriched members with skills necessary to succeed in the real-world. The influence of *FIRST*® has pushed more than 95% of our team to pursue a STEM career. A third of our members have deepened their interests discovered through *FIRST* by interning at numerous national organizations. Our team provides a great platform for student enrichment; in fact, in 2014 a member testified to the US House of Representatives about the life-changing scope of *FIRST*.

Describe the impact of the *FIRST* program on your community with special emphasis on the current season and the preceding two to five years.

The Power Hawks live to inspire next generations through STEM education. Each year our members spend more than 2,000 hours tutoring local at-risk middle school students. Additionally, we donated over 350 pounds of canned food to filling student backpacks for those without access to meals on the weekends. We collected four totes of Lego® for our elementary schools "Legos for Literacy" program and donated 70 board games to support developmental social skills in struggling students.

Describe the team's innovative or creative method to spread the *FIRST* message.

Our 2012 Rebound Rumble robot is an integral part of our outreach. We take "Havik" and minibots to over 22 demonstrations and outreach events yearly. We were even featured on ESPN during a college basketball game! Students are actively engaged with "Havik" and it inspires their parents to have them enrolled in FIRST® at all levels. We held our first summer camp this year, teaching STEM skills and spreading the word of FIRST. It was so successful we are expanding it to be twice as long next year.

Describe examples of how your team members act as role models and inspire other *FIRST* team members to emulate.

Our best display of role modeling *FIRST*® ideals can be found at our annual South County Showdown FLL® Qualifier and Power Hawks Summer Camp. Our sixth annual FLL Qualifier attracted 24 FLL and 11 Jr. FLL® teams from across Maryland. Last year, members pioneered our first summer camp teaching 18 middle school students Gracious Professionalism® and Coopertition®.When our members lead these events, their initiative represents the exemplary ideals of *FIRST* and influences younger teams.

Describe the team's initiatives to help start or form other *FRC* teams.

The Power Hawks are constantly searching for new hotspots to help start FRC® teams within our region. To start a team we: build contacts within the county, search for grants to start teams and demo to prospective participants. In 2013, we served as a guiding force for Archbishop Spalding High School's rookie team, The CAVS Team 4541. We hosted collaboration workshops, provided mentors and lent materials, contributing to their win of the Rookie-All Star Award and their journey to Championships.

Describe the team's initiatives to help start or form other *FIRST* teams (including *Jr. FLL, FLL, & FTC).*

At every opportunity, The Power Hawks educate the public about *FIRST*® and provide resources-even funds, to start new teams at all levels. Just this year, we started 2 Jr. FLL® teams. By demonstrating at community, school and STEM events, we've introduced *FIRST* to thousands. Our student members start teams to introduce their younger siblings to *FIRST*. We also have our Soaring Engineers program to introduce students to robotics and lend materials to start *FLL*® and *Jr. FLL*® in the schools.

Describe the team's initiatives on assisting other *FIRST* teams (including *Jr. FLL, FLL, FTC* & *FRC*) with progressing through the *FIRST* program.

The Power Hawks is an organization that includes all levels of *FIRST*®. From guiding new Jr. FLL® teams to collaborating with skilled FRC® teams and every level in between. Our team actively works with Team 836 The Robobees to share ideas through video calls. We also come together and compare strategies with other *FRC* teams around the country through NASA house calls. We also mentor 3 FTC®, 4 FLL®, and 4 *Jr. FLL* teams to inspire students to push their limits and move forward in *FIRST*.

Describe how your team works with other *FIRST* teams to serve as mentors to younger or less experienced *FIRST* teams.

Our mentoring extends across four Jr. FLL®, four FLL® and three FTC® teams. Each of these teams are directly mentored by FRC® members who teach them Gracious Professionalism and Coopertition, financially supported by our non-profit, and encouraged to move up in the ranks to eventually join us on FRC. By holding an FTC and FLL Qualifier, which also includes a Jr. FLL Expo, we assure that each level of *FIRST*® has the chance to show their robotics skills and has opportunity for growth.

Describe your Corporate/University Sponsors.

Being close to Washington D.C., The Power Hawks have a unique opportunity with our sponsorship. We are sponsored by government agencies such as NASA and NSA, as well as national companies like Microsoft, Lockheed Martin, and Rockwell Collins. In addition, we are sponsored by numerous local, small businesses such as Selby Bay Marina and Bayside Nissan of Annapolis. Having such a broad range of sponsors gives our members a unique experience to learn from a multitude of companies.

Describe the strength of your partnership with your sponsors with special emphasis on the 2013/2014 year and the preceding two to five years.

Our sponsors are an integral part of our success. Every year, our sponsors such as NASA, Department of Defense, Childress-Earnhardt Racing Team, and BAE Systems, look to our team for their next generation of interns. Since the majority of sponsors are local, we can work together to aid our community. This includes hosting demonstrations and outreach programs to spread the word of *FIRST*® and STEM education at their facilities.

Describe how your team would explain what *FIRST* is to someone who has never heard of it.

FIRST® is an organization that inspires young people to be leaders of science and technology. *FIRST* cultivates learning and growth through hands-on experience building robots. Using real-world applications, students achieve their goals while increasing students' self-confidence, communication skills and leadership abilities. The Power Hawks embrace the vision of *FIRST* in their mission to equip the next generation with necessary skills to improve the world through competitive robotics.

Briefly describe other matters of interest to the *FIRST* Judges, if any.

The Power Hawks at South River High School are not only involved in robotics, but our students are largely involved in a county-wide initiative to promote STEM learning and education. A majority of our team members participate in the STEM magnet program at our school, while other members gain their inspiration through Project Lead the Way. Power Hawks are extremely excited about promoting STEM and *FIRST*® ideals with their passion developed in school and expanded though our co-curricular program.

2015 Chairman's Award Presentation Speech

Trent:

The Power Hawks team 1111 is **branching out**, **going out on a limb** and **cultivating** a community of Gracious Professionals who are determined to enrich their own skills while **extending** that same opportunity to others. For that reason, the Power Hawks have embraced our theme of "**branching out** from the hawk's **nest**".

Eleanor:

Our **nest** is built to mimic the business world with deep **roots** in our student leadership. The Power Hawks have four executive leaders composed of a CEO, VEO, Build Operations Officer and Business Operations Officer that make essential decisions based on our team's aspirations. Our general leadership then runs seven cooperative **major branches**, or sub teams, on both business and build which are: Robot Fabrication, Controls, Design, Competition Prep, Public Relations, Events, and Finance. All of our forty members divide their time between 2 subteams: one on build, and one on business, to gain real world experience and a diverse skill set.

Patrick:

To be the best FIRST team we can be, embodying Coopertition and Gracious Professionalism is our biggest mission for students and mentors. Our students create an atmosphere that **kindles** high-quality work with mutual respect and collaboration. In recent years, The Power Hawks have **nurtured** the **growth** of rookie FRC teams in order to foster coopertition in our region. Two years ago, our students and mentors supported team 4541, The Cavs, during their rookie year when they won the Rookie All-Star Award and went to World's. This past year, our students have **forged** a new relationship with team 836, The Robobees, **blooming** together by having weekly video conferences and sharing ideas.

Additionally, a group of our students and mentors participated in the Baltimore Area Alliance Education Day showcasing our team's expertise on 3-D Printing, Team Image, and Scouting. Perhaps the biggest demonstration of our FIRST values is our enthusiasm to always lend experienced help and materials to other teams who may be **stumped** throughout the year and during competition.

Trent:

As an organization, The Power Hawks have set huge goals from weekly summer enrichment workshops, to hosting a record number of teams at our FLL Qualifier, we didn't **LEAF** any objectives behind. While promoting FIRST at Demos, our students learn valuable public speaking and entrepreneurship skills. In order to **stick** with our studies and sustain an average GPA of 3.9, we hold a team study day every year before midterms.
Over the summer months, sub teams **nurture** students' curiosity by taking-on multiple projects including: mastering pneumatics, revamping our website, and broadening our social media reach. To apply these skills, we attended two offseason events that allowed students to try other roles on the team.

Ellie:

Our students know that **planting seeds** of STEM inspiration into our community and the rising generation is the best way to spread their passion for FIRST. This year we held our First Annual Power Hawks Summer Camp, which was entirely student-designed and led. We hosted 18 middle school students that left knowing all about programming, mechanisms, and design. It was so successful that we are expanding this upcoming summer to include 2 sessions. We've **rooted** STEM values in the next generation of Anne Arundel County students by attending STEM events and **exposing** them to the ideas of FIRST and the wonders of robots. Additionally, one of our members was fortunate enough to testify in front of the US House of Representatives last year about how STEM education and FIRST Robotics helped her **bloom**. Our most significant event this past year was the USA Science and Engineering Festival held in Washington, DC, where we presented our robot to three-hundred fifty thousand attendees over the span of four days.

Patrick:

Each year we hold our FLL Qualifier, The South County Showdown, attracting teams across the state of Maryland. Student members run the entire event from start to finish: from scheduling, to volunteer coordinating, judging, and **rooting for** the middle schoolers in the heat of the competition. This past year, we had 24 FLL teams and 11 Jr. FLL teams participate in our qualifier- a new record. Each year, we find that it's the perfect opportunity to **transplant** our knowledge and **grow** the next generation of FIRSTers.

Ellie:

But our reach doesn't stop there. As a team we **spruce up** local children's situations so they can aspire towards better educations. Each year our members spend over 2000 hours tutoring at-risk Middle School students so they can succeed. Additionally, we donated over 350 pounds of canned food to a local Backpack Buddies organization that provides backpacks full of food for students who normally don't have access to meal on the weekends. This way local children can spend more time feeding their natural curiosity and less time wondering about

where their next meal may come from. In the past year, we **nurtured** two programs at Edgewater Elementary School. We first collected 4 totes of used Legos for their Legos for Literacy program that teaches reading skills through Lego manipulation. We also donated over 70 board games to support positive behavioral reinforcements and developmental social skills.

Trent:

The Power Hawks nest would not be as successful without the generous support of our mentors and sponsors. Since the Power Hawks were **saplings**, our generous sponsors including: NASA, Rockwell Collins, as well as numerous, local, small businesses, have acted as the **fertilizer** for our growth as an organization.

Patrick:

While embracing FIRST ideals, the Power Hawks are equipping the next generation with the necessary skills to improve the world for the future. Thank you for your time and consideration. We would love to answer any questions you may have for us.

2015 Chairman's Award Video Script

Introduction

The Power Hawks sapling was planted in 2003. Through constant nurturing, it has grown a strong and intensive root system, which has supported the far reach of our branches. Every year, we continue to grow and thrive, expanding the reach of our root and branch system.

Roots

To spread our reach and remain a strong community, we root ourselves in our outreach and sponsors. Power Hawk members tutor over 2000 hours at our local middle school each school year. Our mentors provide support for our team as well as the teams under our wings We also greatly value our sponsors, who provide mentors and funds that make it possible for our team to push our limits and to continue to grow.

Trunk

Over our team's history our students have coordinated numerous FIRST events. For the past 6 years, we have organized an FLL qualifier and Jr. FLL expo, The South County Showdown. With each year it's impact has grown in size and scope. We also host a yearly FTC qualifier at the US Naval Academy where we promote each FIRST program to teams and the community. These events allow enthused FIRSTers to enjoy the company of fellow teams and community members as they display the skills they've learned.
Hosting events are two ways that we get involved, but things continue to sprout up and out from there!

Lower Branches

The most concentrated impact of our team is on our local community. Last year we founded an annual Power Hawks Summer Camp that introduced 18 middle schoolers to the significance of STEM and FIRST through robotics. The camp was so successful in exciting the students about STEM in their futures, that we've expanded our camp to more than double the impact this year. In addition to our summer camp, we also benefit our community through service events aimed towards teaching local children about the FIRST values and life inside the robotics program.

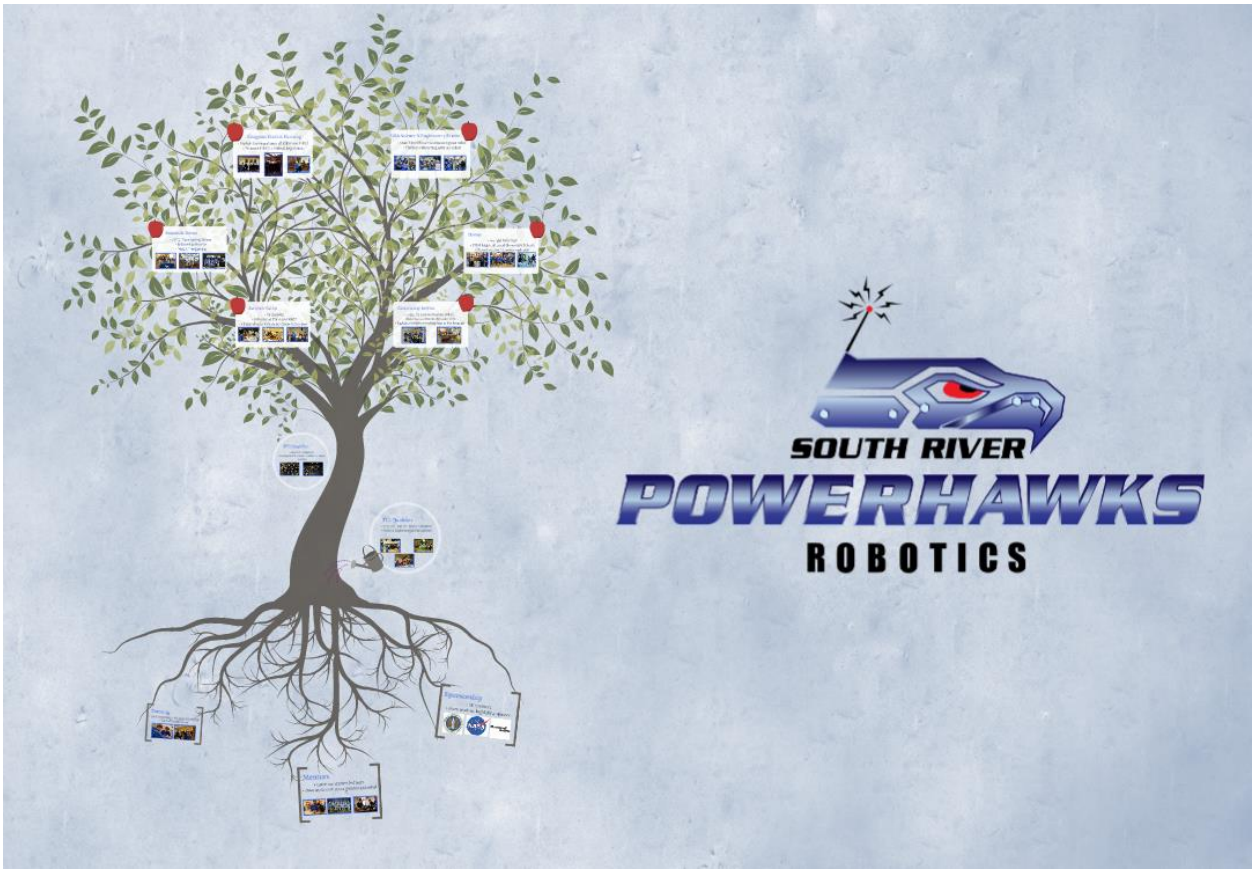
Medium Branches

To stay involved in Maryland, we've participated in events including the Milcom Conference, the Chesapeake Regional Tech Council Thanksgiving, and the YMCA Thingamajig. At the Milcom Conference, our students joined others from the area to train in PTC Creo. The CRTC Thanksgiving, as well as events for our other sponsors, allows us to showcase how their support has helped us grow. Finally, the YMCA event and numerous other STEM nights throughout our county allow us to present FIRST to students from throughout the Maryland-DC area.

Higher Branches

Finally, we were given a chance to spread our values on a national level. Last year, one of our team members testified to The US House of Representatives about how FIRST has impacted her life beyond high school. Our head mentor also contributes to the National Capital District and Chesapeake Regional
Planning Committees. This allows the Power Hawks to have an integral role in the expansion of FIRST in the Maryland area. Lastly, we got the opportunity to present our robot at the 2014 USA Science and Engineering Festival in Washington D.C. We were able to directly engage children with our robot from this past year and demonstrate FIRST to over 350,000 attendees.

The Power Hawks strive to continuously grow. Through our strong roots and trunk, we are able to expand our canopy to benefit more people every year in our local, state, and national communities, all while providing a life changing experience for the students and mentors who make up the Power Hawks.



Power Hawks Robotics Team

Power Hawks Five Year Business Plan

2015

SOUTH RIVER POWERHAWKS ROBOTICS

Team 1111

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EXECUTIVE SUMMARY

Mission

The Power Hawks Robotics Team lives by their mission statement of equipping the next generation with the necessary skills to improve the world through competitive robotics.

Vision

The Power Hawks envision a Maryland full of forward thinking, global citizens.

Team Origin

The Power Hawks Robotics Team was founded in 2003 by John Jacobson and eight South River High School students. The team has grown to 40 FRC® students and three teams of 10 FTC® students each for the 2014-2015 season. Additionally, The Power Hawks also support and mentor four FLL® and four Jr. FLL® teams, two of which were founded this year. In order to support such a large number of students, The Power Hawks have set up a nonprofit organization to manage finances and utilizes an organizational structure of four executive leaders and six sub team leaders.

Summary of Team Growth

The Power Hawks' growth from their inception in 2003 to the current 2015 season is shown below:

2003, the Power Hawks rookie year:

- Student population:
  - students to mentors 8:1
  - male to female 3:1
- No previous experience with *FIRST*

2015, the Power Hawks current season:

- Student population:
  - students to mentors 2:1
  - male to female 1.8:1
- more than 50% of team members have previous involvement in *FIRST*

Overall, The Power Hawks have accurately represented the demographic breakdown of South River High School in race, ethnicity, and demographics.

Objectives

By the year 2020, The Power Hawks aim to:

- Increase student confidence by teaching technical and entrepreneurial skills
- Increase support for robotics programs in Anne Arundel County
- Create and support multiple FRC teams throughout Anne Arundel County

- Gain increased recognition in the community through multiple outreach events
- Expand outreach and awareness of *FIRST* robotics and STEM skills to build a network of students for our program
- Develop a renewable source of professional and parental mentors in technical and entrepreneurial fields
- Improve financial sustainability & stability
- Increase Maryland state support of *FIRST*
- Work to create a support network with other Maryland teams

Keys to Success

- Prepare our students by giving them the means to utilize STEM and entrepreneurial skills
- Promote STEM ideals in the community
- Create reliable and renewable sources of new members
- Secure a minimum of two-years operation expenses
- Obtain and maintain a member-to-mentor ratio of 3:1
- Maintain a record of work for future members to reference
- Overlap outgoing and incoming leadership to avoid power vacuums
- Provide a free thinking environment

Sponsors

Titanium Level (minimum donation of $10,000)
NASA Goddard
NSA Grant
Gold Level (minimum donation of $5,000)
Anne Arundel County Public Schools
Righttime Medical Care
Rockwell Collins
Silver Level (minimum donation of $1,000)
Chesapeake Regional Tech Council
Commodore Mayo Kiwanis Club
Daly Computers
Earth Observation Technologies LLC
Elks #622
Koons of Annapolis
Leidos
Lockheed Martin
Selby Bay Marina
TASC, Inc.
University of Maryland Foundation
Bronze Level (minimum donation of $500)
Berkinshaw Orthodontics
Motorola Solutions Foundations
Pro-Air, Inc.

SRA International, Inc.

Other Sponsors

Arundel Self Storage Annapolis
Bay Engineering
Bayside Nissan
BIT Solutions
Booz Allen Hamilton
Carrollton O Green, Jr.
CED Investigative Technologies, Inc.
Chesapeake Bay Sport Fishing LLC
Eaton Corporation
Edward and Linda Gray
Family Veterinary Clinic
Google
Government Services IPT
Hughes Remodeling LLC
Hutchison Glass
Julie and Kelly Walter Troxler
Kumon "A Dream of Education LCC"
Kwesi O Rogers
Manufacturing Support Group, Inc.
Marianne and William Wood
McCarter Welding
M-Cubed Information Systems
Microsoft
Multimed Technical Services, Inc.
Ralph and Tricia Leighton
Stanley and Rose Heim
Thomas Wright
Tri-State Communications, Inc.
Wells Fargo Bank
William Shoemaker

Partnership

Anne Arundel County
Anne Arundel County Public Schools
Anne Arundel County Public Schools STEM
Anne Arundel County Public Schools Programs of Choice
Central Middle School
Maryland *FIRST*
Microsoft
NASA Goddard Space Flight Center
Rockwell Collins
South River High School

MANAGEMENT AND ORGANIZATION

Team Organization

The Power Hawks umbrella organization is broken into a number of different programs as shown in the figure below.

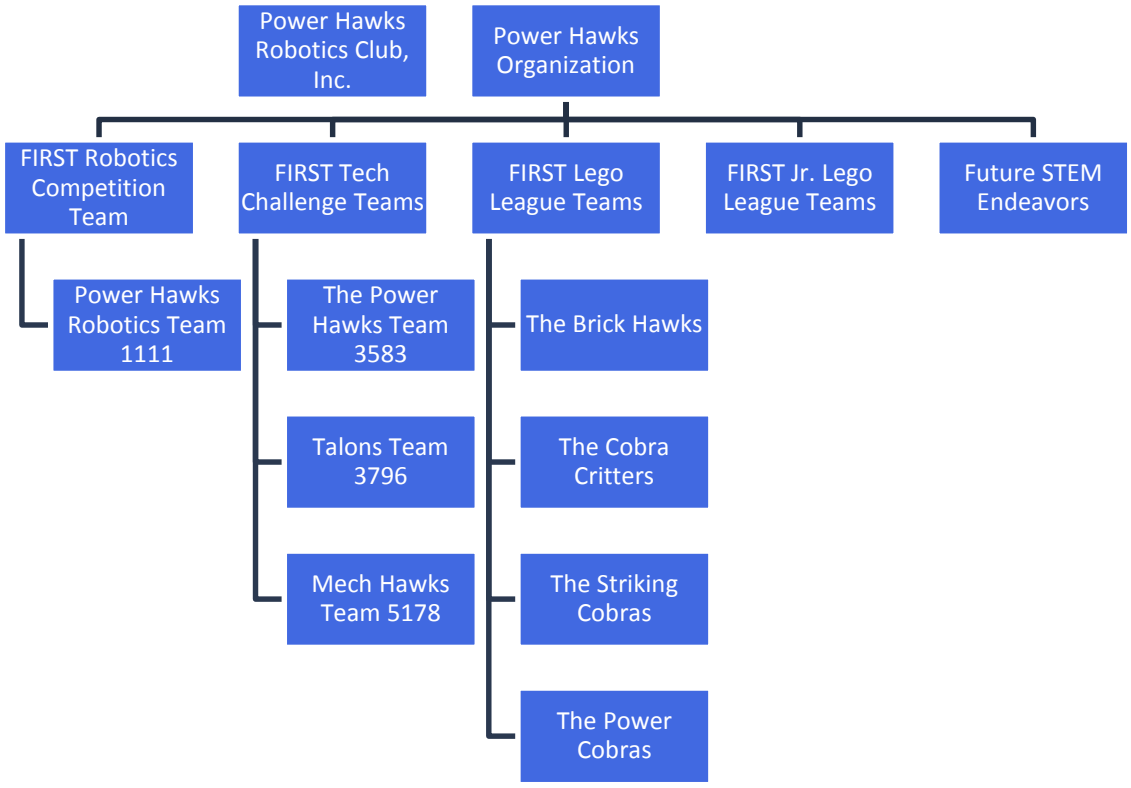


Figure 1: Team Organization

Power Hawks Organization

All school activities of the team fall under the umbrella of The Power Hawks Organization. Most of the teams under The Power Hawks Organization largely operate independently; however, The Power Hawks Organization runs large events. This includes their annual FFL Qualifier, The South County Showdown, an annual FTC Qualifier, and other community outreach service projects, which span all the programs under the organization's wide reaching umbrella. These community outreach programs are run by The Power Hawks' student leadership. These outreach programs aid in completing The Power Hawks Organization overall purpose, which is to create unity in the organization via the completion of large-scale community outreach programs.

Power Hawks Robotics Club, Inc.

The Power Hawks Robotics Club, Inc., is a 501(c)(3) nonprofit run by parents and community members, and is in no way affiliated with Anne Arundel County Public Schools or South River High School. The goal of the nonprofit is to provide funding opportunities to help STEM and Robotics programs throughout Anne Arundel County. The Power Hawks Robotics Club, Inc. is

the primary monetary mechanism for The Power Hawks Organization, providing the majority the organization's funding and materials. While separate from the organization, The Power Hawks Robotics Club, Inc., and The Power Hawks Organization's many programs work very closely to ensure that both missions are met. One instance of the cooperation between these parties is the members of the organization volunteering for the nonprofit's many fundraisers and community outreach projects.

FIRST Robotics Competition Team

The core of The Power Hawks Organization is the *FIRST* Robotics Competition Team. Team 1111, The Power Hawks, is The Power Hawks Organization's only FRC team; which competes annually.

FIRST Tech Challenge Teams

The *FIRST* Tech Challenge teams are considered the organization's less time intensive teams. They allow students who have other major time commitments to still become involved in *FIRST* robotics. The Power Hawks Organization fields three *FIRST* Tech Challenge teams:

- Team 3583-The Power Hawks
- Team 3796-Talons
- Team 5178-Mech Hawks

FIRST Lego League Teams

The *FIRST* Lego League Teams are considered our starter teams for The Power Hawks Organization. They introduce students to robotics and help them understand the time commitment and mind set needed to be a successful member of The Power Hawks Organization. The organization fields four *FIRST* Lego Leagues:

- The Brick Hawks
- The Cobra Critters
- The Striking Cobras
- The Power Cobras

FIRST Jr. Lego League Teams

The *FIRST* Jr. Lego League Teams feed our *FIRST* Lego League Teams for The Power Hawks Organization. They introduce students to robotics and help them understand the time commitment and mind set needed to be a successful member of The Power Hawks Organization.

Future STEM Endeavors

The Power Hawks Organization continues to look for other ways to further inspire more students. Currently, The Power Hawks Organization is recruiting additional parents so that programs can be expanded and added. Future programs the organization would like to start with more parents include:

- Technology Student Association (TSA)
- Other STEM co-curricular programs

Management Summary

Power Hawks Organization

The Power Hawks Robotics Organization is managed by student leaders, mentors, board of directors, and a teacher advisor.

Students

Student leaders are generally juniors or seniors in high school. At the end of the previous build season students apply for leadership positions. They are interviewed and selected to their positions by mentors and the outgoing leadership. Their responsibilities extend beyond leading their peers, to include teaching of basic skills to newer members and serving as the liaisons between the students and the mentors.

Board of Directors (BOD)

Members of the community are elected to the BOD which controls The Power Hawks Robotics Club, Inc. The board also plays a general role on the team, with members as mentors for build and business, funding, planning, and implementation.

Advisor

The Power Hawks team is school based with a head mentor that is a school or district employee. Responsibilities of the teacher advisor/head mentor include coordinating with the school, supervision of students and activities, organization of mentors and students for meetings, and working closely with The Power Hawks Robotics Club, Inc. and the student leaders.

Team Organizational Hierarchy

For 2014-2015, the FRC Team 1111 has developed a dual organizational hierarchy (business and build) to administer the team operations.

Student Executive Leadership

Strong student leadership is the foundation of the Power Hawks Team. Student Executive Leadership is comprised of four different roles as shown in figure 2.

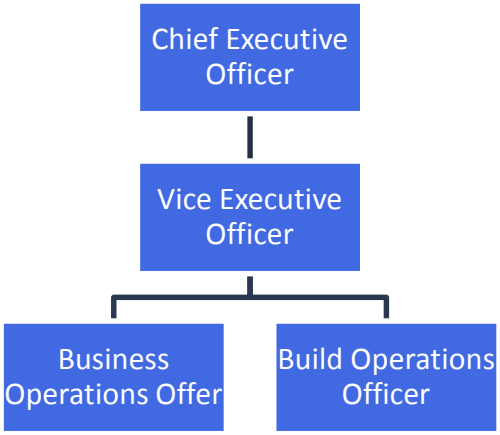


Figure 2: Student Executive Leadership Organization

Every year students are given the opportunity to apply for these leadership positions. The recipients of these positions are determined by the outgoing executive leadership with mentor input.

Executive Leadership is expected to complete, among others, the following tasks;

- Run team meetings
- Make decisions for and about the overall team
- Create and distribute team emails and newsletters
- Develop a foundation for establishing college and career opportunities
- Maintain and update the team calendar
- Delegate as needed within the team leadership.

Overall, the primary role of the Executive Leadership is to sustain The Power Hawks team and facilitate growth within the community. The Executive Leadership Team is expected to complete this role *FIRST* and foremost, as it pertains to the continued success of The Power Hawks Robotics Organization.

Outside of these general expectations, each leader has role specific tasks to complete, which are as follows:

Chief Executive Officer (CEO)

The FRC CEO is the leader of the entire Power Hawks organization. This person is responsible for maintaining a positive working environment for the total program and being a student liaison to the school system. They work to ensure the team is always moving in a forward direction and that the student leaders and adult mentors are helping to ensure every student is growing to their full potential. Further responsibilities include, but are not limited to:

- Oversee all operations of the organization
- Oversee all internal & public relations
- Report to school administration, parents, sponsors and business partners, and team members
- Maintain a safe and productive learning environment for all participants
- Help to recruit and train new teachers, mentors, and students
- Set and maintain the calendar and schedule
- Ensure all sub teams are completing objectives in a timely manner

Vice Executive Officer (VEO)

The FRC VEO assists the CEO with all tasks, filling in for the CEO when absent, and helping to maintain a healthy workload for both of them. The VEO carries out the CEO's plans, working side by side with students and mentors to help the team in their growth. Further responsibilities include, but are not limited to:

- Create and maintain all team organization data
- Create and maintain data on student progress
- Create and maintain data on team progress
- Track attendance at meetings

- Fill in for the CEO when necessary
- Fill in for team captains when necessary
- Assist sub teams when deadlines approach

Build Operations Officer (BOO)

The BOO oversees all aspects which involve the build side of The Power Hawks Robotics Team. Responsibilities include, but are not limited to:

- Plan build schedules
- Assist in developing a build budget
- Create and maintain robot bill of materials
- Create and maintain the team Gantt chart
- Ensure all safety rules are followed in team areas
- Expertise on all *FIRST* game manual
- Maintain a demo robot
- Ensure students maintain and properly use all tools

Business Operations Officer (BUOO)

The BUOO oversees all aspects which involve the business side of The Power Hawks Robotics Team. Responsibilities include, but are not limited to:

- Develop and maintain an annual and five year business plan
- Assist in developing a business budget
- Assist in developing approved fundraising campaigns
- Maintain all identity and media standards
- Enforce identity standards with all media that the public will see
- Ensure all social media and internet presences are maintained and appropriate
- Maintain weekly progress on business team's organizational Gantt chart

Student General Leadership

Under the 4 roles listed above, there are single person leadership positions that are responsible for overseeing the wellbeing and success of each sub team. The hierarchy of these roles is shown in figure 3.

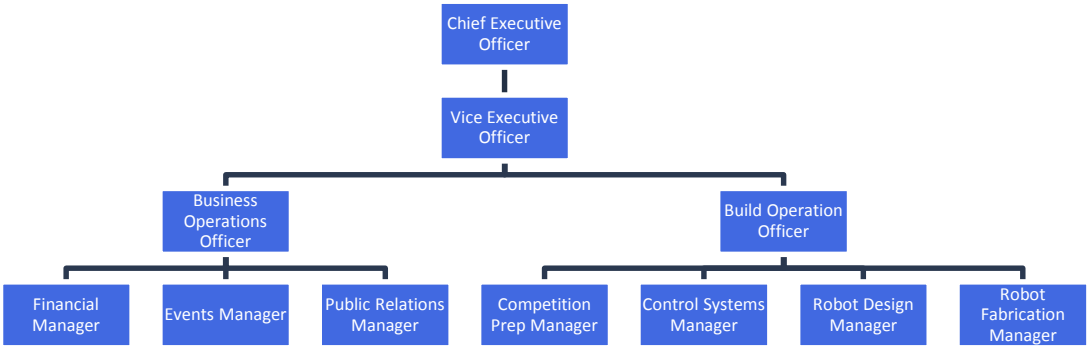


Figure 3: Student Leadership Organization

In general, each of these roles is fulfilled by students who have shown particular potential in the previous season, but they may be filled when a new student shows specific qualities during the application process. Each position is filled with one student only, with an assistant assigned at the request of the student in the position and with the agreement of the Executive Leadership Team. Each student on the Student Leadership Team is expected to aid the Executive Leadership Team's primary role of continuing the success of The Power Hawks Robotics. While this is their primary role, each position also has more specific roles as detailed below. (Please note, this is by no means an exhaustive list and more may be expected of each position.)

Financial Manager

The financial manager is responsible for all financial procurement to support The Power Hawks and tracks spending for the program. Responsibilities include, but are not limited to:

- Maintain and communicate the team budget
- Liaison with Power Hawks Robotics Club, Inc. treasurer
- Liaison with South River High School financial secretary
- Maintain contact with new and existing sponsors
- Coordinate the procurement of new sponsors
- Invite sponsors to team events
- Plan and coordinate fundraising events

Events Manager

The events manager is responsible for planning and coordinating all events that The Power Hawks participate. Responsibilities include, but are not limited to:

- Plan and coordinate community service events
- Connect with sponsors for demonstrations
- Organize volunteers and paperwork for specific events
- Coordinate design and ordering of spirit wear
- Liaison with school yearbook
- Organize team-building activities
- Coordinate all travel arrangements for field trips and competitions

Public Relations Manager

The public relations manager is responsible for all media that represents the team to the public. This includes print and web materials, photography, video, and social media. Responsibilities include, but are not limited to:

- Organize and complete all award submissions
- Create videos for team events
- Document all team activates through photography
- Release appropriate photos to the public
- Document all team activities through videography
- Release appropriate videos to the public
- Ensure identity standards are held by all persons
- Maintain existing graphics
- Create new graphics as necessary

Competition Prep Manager

The competition manager is responsible for all of the tasks that happen during a competition. Responsibilities include, but are not limited to:

- Coordinate drive team
- Complete all prerequisites for scouting
- Organize scouting at events
- Manage back of house pit
- Manage front of house pit
- Coordinate judging speakers
- Coordinate award presentations
- Organize photography during events
- Organize videography during events
- Manage stands and spirit
- Collect data for drive team
- Coordinate battery charging
- Ensure pit and drive team are hydrated and fed

Robot Fabrication Manager

The robot fabrication manager is responsible for the manufacturing and implementation of the robot subsystems. Responsibilities include, but are not limited to:

- Coordinate designing and building of drivetrain
- Coordinate building of bumpers
- Coordinate building of robot mechanisms
- Coordinate building of mock field components
- Maintain and upgrade demo robot
- Maintain and upgrade practice robot
- Keep all storage rooms clean and organized
- Keep inventory of all parts and tools

Robot Design Manager

The robot design manager is responsible for the design and testing of the robot. Responsibilities include, but are not limited to:

- Coordinate robot design with team
- Implement design of robot
- Manage 3D printing systems
- Manage CAD of robot
- Digitally design and test robot
- Design robot components and upgrades
- Render robot and release to public in conjunction with public relations subteam
- Maintain Power Hawks design standards

Controls Systems Manager

The controls system manager is responsible for the design and implementation of all programing and electrical components on the robot. Responsibilities include, but are not limited to:

- Coordinate design of control system
- Plan and integrate sensor systems
- Coordinate programming of robot
- Coordinate and manage wiring and integration of electrical systems
- Coordinate user input systems
- Coordinate management of battery systems

STRATEGY AND IMPLEMENTATION

FIRST Robotics Awareness Plan

Student Recruitment

The Power Hawks offer two levels of *FIRST* to high school students - FRC Team 1111 and FTC teams 3583, 3796, and 5178. The goal of The Power Hawks Organization is to have a network of students devoted to learning STEM and entrepreneurial skills.

Pool of Recruits

Specific team recruitment begins at sixth grade and continues through twelfth grade. These efforts are aimed at South River High School students and its feeder middle schools. The team also makes additional efforts to reach out to students throughout Anne Arundel County.

Specific Target Groups

- Incoming freshman: Flyers and other communication are placed around the feeder middle schools to spark interest to get involved with *FIRST* through The Power Hawks Organization starting with FTC.
- Project Lead The Way (PLTW): The Head Mentor is significantly affiliated with the PLTW program at South River, and directly interacts with students who have demonstrated interest and potential in engineering fields
- STEM magnet program: The robotics program is heavily advertised to the STEM magnet program students as an avenue to further their interest in STEM careers.

Current Efforts to Recruit

- Indirect:
    - PLTW events- Target incoming freshman and spread engineering ideals similar to those of *FIRST* and The Power Hawks
    - STEM events- Target incoming 7th graders and freshman to spread science, technology, engineering and math ideals similar to those of *FIRST* and The Power Hawks
- Direct:
    - Demos- Demonstrations of current and past achievements of the team, usually involving interactive activities with competition robots
        - STEM events personally attended by representatives of The Power Hawks
        - Community events, including FLL South County Showdown
        - School Club Showcase
        - Jurassic World Midnight Premiere
    - FTC apprenticeship- A select number of FTC students who have shown great interest in moving up to FRC are given a specific FRC team member to shadow
    - Announcements and flyers advertising the team and team sponsored events

Plans for Growth

- Use of assemblies, tutoring, and newsletters in middle schools to increase awareness and interest for the Power Hawk sponsored teams
- Establishing interactive workshops and Jr. FLL teams, supported and mentored by The Power Hawks, at local Elementary schools

Application process

After showing initial interest in one the various teams within The Power Hawks Organization, students are given the opportunity to enter The Power Hawks' application process.

Jr. FLL (K-3)

All interested students attend an information night, where they are sorted into teams of 4-6 students.

FLL (4-8)

All interested students attend an application night. After submitting a written application for the team, they participate in a variety of activities to determine their ability to follow the principles of *FIRST* and their creative ability.

FTC (7-12)

All interested students attend an application night. After submitting a written application for the team, they participate in a variety of activities to determine their ability to follow the principles of *FIRST* and their creative ability. FRC executive leadership and the head mentor assist the FTC head mentor in selecting students for the FTC program. These students are later split into three teams by the FTC head mentor in accordance with any preferences mentioned on their application.

FRC (9-12)

Interested students attend an application night. After submitting a written application for the team, the applicants participate in a variety of activities to determine their ability to follow the principles of *FIRST* and their creative ability. Returning members and mentors take notes on applicant performance during these activities. Team executive leadership and the head mentor then use these notes to make the final decisions about who is accepted onto the team.

Mentors

Mentor Recruitment

The Power Hawks recruit two types of mentors: professional and parental. Parent mentors are typically obtained through parent nights, where the CEO and Head Mentor keep parents up to date on all of the things their children do on the team, and all that the team does for their children. Professional mentors are reached through community events such as demos and fundraisers, or are provided by the team's sponsors. After they have spent a season with The

Power Hawks, professional mentors often enjoy the experience so much that they return for additional seasons.

Mentor Retention

Mentor retention is crucial to having a successful team long after the students have graduated. Some of our mentors fall into both categories, parental and professional. They begin mentoring with the team while their student is a member but then stay with team in a professional capacity. They often work in STEM fields and view their mentorship as an investment in the team and the future of those fields. Parental mentors are generally on the team as long as their children are participating, however there are exceptions. Professional mentors often work in STEM related fields and view their mentoring as an investment in the team and towards the students' future goals, so they generally stay longer than four years as a mentor.

Student Skills

Through The Power Hawks Organization's mentorship and team values, team members learn a variety of skills that can be applied later in life. By being a part of The Power Hawks' projects, competitions, and community service, members are able to show real world work experience when applying for colleges, internships, and scholarships.

Technical Skills- The Build Operation

A crucial aspect of the six week build season is the knowledge of how to properly use tools and practice shop safety. These skills are developed in all interested team members prior to build season. Over the summer, the team offers weekly training sessions to help members develop these technical skills through fun and educational projects.

During the build season, analytical and design skills are developed by team members. The *FIRST* week of build is devoted to strategy and design. Preliminary designs are created and refined through hand sketches, CAD models, and mentor input. Final designs are determined by a panel of student leaders and mentors.

Troubleshooting and problem solving go hand in hand throughout the final building process. Students utilize mentors' experience in combination with their own innovative ideas to find solutions to the various problems that occur during the transition from concept to reality.

Throughout the season build leaders set specific goals, along with time constraints, on the team's Gantt chart. This chart is continuously updated and posted so every team member is aware of their responsibilities and is held accountable for adhering to it. This teaches the students project management, time management, and planning skills.

Entrepreneurial Skills-The Business Operation

The objective of the business operation is to maintain the administrative operations of the team. It gives all the members of the business operation experience in important fields, such as financial and time management, organizational skills, and cooperation within a team.

All leaders develop financial management skills through the creation of annual budgets for their sub teams. These budgets must be approved prior to build season by the nonprofit's Board of Directors, which can modify budgets as they see fit. The Financial Manager creates weekly budget reports that aid leaders in complying with their budgets.

All business leaders are required to set time specific goals throughout the year which are included on the team Gantt chart. This chart is always posted in its most up to date form, so that every team member is responsible for fulfilling these goals. This teaches the students project management, time management, and planning skills.

Team members develop organizational skills by documenting daily activities and keeping a log of events. All team members create documents that are stored and shared both physically and virtually for future use and reference.

Cooperation is encouraged in all aspects of the team. The organizational structure of the team is designed to maximize collaboration to complete all tasks. This collaboration both between and within sub teams develops expertise in a variety of fields that potential employers would find desirable.

Life Skills

Motivation, focus, determination, and persistence become natural characteristics of students involved in The Power Hawks Organization. Communication skills, responsibility, and leadership are instilled in every member. Students benefit from the time and energy they invest in their work by gaining skills which are applicable in higher education and career paths.

FRC Team 1111 Expectations

Student Expectations

Students are expected to engage in the team matters and have a positive attitude. New members are not expected to have any previous experience in robotics, *FIRST*, or business affairs, as the true value of the team the willingness of students and mentors to teach each other. Students are expected to attend meetings regularly and on time, to be an active member of the team, and to maintain a GPA of 2.5 or higher. In all events -outreach, team building, or competitions, students are expected to uphold the values of *FIRST*, the team, and their school.

Mentor Expectations

Mentors are expected to serve as teachers and guides. They are also expected to reciprocate the respect paid to them by the students. Mentors are not expected to make decisions about or build the robot, but rather to guide the students through the engineering process. They are expected to impart not only their knowledge, but their experience to the students, and influence the students to pursue STEM or business fields.

PRODUCTS AND SERVICES

Products

Robots

The Power Hawks design and build a FRC competition robot following the current year's game objective and design constraints.

FRC Team Robot

2015 Game 'Recycle Rush'

Tower Hawk, The Power Hawks' competition bot for the RECYCLE RUSH[SM] challenge for 2015. Its main objective is to stack totes and recycling containers, with additional points awarded for proper disposal of litter. Utilizing hooks, winches, pulleys, and pneumatic springs, Tower Hawk has been engineered to place totes on scoring platforms. This season The Power Hawks have built two robots, one testing/practice bot and a competition bot that trails the practice one by approximately three days.

2014 Game 'Ultimate Ascent'

Merlin was created for the AERIAL ASSIST[SM] challenge in 2014. His main objective was to launch exercise balls over a truss with a built-in pneumatic catapult while also having the capability to catch launched balls. Merlin's speed and maneuverability are what allowed him to be a very effective team player and to rise above other robots in the 2014 competition. Merlin won 12 straight games at our *FIRST* regional.

2013 Game 'Rebound Rumble'

Havik was made for REBOUND RUMBLE[SM] in 2012. The game task was to pick up foam basketballs and launch them into basketball hoops at three different heights. There were also three seesaws located in the middle of the field that a robot could balance on for additional points. Havik's six wheel drive-train allowed him to make tighter turns and had a gearbox that could switch from high to low gears. Havik is now the team's demo bot, showcasing *FIRST*, and rocking a new paint job.

Award Entries

- ***Chairman's Award-*** A select group of Power Hawks members work on the team video, while another works on the presentation, and a final group works on the essay and mini-essays. These groups are held together by a few common members that ensure all elements of the award submission work together cohesively.
- ***Woodie Flowers Award-*** All team members vote on the mentor they feel is the most dedicated to the team, while a small group of students write the award itself to ensure it remains secret from the mentors.
- ***Dean's List Award-*** Mentors collectively choose two students on the team that they believe deserve recognition for their exceptional performance. The award is then written by the Head Mentor with input from all other mentors.
- ***Entrepreneurship Award-*** The Business Operations Officer writes the executive summary, chooses photos, and updates the official team business plan.

Service

FRC Team

FRC Team 1111 continues to thrive with roughly 40 members. The build portion of this team focuses on the design and production of the FRC robot. The business portion of the team focuses on award submissions and how the team interacts with the community. The organizational structure of the FRC team is intended to give students a taste of both the professional engineering and business administration worlds.

FTC Teams

The Power Hawks Organization has grown to include three FTC teams (The Power Hawks 3583, The Talons 3796, Mech Hawks 5178) who are mentored by members of FRC. Each team consists of ten members that design and construct a FTC robot. These teams work from September to January, and compete in up to two qualifying competitions.

Community Efforts

Robotics Oriented Outreach

The main focus of The Power Hawks' outreach program is elementary and middle school students. The team sponsors and mentors several FLL and Jr. FLL teams at local middle and elementary schools. Additionally, The Power Hawks organize and run an annual FLL Regional Qualifier and Jr. FLL Expo, The South County Showdown, which hosts 20-24 FLL and 4-10 Jr. FLL teams.

The Power Hawks' outreach program is not limited to elementary and middle school students. The team also assisted Archbishop Spalding High School in creating their own FRC team, the

CAVS Team 4541. The Power Hawks sent students and mentors to help the CAVS in their rookie year.

Community Service

The team has established The Power Hawks Academic Tutoring Program at a local middle school. The program is devoted to mentoring and tutoring at-risk students. The Power Hawks are taking measures to expand the program to other middle schools within the South River High School feeder system and SRHS itself.

The Power Hawks have also participated in several charity drives, such as:

- Soles for Souls- donating more than 100 pairs of shoes to this program which donates new or gently used shoes to people in need who don't have access to such necessities
- Legos for Literacy- collecting gently used Legos for a tactile learning program to help students who don't learn in the same way or at the same speed as their classmates
- Backpack Buddies- holding a food drive which resulted in more than 350 pounds of food for a program that supplies food to students over the weekend who primarily rely on school based lunch programs for their meals.
- School supply drive- organized by the Power Hawks at their annual FLL Qualifier and Jr. FLL Expo to collect and donate school supplies to local schools.
- Board game drive for local elementary school's PBIS (Positive Behavioral Interventions and Supports) program

Alumni

The Power Hawks alumni are one of the most valuable resources to the team. Their years of interacting with *FIRST* and The Power Hawks Organization have not only taught the students engineering and science principles, but leadership, cooperation, humility, and respect for diversity, amongst other life lessons. Power Hawks alumni believe in giving back to the organization that gave them so much, and regularly return to Power Hawks' events offering advice and guidance. Graduating Power Hawks account for approximately 10% of all SRHS scholarships even though they are only 2% of the graduating population. Almost 100% of the graduate members attend a four-year university; 65% of those pursue STEM-related degrees, 20% pursue business-related fields, and 15% pursue dual fields. The team is proud to be a part of their educational and social development.

FINANCIALS

Financial Overview

The Power Hawks Robotics Club, Inc. manages the finances of Team 1111 and the teams they sponsor. The Board of Directors determine where and how this funding is spent. The treasurer of the Club and The Power Hawks Organization's Team Financial Manager approve small expenses, track budgets, and record incoming and outgoing funds.

Funding

Sponsorship Process

Planning

The financial manager develops a list of potential sponsors, of large and small corporations located around Anne Arundel County. The team then does a series of cold calls, where students call businesses before sending sponsorship packets.

Create Sponsorship Packets

A team of students and mentors draft and create the sponsorship packet, which is sent to promising potential sponsors from the list of potential sponsors. This packet provides information about sponsorship levels, benefits, the team, and contact information.

Send Sponsorship Packets

Packages and envelopes are then provided to the Financial Manager, who is responsible for sending the packets to the selected businesses. The Financial Manager is the point of contact (POC) between the businesses and the team.

Follow Up

The Financial Manager sends a follow letter and makes a phone call to the designated businesses two weeks after the packages are sent. This follow up is to gage businesses interest in supporting the team and to answer any questions they may have.

Offer Demonstrations

The Power Hawks offer to hold demonstrations for any interested businesses, whether they be private demos for management and employees or at company events. The purpose of these demos is to build a stronger partnership with businesses that support the team and persuade those professionals to take on greater roles in the *FIRST* program.

Thank You Letters

Since The Power Hawks operate under the nonprofit club, two sets of thank you letters are sent to sponsors: the tax deductible notification and official club documentation, and a personal team letter of appreciation. In these letters, sponsors are invited to attend various events held by the team, which include community demos, Kick-off, Robot Send-off, and competitions.

Fundraisers

Members of the team are encouraged to participate in at least one fundraiser. These events include, but are not limited to: valentine flower sales, raffles, car washes, flocking, and blanket sales.

Results

NASA House Team

With the aid of one of the team's mentors, who was connected with the NASA Robotics Alliance, the team became a NASA House team. In return for $10,000 of sponsorship money and use of the NASA machine shop and other materials, the team gives NASA all video recordings from two GoPro cameras. The cameras are placed around the shop and on the robot to gather footage for a NASA promo video. This makes the team one of three NASA teams in the region.

NSA Grant

The team reapplies annually for the $10,000 grant that provides funding for community outreach projects and sponsorship of other *FIRST t*eams.

Prosperity Fund

All of the funding that is not spent in a team year is put into the Prosperity Fund of The Power Hawks Robotics Club, Inc. The team aims to save two years' worth of operating expenses over the next five years.

Spending

Budget Development

Subteams submit individual budgets to the Board of Directors for approval.

2014-2015 FRC Budgets

Build Sub teams	
Fabrication	$4296.48
Competition Prep	$1132.60
Design	$250.00
Controls	$3423.45
Subtotal	$9,102.53
Business Sub teams	
Events	$235.94
Public Relations	$2052.92
Finance	$100.00
Subtotal	$2388.86
Total	$11491.39

Table 1: List of 2015 Subteam Budgets

Financial Risk Management Plans

Risk Identification		Risk Assessment		Risk Management	
List of Possible Risks	**Impact of Risk**	**Likelihood H/M/L**	**Impact H/M/L**	**Steps Already in Place**	**Person(s) Responsible**
Student injury on equipment	Serious injuries can lead to the loss of the school facility	M	H	Proper safety measures are taught and enforced at all times	Entire team, all mentors, Board of Directors
Loss of major sponsor(s)	Inability to continue functioning as a *FIRST* team	M	H	Sponsorship packets are sent annually to targeted and previous sponsors	Financial Manager, Board of Directors
Loss of board member(s)	Creates a vacancy or vacancies within the Board of Directors	M	H	Active recruitment with parents and the community	Board of Directors
Loss of teacher sponsor	The team would lose its ability to use school facilities	H	H	Recruitment of multiple teacher sponsors and maintaining a close relationship with all school faculty	Head Mentor, Board of Directors, current teacher sponsors
Loss of school facilities	The team loses a meeting location and use of school facilities	L	H	Continued relationship with administration and school to ensure that there is support for team activities	Head mentor, entire team, Board of Directors

Table 2: Financial Risk Management Plans

TERMS OF REFERENCE

Board of Directors (BOD) - Arm of management in The Power Hawks Robotics Club, Inc.
FIRST - For Inspiration and Recognition of Science and Technology, the organization coordinates with robotics teams worldwide to provide students with annual challenges, opportunities, and finances to students.
FFL - FIRST Lego League is the *FIRST* program offered to both elementary and middle school age students.
FRC - FIRST Robotics Challenge is the *FIRST* program offered only to high school age students and the final *FIRST* program offered to students.
FTC - FIRST Tech Challenge is the *FIRST* program offered to both middle and high school age students.
Jr. FFL - Junior *FIRST* Lego League is the *FIRST* program offered to only elementary students, and serves as an introduction to *FIRST* values and cooperition.
Positive Behavioral Interventions and Supports (PBIS) - program focused on reducing disciplinary incidents and increase a sense of safety in schools nationwide in order to better the academic output.
Power Hawks Organization - A student run organization developing and delivering all educational-based programs The Power Hawks Robotics Club, Inc. sponsor.
Power Hawks Robotics Club, Inc. - Nonprofit organization that supports STEM endeavors in Anne Arundel County, Maryland.
Power Hawks Robotics Team - Co-curricular program at South River High School that encompasses FRC Team 1111 and all its students.
Project Lead The Way (PLTW) - A national program that partners with STEM to teach the ideals of engineering and science to students interested in the fields.
Science, Technology, Engineering, and Mathematics (STEM) -A national program that teaches students professional and technical skills in a curriculum that integrates all classes into cumulative programs.
South River High School (SRHS) - Refers to the school The Power Hawks use for meetings and fabrication.
The Club - Refers to The Power Hawks Robotics Club, Inc.
The Team - Refers to FRC Team 1111.

2015 Business Plan Executive Summary

Team Mission Statement

Please briefly indicate what you believe to be the "driving engine" of your team. Your mission should be clear and concise. It should represent to any reader exactly what your business plan strives to accomplish.

The Power Hawks Robotics Team lives by their mission of equipping the next generation with the necessary skills to improve the world through competitive robotics. Every decision made comes back to their mission statement, which work hand in hand toward making Maryland a state of forward thinking, global citizens.

On the FRC® team, this means both building a competitive robot while teaching valuable engineering skills and improving our image while teaching entrepreneurship skills. In our outreach, Power Hawks embody the theme: "inspiring the next generation through STEM education", and allocate resources toward exciting students in the area with FIRST® robotics.

Team Origin

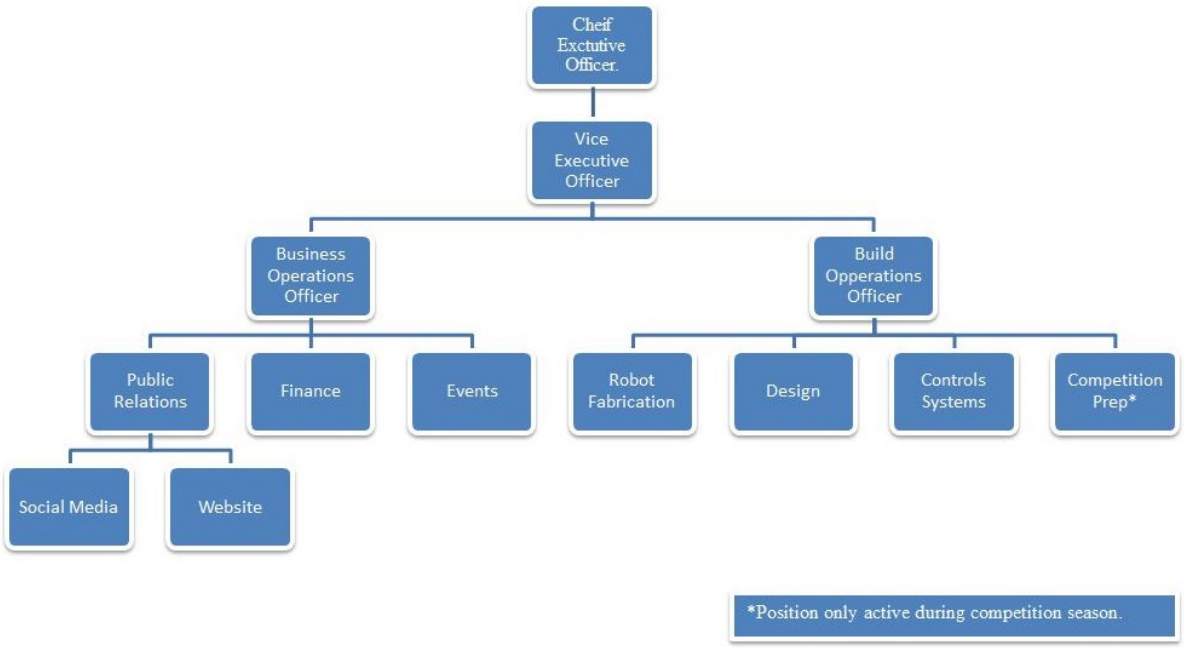
Please provide the date that your team formed, the location of your team, the current number of team members (highlighting any growth over past years) and describe the challenges the team had to overcome in order to participate in FIRST events.

The Power Hawks Robotics Team was founded in 2003 by John Jacobson and eight South River High School students. The team has grown to 40 FRC students and 30 FTC® students for the 2014-2015 season. The Power Hawks also support and mentor four FLL® and four Jr. FLL® teams, two of which were founded this year. In order to assist such a large number of students, The Power Hawks have set up a nonprofit organization to manage finances.

One of the biggest issues the team faces is financing all travel expenses for 40 students and 15 chaperones venturing to out of state competitions. To overcome this challenge, The Power Hawks have split the cost of the trip between the nonprofit, the financial branch of The Power Hawks umbrella organization, and the individual students. The nonprofit pays for half of the trip through team fundraising and sponsorship. To ensure that all team members have the opportunity to attend competitions The Power Hawks provide financial aid for students who are unable to afford the trip. Ensuring that 40 students and 15 chaperones are always engaged and involved at all parts of competition is a challenge at times. By having team members sign up for various jobs during the competition, there is no question on who plays what roles throughout the event. We keep students busy with jobs ranging from pit crew and drive team to scouting and spirit in the stands. We even have students sign up to "flock" various pits around the competition.

Organizational Structure

Please detail how the team is structured to 1) Raise funds; 2) Ensure funds are properly spent; 3) Find and engage sponsors; 4) Recruit team members/mentors for current & future seasons; 5) Ensure FIRST principles remain core to the team's efforts.



The Power Hawks are a student led team. The Power Hawks' funds go through their nonprofit organization The Power Hawks Robotics Club, Inc. The team Financial Officer works closely with the financial secretary of the nonprofit to monitor expenses, fundraising, and sponsorship. The seven sub teams create budgets prior to build season which are approved by the Board of Directors from the nonprofit. The Financial Officer creates weekly budget reports for each sub team leader to compare their actual spending to the budget.

Fundraising is vital to The Power Hawks' success, allowing room to expand resources, develop the team, and to branch out to other schools in the community. Since The Power Hawks formed, they have spread the message of FIRST by starting 20 Jr. FLL teams, 30 FLL teams, 3 FTC teams, and are actively starting three FRC teams. The Finance sub team contacts 125+ companies annually to build relationships that ensure the team can gather the resources needed to be successful.

The Power Hawks set a precedent for student growth for FIRST. The 3 FTC teams that The Power Hawks mentor are a major source of new FRC membership. The Power Hawks actively promote the team to their peers and teachers to gain school support, new members, and mentors. The Power Hawks' recruitment opportunities include utilizing the strong bond with their host school, which houses a STEM magnet and a Project Lead The Way program. South River High School provides the facilities and the venue to recruit quality candidates for the team.

Relationships

Please detail team efforts to specifically engage, inspire, educate and retain 1) Team members; 2) Mentors; 3) Sponsors/Community.

The Power Hawks maintain a constant flow of members from year to year by encouraging them to move through FIRST's programs. By sharing facilities with the FTC teams, the two groups regularly interact and FTC students interested in moving to FRC can easily see how The Power Hawks function as a team.

In addition to bringing in new members, The Power Hawks maintain many of the same members from year to year. Alumni frequently return to mentor during their spring and winter breaks and stay involved with the team. Their desire to return to the team is partially due to the frequent team building events held by the team each year. These allow team members to build strong bonds of friendship, making The Power Hawks not only a team, but a family.

The Power Hawks have two types of mentors: parental and professional. Parent mentors are typically obtained through parent nights, where the CEO and head mentor keep parents up to date on all of the things their children do on the team, and all that the team does for their children. Professional mentors are reached through community events such as demos and fundraisers, or are provided by the team's sponsors. After they have spent a season with the Power Hawks, professional mentors often enjoy the experience so much that they return for additional seasons. Additionally, the team offers to hold demonstrations at sponsor's businesses to engage the community and encourage further participation with the Power Hawks.

Deployment of Resources

Please detail how the resources of your team (Financial or otherwise) have been deployed to 1) Engage the community to spread the message of FIRST; 2) Inspire others to get involved so that FIRST continues to grow; 3) Ensure all team members get the most out of their FIRST experience.

After twelve seasons, The Power Hawks have accumulated a great deal of financial and material resources. The team has allocated upwards of $4,000 on demos and creating community outreach events this year alone. Among these community outreach events is The Power Hawks summer camp, which has been expanded from its inaugural year to include two week-long sessions, spreading a love of STEM education and FIRST ideals to a larger number of middle school students. Also funded is the Power Hawks' new Soaring Engineers program, a modular outreach program for schools and community centers to expose students to STEM principles and excite them about robotics.

The majority of The Power Hawks' resources are spent supporting the FIRST teams under The Power Hawks umbrella organization. In addition to supporting their three FTC, four FLL, and four Jr. FLL teams financially, The Power Hawks also donate materials, student mentors, and equipment to these teams.

All Power Hawks members are given the opportunity to be involved in the community, connect with future employers, participate in summer training sessions, apply for scholarships

and work toward leadership positions. In order to attend FRC competitions, Power Hawks are required to complete a minimum number of community service hours, which ensures that they get more out of FIRST than simply attending meetings. Each student receives guidance from adult mentors and peer leaders to excel in their personal roles on the team. Mentors provide partnerships between the working world and students to forge tools our members can use later in life.

Future Plans

Please indicate specific plans the team has for the next 3 years in regards to sponsorship, team and community outreach (including helping FIRST grow) and detail how you expect to be able to accomplish these goals.

The Power Hawks plan to increase their efforts to promote FIRST and STEM education to middle and elementary school students. Over the next three years, this will be done in coordination with local schools. By creating newsletters and multimedia content, The Power Hawks promote FIRST ideals in school. This past year The Power Hawks held a robotics summer camp for middle school students. The team is expanding from a single one week session to two one week sessions this upcoming summer while intending to expand each year. The Power Hawks also tutor at a local middle school, reaching hundreds of at risk students for over 2,000 hours annually. Team members help those students with homework and test preparation, while giving them a positive role model who exposes them to the world of competitive robotics. The team plans to expand the reach of this program by contacting other middle schools.

The main focus of The Power Hawks outreach plans are elementary school students. The team targets this age group through the four Jr. FLL teams supported by The Power Hawks and through various outreach programs. One such outreach program is the team's new Soaring Engineers initiative, which is set to be implemented in mid-to-late 2015. Its goal is to teach elementary age students the basics of robotics and engineering through a fun, themed robotics competition designed by The Power Hawks' students. This program is geared to inspire every student to pursue an interest in STEM, helping our community, school system, and team in the long run.

Financial Statement

Please include information on team finances (include financial statement detailing income and expenditures). Uploading an image of your team financial plan below, will also satisfy this requirement.

The Power Hawks generate funds through fundraising and sponsorship, generating approximately $10,000 and $55,000, respectively. The team has over 50 sponsors, most of which are locally owned and operated businesses. Other major contributors include the National Security Agency, NASA Goddard, Anne Arundel County Public Schools, Rockwell Collins, and Booz Allen Hamilton.

Each year, sub team captains create new budgets based on the previous year's expense reports. These must be approved by student executive leadership and the nonprofit Board of Directors. This year, the business portion of The Power Hawks budgeted just under $2,400 in expenses. The build portion budgeted about $8,000 for build season and just over $1,000 for competition season. Sub team captains are kept up to date with how well they have maintained their budget via weekly reports created by the Financial Officer. These reports show the leaders how much money they have currently spent on and off budget, the differences between actual and estimated prices of items purchased, which budgeted items have yet to be purchased, and how much money is remaining. Additionally, The Power Hawks spend a minimum of $12,000 on competition attendance and trip expenditures every year, which is partially funded by students and the rest is funded by the non-profit club and fundraising.

Risk Analysis

Please describe the team's risk mitigation plan. Present a SWOT (Strengths, Weaknesses, Opportunities, and threats) analysis or narrative that describes the team plan to identify and respond to sustainability threats.

The Power Hawks maintains an extensive risk management plan to help identify, assess, and manage any situation that may arise. This includes such risks as losing sponsors, loss of facilities, injuries, and damages to equipment. The Power Hawks have worked closely with South River High School and The Power Hawks Robotics Club, Inc. to ensure all possible risks are properly analyzed and procedures are put in place to mitigate those risks.

The Power Hawks have also implemented a SWOT analysis to identify and respond to potential threats before they arise.

Strengths:

- School support
- Mentor base
- Low capital costs
- Established team goals
- Strong community support
- Alumni return interest (support & volunteerism)

Weaknesses:

- Graduating seniors can mean loss of experience
- Large amount of time spent training each year
- Large group of students to keep on track

Opportunities:

- Expand outreach with summer camp
- More community service focused around team goals
- Growth within South River High School to include more diverse abilities & interests
- Expansion of tutoring to other middle schools

- Summer training workshops
- Potential influx of engineer oriented STEM students, many of whom will be able to expand both The Power Hawks and FIRST Robotics' beyond its perceived potential

Threats:

- Student injury on equipment
- Loss of sponsors
- Loss of board members
- Loss of teacher sponsor
- Loss of school facilities

Other Considerations

Briefly describe other matters of interest to the FIRST judges, if any.

The Power Hawks have extensive experience in public relations, which develops business skills through creation of multimedia content. The public relations sub team uses multiple mediums including website, Facebook, Twitter, and YouTube to reach out to its audience. These mediums help students gain various skills from content writing, to graphics creation. The Power Hawks create goals to continuously improve, update, and provide consistent content to their growing audience of over 57,000 people.

2015 Dean's List—Eleanor Wood

The Power Hawks Robotics Team operates as though they are a major corporation. There are student workers, mid-level managers, and then there's Eleanor Wood, our CEO. Eleanor, or Ellie, a junior at South River High School enrolled in the STEM Magnet program for nanotechnology, is focused, driven, and compassionate. She strives to create an environment that pushes the Power Hawks forward while ensuring that all team members feel valued and important. Through her leadership qualities, Ellie spreads the word of FIRST through our community and beyond.

Ellie strives to grow the Power Hawks, focusing on student development and collaboration. She works hard to ensure every member of the team grows to their full potential, tailoring each part of the program to the students it represents. Ellie defines what it means to be a quality leader. She listens as much as she leads, ensuring everyone understands why the team is doing what it is doing. She delegates efficiently and fairly, ensuring each student leader and mentor is working hard to better the students they work with. Ellie works hard to ensure the students have fun while learning, understanding that the best education comes as students enjoy themselves and feel comfortable. Additionally, at events or competitions Ellie makes sure the team reaches out to all teams at the event, making sure to put working together well before winning on the field.

In addition to promoting coopertition and gracious professionalism both in our team and where we go, Ellie has taken great strides to push the Power Hawks out into the community. Ellie leads the team in finding new and innovative ways to reach out to our community. She pioneered the team's collaboration with Backpack Buddies to ensure young students don't go hungry on the weekend, she organized LEGOs for Literacy to help students engage in tactile

reading, and collected board games to help young students learn coopertition in fun and exciting ways. She also pushes the team to grow their outreach in STEM fields, more than doubling the number of STEM events we attend, including numerous STEM nights for middle and elementary school students to excite them about STEM principles. Ellie completely defines “its more than just a robot.” She realizes robotics is the best tool available to excite and educate our next generation, and is constantly striving to find new and exciting ways to help develop the next generation of community and world builders.

Ellie also works hard to spread the message of FIRST in Maryland and beyond.. She recognizes FIRST as the perfect vehicle to make our community and world a better place, and strives to start more FIRST programs in as many schools as possible. She is actively working to start FIRST LEGO League teams in Anne Arundel County’s special needs elementary and middle school, and at the county’s behavioral needs school, recognizing that all students, regardless of their ability, are able to develop the skills needed to succeed through FIRST. She is also helping to start a team at one of the county’s lowest performing high schools, in an effort to use robotics to improve the school community and performance. Ellie thinks big picture as well. She has played a pivotal role in developing a political push that a group of teams are planning on starting this spring in Maryland to gain recognition and support from the state. She has participated in planning meetings and discussions, worked on invitations for politicians, and has completed hours of research in how other states have gone about getting support so that we may learn from what they have done.

While Ellie has only been involved with FIRST for two years now, her passion and dedication is equal to many years of hard work. Her constant desire to help more students and make our community and world a better place knows no bounds, and she is a shining example of what it means to be a leader in FIRST and in society.

2015 Dean's List—Clay Newman

Clay Newman, a junior at South River High School enrolled in the STEM Magnet program focusing in engineering, embodies the FIRST qualities of Coopertition and Gracious Professionalism and the values of The Power Hawks Robotics in everything he does in his life. In the past two years with the Power Hawks Robotics, he has played a major role in our robot fabrication area of the team in an effort to further the team's mission and ideals while growing as an individual and a member of our community. Clay came into the Power Hawks in his sophomore year where he quickly proved to be an intelligent and promising young student. While quiet at first, Clay grew quickly into his position on the team, taking a leading role in fabrication the competition robot, rising to be the fabrication captain this year.While on the team Clay has shown his passion for both learning and teaching. From the very start, Clay could be found on a daily basis teaching younger or less experienced members various fabrication skills from designing parts to fabricating within tolerances. Often taking initiative to learn new topics, Clay clearly loves to tinker, teaching himself new content constantly, and then taking that content to the team to share the knowledge.

As the fabrication manager for the 2015 competition season, Clay has embodied what it means to be a good leader. While firm when he has to be, Clay can often be found listening to his teammates, learning from them just as much as he teaches. He realizes that he can't know anything, and has done a wonderful job at delegating tasks so that each and every student has an expertise and can grow to their full potential.

Clay has also used the Power Hawks both as a way to help in the community, and a way to come out of his shell while doing so. While typically quiet, He has used many of our community outreach events to branch out, learning to assertively engage with others while

spreading the ideals of FIRST and of the Power Hawks. He can often be found talking to a parent or child about what FIRST has done for him and his team members, and constantly encourages

students to engage in the many levels of FIRST robotics so that they may grow such as he has. He also played a pivotal role in our first year of running a Power Hawks summer camp for middle school students. He could be found actively engaging with the middle schoolers, showing how learning can be such a powerful and fun tool, and spreading STEM principles to excite them and inspire them to take an interest in engineering and technology. From a shy, quiet student just a year ago, Clay has grown leaps and bounds because of the Power Hawks, building the skills necessary to go out into society and help make our world a better place.

Clay is an incredible asset to the Power Hawks, not only because of his expertise that he brings, but because of the passion that he has developed in furthering our ideals. He epitomizes the ideals of Gracious Professionalism and of the Power Hawks 3 core ideals—respect, responsibility, and engagement. Clay has shown time and time again his passion for growth, and it will be truly amazing to see how he grows and works to help make the world a better place.

2015 Woodie Flowers Award—Zachary Cohen

Ask a Power Hawk student who motivates them, you're bound to hear the name Zac Cohen. Ask about their passion for FIRST, and his influence is mentioned. Witness Zac's enthusiasm, and it is clear that his inspiration drives Team 1111.

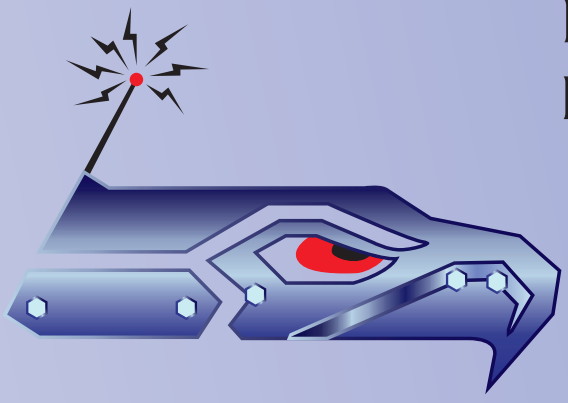
As a founding member of Team 1712 Dawgma, Zac's affiliation with FIRST spans 10 seasons. Zac uses that experience to lead the 70 students and 30 mentors of Team 1111. He inspires students to develop real-world communication skills through the use of Gantt charts, identity standards, and social media. Zac coordinates ongoing outreach events, from elementary STEM to Maryland FIRST, so students can share their passion for FIRST. Daniel Weber, a senior on the team, said, "I can't remember a time when I'd stop by and Mr. Cohen wasn't on his email or FIRST forums, searching for greater opportunities for students." Zac's reach extends beyond our team, actively pushing to start new teams including Team 4541, The Cavs, Rookie All Star Award recipients.

Additionally, Zac is an asset to the Baltimore Area Alliance (BAA), Anne Arundel County Public Schools (AACPS), and Maryland FIRST through his volunteer work. In the BAA, Zac is involved in planning off-season events and presenting workshops to FIRST teams. To increase the accessibility of FIRST and STEM, Zac wrote the robotics class curriculum for AACPS. Within Maryland FIRST, Zac contributes to the planning of the annual Chesapeake Regional and to FIRST's transition to district competitions. Additionally, he is leading a push for legislation to support FIRST within Maryland State government.

Students are inspired by Zac's drive for self-improvement. Zac was selected to attend the 2014 Air Force leadership training seminar in Colorado for FIRST mentors to hone leadership skills. He incorporates all he's learned to improve student problem-solving, communication, and teamwork. "The way he pushes us forward, and his curiosity, inspire me to persevere through problems. I now want to pursue a career path in Marine Engineering," said Brittany Pennell, a junior on the team.

Zac enthusiastically motivates students to follow their passions and goals using FIRST principles and STEM education. He lives by the idea of creating contributing members of society that continue their FIRST legacy. Delia Votsch, former FRC 1712 Championship Dean's List Recipient, has always been impressed with "his ability to bring out the best in people." Zac's leadership and vision drive the Power Hawks' aspirations to progress to become a top-tier FIRST team.

Past WFFA winner Rich Kressly noted, "Zac's boundless energy, his unwavering commitment to his students, his clear vision of the FIRST ideals, his tremendous communication skills, and the impact he is having in his community, region, and beyond show exactly how deserving of WFFA recognition he is." The Power Hawks concur, believing that Zac is a phenomenal mentor who epitomizes all aspects of this award.



Media and Technoloy Has Opened the Door to:

The Spread of FIRST Ideas

Explosive Viral Media

A growing audience of more than 1.7 billion

How are we using these new tools?

Audience

We reach our audience in a variety of ways, including our Website, Facebook, Twitter, and Youtube. We aim to inform and interest the next generation of engineers through all medians.

A Growing Follower Base

of **57,000**

People

Strategy

Simplicity

All of our media is short and to the point. We also make sure our media is paired with videos, or pictures for our visual audience.

Expansion

We are always looking for ways to expand our efforts, from new video series to interactive webpages.

Consistency

We have created and mantained our Identity Standards in order to represent our team consistently on all media.

Website

More Than 2,100 Unique Users

Our website is a fun, cohesive introduction to The Power Hawks Robotics Team and FIRST.

Website Statistics since Update

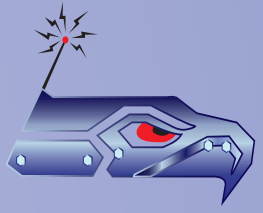
Since our website's update 3 months ago we have had over :

10,000 Pageviews

3,000 Sessions

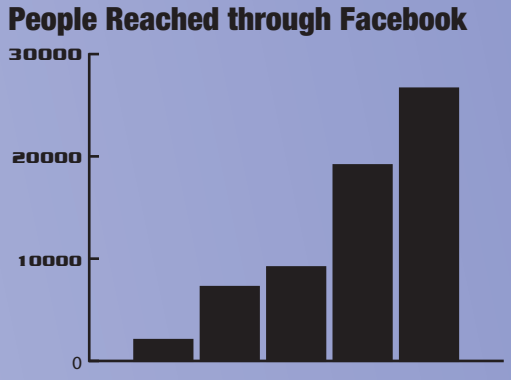
We have a Notebook that is a great way for our fans to keep up to date on what we have done each week.

The new Power Hawks website meets our Identity Standards as well as those of FIRST.



Facebook

Our Facebook is our most popular online platform. It has reached more then 64,700 people since its creation, and the amount of people it reaches each year is still growing, as shown to the right. This platform is one of the many places where we post photo collages, videos, shoutouts to sponsors, and team updates of our activities.



Twitter

@Powerhawks1111

Our Unique Twitter Handle that is our account identification when people look for us on Twiiter.

#FRC1111

Our Hashtag for the FIRST Community

#OMGRobots

Our Hashtag for the STEM Community

#Powerhawks

Our Hashtag for our unique content

YouTube

YoutTube has a diverse audience of 1 billion people

YouTube is where The Power Hawks Robotics Team plans to focus there media efforts next. We have a video series in development, that will allow for audience input, and will be educational. The plan is to spread our values, *FIRST* Values, and engage our target audience through exciting videos.

Looking Forward

Targeted Audience

We are focusing more on our selected target audience of kids from the Jr.FLL level to high school. This will help spread FIRST ideas in the country's youth.

Interactive

We plan to make our media more fun and interactive through user input and video. This will help engage our audience and spread FIRST values.

New Content

We are working on creating a balanced amount of interesting and meaningful content, such as a new youth focused web series. These web series will be released on website and YouTube in a way that will invite kids to FIRST and expand their FIRST knowledge.

Website: www.powerhawks.org
Youtube: www.youtube/user/TeamPowerHawks

SOUTH RIVER POWERHAWKS ROBOTICS

Twitter: www.twitter.com/Powerhawks1111
Facebook: www.facebook.com/PowerHawks

Power Hawks Robotics Team

Soaring Engineers

2015

SOUTH RIVER
POWERHAWKS
ROBOTICS

Team 1111

Abstract

Soaring Engineers is a program designed to inspire youth to pursue interests in FIRST and STEM. The program is designed to a portable curriculum that can be used almost anywhere for grade levels 2-8. The program is broken up into two possible curriculums. One is a more rigid 90 minute program designed for older kids. This curriculum is focused on the design process and allows the students to build their own attachments for a VEX IQ robot and compete in a tournament bracket. The second curriculum is a more fluid system of station that can be changed to allocate for varying numbers and age groups of students. In this document both plans are outlined and the instructions for each activity are provided.

Contents

Scripted Curriculum Plan

Presentation: 10 min

Group running Soaring Engineers sets up field while others present the Prezi.

Field Setup:

Set up Mini Medical Madness field during Prezi.

Prezi: 6 min

A short presentation introducing the Power Hawks and teaches the basics of robotics and the Mini Medical Madness Game.

Introduction: 3 min

Tell students about the itinerary for the day and remind them about safety habits.

Get them into groups: 2 min

Break them up into groups of four.

Robot Design Competition: 15 min

Students will utilize the robot creation handout to design a robot that they would like to build. Students are encouraged to use imagination.

Group deliberation/voting: 3 min

Groups will work together as a group to decide their favorite design.

One Presentation from each group: 5 min

Groups will present their favorite design.

Mini Medical Madness Game: 60 min

Explain Game: 2 min

Explain the rules of the game using the game rules sheet.

Team Organization: 5 min

Organize into 8 teams. Create team names.

Build & Competitions: 48 min (2 min each match)

Teams will create attachments to their robots in order to complete the tasks of the Mini Medical Madness game. Teams will compete in elimination tournament bracket.

Awards: 5 min

Winning team gets awarded(Candy or Small Toys)

Final Speech: 5 min

Reinforce message about FIRST and STEM, Encourage students to find or create their own robotics teams. Thank the class.

Flexible Curriculum Plan

Presentation: 10 min

Group running Soaring Engineers sets up field while others present the Prezi.

Stations: Flexible

Stations are 6 min each. Each group of students will visit each station once with the exception of Mini Medical Madness, in which students will spend two turns in. Choose between stations per event length.

Meet The Power Hawks:

A brief presentation where team members explain their experiences on the team and about our demo FRC bot Havik and an FTC bot.

Robot Design Station:

Students will utilize the robot creation handout to design a robot that they would like to build. Students are encouraged to use imagination.

Team Work Handout:

Students will complete handout on teamwork and be encouraged to discuss what makes a good team and tell about examples of teams they have been on in the past.

Team Work Activity:

Students will work as a team to construct a ramp for a VEX IQ robot to drive up using various materials including: pipe cleaners, popsicle sticks, masking tape, and construction paper.

Mini Medical Madness :

Students will spend two turns here. Run two 3 minute games following the Mini Medical Madness game rules.

Word Search/Crossword/Coloring Pages:

Students will use the crosswords and word search handouts.

Final Speech: 5 min

Reinforce message about FIRST and STEM, Encourage students to find or create their own robotics teams. Thank the class.

Mini Medical Madness

Field Set Up

The game is played in an 4'x4' square PVC frame. Two goals are placed in the center of the top and bottom of the field and secured with T-brackets. 18"x18" tape squares in alliance colors will be places in each of the four corners. Place ball dispenser in the middle of the field.

Game Summary

The object of the game is to gain points by pushing the orange balls, or cancer cells, into the goals, teams will score in the goal that is the same color as their starting base.

General Rules

1. One robot per team
2. Only balls inside the borders of the goals will be scored
3. There are 4 teams
4. Robots can play defense but cannot intentionally ram or damage them. Give five points to the robot hit or damaged.
5. No one without permission can go onto the field.
6. Once the match starts, the players cannot touch the robot.

Scoring

- A cancer cell (orange ball) is worth 1 point in the low goal and 2 points in the high goal
- A healthy cell (white ball) in the low goal subtracts 1 point and a healthy cell in a high goal subtracts 2 points.

Material List

Part	Quantity
1 ½" PVC Pipe	16'
1 ½" PVC T-Joints	4
Red Goal	1
Blue Goal	1
Red Tape	1 roll
Blue Tape	1 roll
Robots	# of teams

Name:_____

Teamwork Station Handout

Part 1
Fill in the blanks using the correct words from the word list below.

combined separate group person quality sloppy

Teamwork is the _____ action of a _____

of people to get more _____ work done in a shorter

period of time than one person could get done alone.

Part 2
Write two things you can do to be a good team member.

1. _____

2. _____

Name:_____

Robotics Word Search

Find the robotics related words in the word search below.

A U E I T C M R W S J V J U S
S A H B O R E L S S E K U S Q
B P F D A E U B Q I B N Q A H
B B E Q N Y R T B J Y R S S G
Y V G I U W A L C G E E W O E
Q T G C I R C U I T X T H J R
G N I M M A R G O R P U E X I
E K O C V Z J Q P S F P E Z W
D Q S Z I J C R B A W M L L Z
M X J A G R R K U S M O Y O I
D V U I T G T D W D A C O S M
L A J Z D V P C R C A C E W Z
P T A D N V Q G E Q O J L D A
L C V F D L U P J L T A U Q Q
K N C S E T A E F I E J F A L

ARM
CIRCUIT
CLAW
CODE
COMPUTER
ELECTRICITY
ENGINEER
PROGRAMMING
SENSOR
TASK
WHEEL
WIRE

Name:_____

Robot Creation Handout

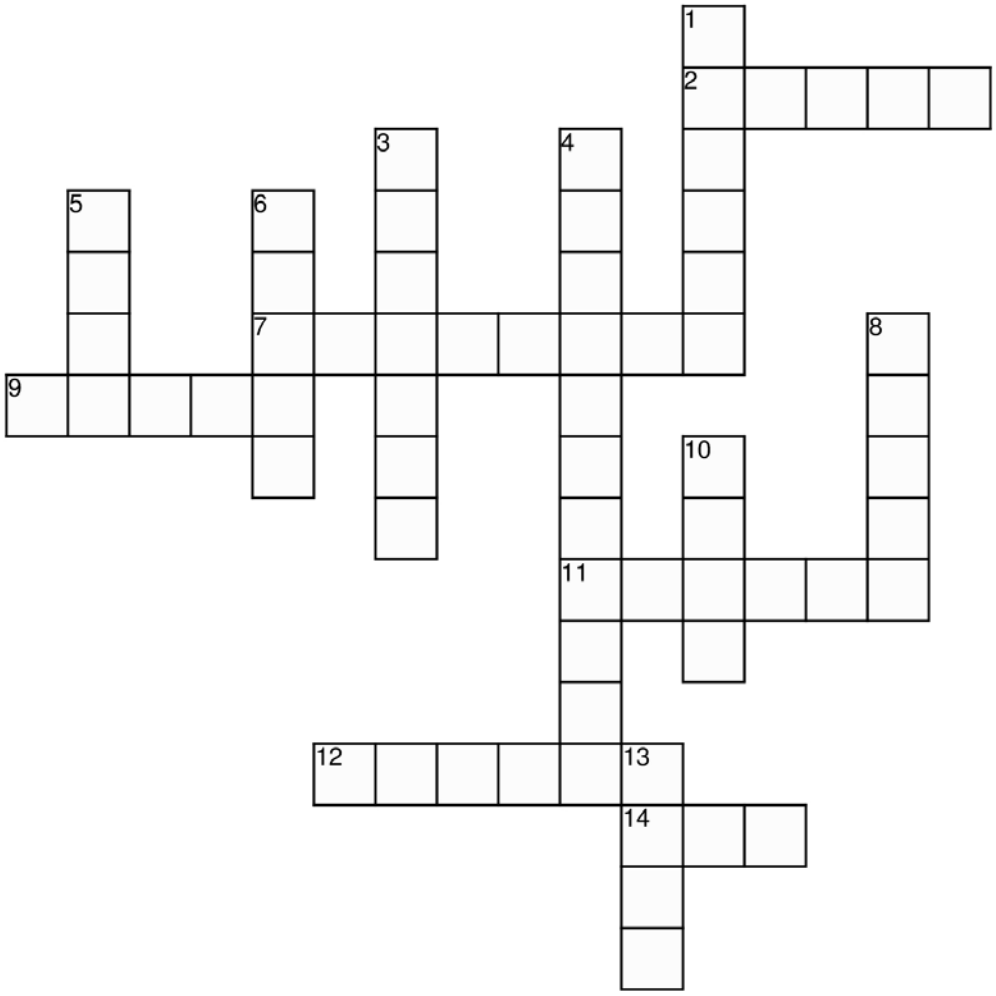
Think about a robot you might build someday. Draw what it would look like in the box below.

Name your robot: _____

Tell how it will help people or improve the world:

Name:_____

Robots in Space Crossword



Across

2. The planet you live on
7. Someone who builds robots
9. How you move a car
11. The Earth is a
12. A set of connected things
14. Used to lift

Down

1. A device that gives information to the robot
3. Coded instructions for a computer or robot
4. Where the stars are
5. Toothed wheel
6. A circular object that rotates
8. A machine capable of carrying out a series of actions
10. Used to grab
13. The Red Planet

Power Hawks Robotics at South River

2015 Summer Camp

Engineering and Robotics Summer Camp

A four day camp offering educational oppertunities, teamwork experience, and FUN!

www.powerhawks.org/summer-camp/

POWERHAWKS ROBOTICS

Purpose

- To promote the engineering programs in - and highlight feeder high school Project Lead The Way completer pathways.
- To increase opportunities for students to experience a Project-Based Learning program designed to introduce middle school students to the fundamentals of advanced math, engineering, science, and technology through cooperative and competitive robotics.
- Run by high school students and teachers in order to inspire students in the areas of STEM

Activities

- Hands on projects in the areas of robotics, programming, design, and more!

Who Can Attend?

- Incoming 7th and 8th Graders.

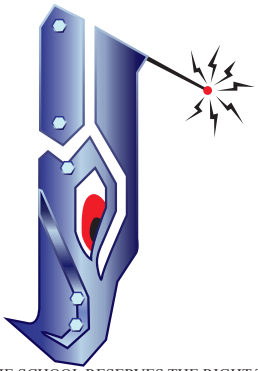
Where and When?

- The Tech Ed Department of South River High School
- 8:30 - 12:30 PM
- Session 1: June 22 through June 25
- Session 2: June 29 through July 2

Fee

- $30 (Must be included with application)
- Snacks will be provided

Mail or drop off application by 5/30 with check (payable to SRHS) to:
South River High School
Attn: Zachary Cohen
201 Central Ave, East
Edgewater, MD 21037



First Name	Last Name		
Gender	Grade in fall of 2014	Session	
Home Address	City	State	Zip
Parent/Gaurdian N ame	Phone	Email	
Emergency contact	Phone	Allergies/Other	

Power Hawks Robotics Team

Summer Camp

2015

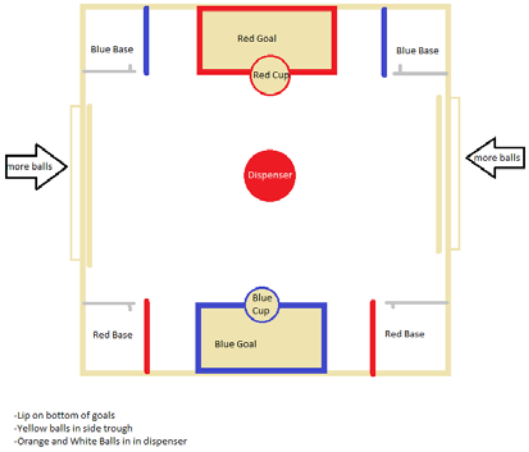
SOUTH RIVER
POWERHAWKS
ROBOTICS

Team 1111

Medical Madness 2015 Summer Camp Game Rules

Field Setup:

The game is played in an 8'x8' square PVC frame. One 18" starting area PVC segment attached 18" from each corner by PVC T brackets on the top and bottom sides. Two 1' goal PVC segments attached to each side by PVC T brackets on the top and bottom sides. Goal frames attached at the end of PVC goal segments. Mark bases on the top with red tape and goal on top with blue tape. Mark bases on the bottom with blue tape and goal on the bottom with red tape. 30" segments of PVC centered on the interior of the left and right sides. 2"x30" troughs placed symmetrical to the 30" PVC segments. Put 18 yellow balls in each trough. Fill dispenser with 75 white balls and 75 orange balls. Place dispenser in the middle of the field.



Game Summary:

The object of the game is to gain points by putting the cells into the low and high goals. Cancer cells are worth 1 point in the low goal and 2 points in the high goal. Cholesterol cells are worth double what the cancer cells are worth. (2 points in low goals and 4 point in high goals) Teams each get half the total points scored in their alliance's goals.

General Rules:

1. One robot per team
2. 4 teams on the field
3. Robots must start completely in their base with the door shut
4. Players cannot touch the robot after the match has begun
5. Nobody is allowed on the field once the match has begun
6. If a cell rolls into the base, players may remove it from the field or lightly roll it back onto the field.
7. Any robot damaged by another robot will be given 3 bonus points

Scoring:

- An cancer cell (orange ball) is worth 1 point in the low goal and 2 points in the high goal
- A cholesterol cell (yellow ball) is worth 2 points in the low goal and 4 points in the high goal
- A healthy cell (white ball) in the low goal subtracts 1 point and a healthy cell in a high goal subtracts 2 points.
- Getting back into the base and shutting the door is worth 10 points to that team

Material list:

Part	Quantity
Orange Practice Golf Balls	75
White Practice Golf Balls	75
Yellow Practice Golf Balls	36
1 ½” PVC	28 ft
1 ½” PVC T Joints	12
1 ½” PVC Corner Joints	4
Red Tape	1 Roll
Blue Tape	1 Roll
Goal	2
Ball Dispenser	1
6” Diameter Cup	2

Power Hawks Robotics Team

Power Hawks FLL Qualifier Guide

2015

SOUTH RIVER POWERHAWKS ROBOTICS

Team 1111

Contents

The Qualifier at a Glance

What

- The Power Hawks hosts the annual South County Showdown Qualifier. The qualifier is held at South River High School and holds 18-24 FLL teams. There are 12 components to planning the event. Each component has a student in charge with an adult mentor guiding them to guarantee success. During the qualifier every member of the Power Hawks organizations, student and adult, volunteer their time by working in different areas of the event including but not limited to concessions, judges, and field resetters.

Who

- Jobs to fill (student and mentor)-
    - Event Coordinator: They oversee the entire event. They lead the weekly meetings and manage all the areas of the event. If a problem comes up it is their job to quickly find a solution.
    - Volunteer Coordinator: Their job is to organize the volunteers. They are in charge of managing the VIMs account for the event and what jobs go to volunteers. They help during the event by maintaining the schedule and answering any questions the volunteers have.
    - Teams Coordinator: They are the main contact for the teams coming to the event. They are responsible for making and distributing info packets to all the teams and to collect the lunch orders and team info sheets back from the teams.
    - Judges Coordinator: They are in charge of finding volunteers to be judges for the event. They contact anyone who is interested and are their main contact for any questions. During the event they debrief the judges and then oversee the judging.
    - Referee Coordinator: They oversee the official referees for the event. They find adults willing to referee and then make sure that the referees know all the rules of the game. They are also in charge of the field parts, making sure that all the pieces are in working order.
    - Hospitality Coordinator: Their job is to maintain the hospitality room. This is for the judges and adult mentors who we want to show our appreciation for with a room that they can go into to relax and eat any of the complimentary breakfast, lunch, or snacks we provide.
    - Concessions Coordinator: They are in charge of selling food in the event. They determine what is being sold and how it will be prepared. They oversee the concession stand during the event to make sure that all the food is safe to eat.
    - Sponsors Coordinator: Their job is to make and prepare documents, describing the qualifier to potential sponsors and sending them out. They keep track of who they contact and the money given to us.

- Press Releases Coordinator: Their job is to contact the media, spreading the word about the qualifier. They write an article talking about the challenge for the public and send it out to news channels, newspapers, and websites.
- Tech/AV Coordinator: They are in charge of the sound and visual effects. During the qualifier they set up projectors, screens, cameras, and speakers so the matches and scores can be seen. Also, so the announcers and music can be heard.
- Materials Coordinator: Their job was to manage all supplies needed for the qualifier. They take inventory of everything we have and what we need to get. They would keep track of where materials go in the event and make sure it goes back in the proper spot.

When

- Date: Pick a date appropriate for competition based on the FLL schedule and time it takes to plan the event. Their build season begins in early fall, so the events fall between early December to late February. For our team, we have an early event, typically the first weekend of December, so we begin planning in August.
- Meetings: We would meet once a week for an hour on Sundays to discuss the progress so far and what needs to be done in the next week. We would take this time to also bring up any issues that have come up and as a group decide a plan to solve the issues.

Where

- Location for planning: Meetings for the event is crucial for the event's success. Find a location that has enough space for all of the planning committee. Community buildings are ideal because they have large meeting halls and tend to already have tables and chairs already there.
- Location of event: Picking the right location for the event can be tricky. There are several factors to be considered. There has to be enough space for all of the pits, practice tables, competition field, and audience members. For judging, there needs to be enough private rooms, with access to a projector, to accommodate the number of teams going. The building must have access to 120 V, 200 amps across multiple circuits for all the areas that need power.

Why

- Who does it help?: The Power Hawks ask for donations from the teams at the qualifier to give to a charity that benefits the education of youth. This year we collected school supplies for 21st Century Education Foundation an organization that is dedicated in aiding students. We measured how much a team donated by weight and then gave an award to the team who donated the most.

Time line for FLL Qualifier 2014

Graphics

Sept. 6 Sponsor flyer design started
Sept. 21 Sponsor flyer completed
Oct. 11 Invites for VIP
Oct. 15 Front of tee shirts design due.
Nov. 23 VIP Packages done
Nov. 23 FLL teams registration package done
Nov. 23 Programs done
Nov. 23 Map of rooms used in the school

Website for FLL Q

Oct. 6 Website graphics and info updated for the current season, all info updated for fundraiser.
Nov. 1 All sponsor final on website.
Mid Nov when MD FIRST gives the final teams for our qualifier, FLL teams are added to the FLL Q website
Dec. 6 Final results are added to the website with teams advancing to State Championships

Awards

Nov. 1 Finals sponsors ID
Nov. 3 Trophies design sent to vendor. Need to contact Quality signs and get details on sizes of trophies due NOW for graphics.
Nov. 7 Trophies approved for vendor
Nov. 7 Jr. FLL awards ordered

Judges Tee shirts

Oct. 15 Front of tee shirts design due.
Nov. 1 Final sponsors id
Nov. 3 Tee shirt design sent to vendor for printing

Concessions

Oct. 12 Ask Mr. Miller to use popcorn machine
Nov. 22 send food permit application
Nov. 2 Determine donation food list
Nov. 9 Set up food donation sign up
Dec. 4 Order parts for grill
Dec. 4 Fix grill
Dec. 4 Refill propane tanks

Hospitality

Nov. 2 Make a list of food donations
Nov. 9 Make sign up for food donations

Teams

Mid Nov. Contact teams
Mid Nov. Make sure every team has the proper paper work
Mid Nov. Make sure teams place lunch orders

Tech/AV

Oct. 26 Create materials list

Volunteers

Nov. 20 Assign volunteer jobs

Judges

Nov. 9 Determine final judge list
TBD Train judges

Referees

Nov. 2 Find referees
Mid Nov. Pick up finished kits

Materials

Oct. 26 Make a list of any materials needed
Nov. 2 Order needed materials
Nov. 16 Make final check list

Sponsorship

Oct. 5 Have tri-folds ready to distribute
Oct. 12 Finish Sponsorship packet
Oct. 31 Find sponsors for FLL Qualifier

Press Release

Oct 12 Make press release
Early Nov. Send out press release

School Drive

Oct 12 Find organization do donate to

Event Coordinating

Nov. 19 Final schedule for qualifier

Reminders

Nov. 30 Email volunteers on what jobs they have
Nov. 30 Email people donating food
Nov. 30 Email VIPs
Nov. 30 Email Judges
Nov. 30 Email Referees

Follow up

Dec. 14 Thank you letter for outside help
Dec. 14 Debrief

Meeting 9/28/14

Concession:

- Contacted Mr. Marker?
- Heard back from any food places?
- Ask Mr. Miller about the popcorn machine for this year

Sponsorship:

- Is the trifold finished?
- If so is it printed? If not when can it be printed?
- Need new ideas to bring in sponsors. Incentive maybe?
- Company logos going on trophies are needed by Nov 1

Tech:

- Heard back from contacts for equipment?

Materials:

- Find out how many table skirts we currently have and how many we need to order
- Any other supplies we need?

Judges:

- Talked to Mr. Reiman?
- Find possible judges outside of the team

Teams:

- Work with website to finish the google form
- Keep track of when registration for the teams close

Hospitality:

- Current plan of action?
- Has there been any progress?

Volunteers:

- Any possible volunteers outside of robotics?

Awards:

- What awards are we going to hand out?

Referees:

- Have a list of possible referees and contact them

Meeting 10/5/14

Awards:

- Finished FLL award details are on the google drive
- 18 awards
- Contact Quality signs and get details on sizes of trophies ASAP

Teams:

- Mrs. Place is the new parent in charge
- No definite date for the end of registration
- Materials from last year are in a binder, should be found

Tech:

- Booked custodian

Sponsorship:

- Have any potential sponsors been contacted?
- Have past sponsors been contacted?
- Is the sponsorship packet done?

Materials:

- Has an inventory been taken?
- Do we know what we need to still buy?

Referees:

- Do we know who to ask to be referees?
- Has anyone already been asked?

Volunteers:

- Have any adults been asked to volunteer?

Concessions:

- Are parts ordered for grill?
- Have any food places responded?

Hospitality:

- Any more ideas on what food to have?

School Drive:

- Possibly work with the county office
- Maybe combine with the backpack food program and a needy school for additional donations
- Consider taking cash donations as well equal to a weight in school supplies

General:

- Sponsorship flyers are printed and need to be folded
- Update the FLL Qualifier Website for logo and information
- Timeline finished and needs to be updated

Meeting 10/12/14

Teams:

- Locate team folder
- Rewrite the welcome letter
- Need the schedule, food prices, and donation details

Materials:

- Finished the list. Do any groups need to add other items?

Press Plan:

- working to complete a Contact List (will be up on Google Docs) with groups we'd like to contact and any contact info we have (to be done by 10/19)
- will create a Contact List of VIPs and local schools (to be done by 10/19)
- distribution of press release to media outlets beginning November 11 (via e-mail)
- follow up press calls beginning November 12 (over 2 days)
- County PTAs/PTOs to be contacted beginning November 6
- Press release to be re-sent week of 12/1 to all the same sources
- Article for distribution post-event (with pictures) completed n/l/t 12/10 and submitted to media outlets n/l/t 12/12

Press package:

- this would be the same as the VIP package (map, schedule, welcome letter) but should also include a contact sheet for key individuals at event

Service Project:

- We will collect school supplies and monetary donations to be distributed by AACPS Office for School and Family Partnerships and the 21st Century Education Foundation.
- Teams will get credit per item (weight doesn't seem like the ideal measure for such disparately different (and light) items)
- We need to set a $$ to item correspondence ($1 = 1 item?)

School Supply Drive flyer:

- Draft completed
- need to gather feedback
- need to work with TEAMS committee to see that this information reaches all teams in a timely fashion AND is emphasized a few times leading up to the event

Sponsorship:

- Have any potential sponsors been contacted?
- Have past sponsors been contacted?
- Is the sponsorship packet done?

Referees:

- Do we have all the referees?

Judges:

- Has any adults been asked?

- Is a student list being made?

Volunteers:

- Have any adults been asked to volunteer?

Concessions:

- Have any food places responded?

Hospitality:

- Any more ideas on what food to have?

Meeting 10/19/14

Teams:

- FLL team letter is started
- Needs the name and contacts for the school supply drive
- How are we recording lunch orders?

Materials:

- Is everything on the list bought?

Sponsorship:

- Sally is no longer in charge of sponsorship. We need another student to come in for this job

Referees:

- Who will the referees be?

Judges:

- Is the judges email ready to send out?

Volunteers:

- Mr. Meinhold is registered to VIMS as volunteer coordinator
- Go over job list and schedule
- What requirements do we want?

Concessions:

- Has Mr. Miller been asked about the popcorn machine?
- What is the progress of the food list?
- the menu could use more items (i.e. snack items)
- Has Connor gotten the email header from Mr. Cohen?

Hospitality:

- Drafted a menu for breakfast and lunch.
- Need to determine best place to purchase certain items.
- How can they work with concessions to ask for donations?

Meeting 10/26/14

Sponsorship:

- The whole team should bring in sponsorship
- Should we bring in students for FLL this late, or just have the PH Sponsorship team be in charge of it this year?

Judges:

- Email was sent out. Any responses?
- Has students been picked to judge?

Teams:

- Finalized the initial email to teams
- Team names come in this Monday (10/27)
- When should the email be sent out once we get the names?

Volunteers:

- Schedule is drafted
- List of jobs is updated
- Everyone in the planning group needs to fill out a position on VIMs

Materials:

- Is there any other material to buy?

Referees:

- Who will the referees be?

Concessions:

- Has the health permit been filled out?
- What is the progress of the food list?

General info:

- PTA/PTO list completed
- Have a list for press contacts
- VIP invitation is completed
- Working on the VIP list. Need the current sponsors' contact info

Meeting 11/2/14

Awards:

- Still need some sponsors logos
- Placing order by Thursday
- Need Graphics to work on back of Judges Tee Shirts with sponsor logos

Teams:

- Made a basic schedule for teams. Details will come soon
- When will we get the list of teams?

Volunteers:

- Has everyone in the committee sign into VIMs?
- 20 students need to sign up
- Should adults be invited to next Thursday meeting to sign up?

Judges:

- Has anyone responded to the email?
- If so how many do we have?

Referees:

- All the referee slots are filled
- Need kits next

Concessions:

- The health permit been filled out
- South River Pizza will sell XL pizzas for $8 and provide a warming unit to keep 3 pizzas warm
- Lunch pre-order form completed?

Hospitality:

- What progress has been made?

Sponsorship:

- Picked up 2 sponsors

Meeting 11/9/14

Awards:

- Trophies order, received the proof on 6th, need one change done for a sponsor before signing off
- Need Sponsors on the back of the Judges tee shirt.
- Side note will need last year Tee Shirt back for FRC for the FTC tee Shirts order.

Teams:

- 24 teams currently. Should we take more?
- If so how will the schedule change?

Volunteers:

- Has everyone in the committee sign into VIMs?
- What key roles still need to be filled?
- SAT is this day, are any of the students going to be taking that?

Judges:

- Has anyone responded to the email?
- If so how many do we have?
- If the student list is done confirm with those on the list about their role

Referees:

- What is the role of the student referees?

Concessions:

- Is the donations list finished?

Hospitality:

- What progress has been made?
- Is the donations list finished?

Meeting 11/16/14

Teams:

- Rough schedule for judging and qualification matches completed; Team info packet sent.
- The schedule has added 15 mins to the judging in the morning and 30 mins to matches compared to last year
- Have a finalized schedule by next meeting.
- Is another table possible?
- Are there more matches after the initial qualification matches?
- Does every team need to play every other team?
- Haven't received any info packets, but four replies from teams
- Maybe cut into lunch?
- Are we posting the teams on website like last year?
- Need all sponsor logos to put on the schedule

Judges:

- Have more adults signed up?
- Have any FIRST volunteers signed up to judge?

Awards:

- Are the t-shirts ordered?

Volunteers:

- Has anyone signed up to the event as a FIRST volunteer through VIMs?
- We have a nurse for the entire event, Tara McCullagh
- Most key roles filled
- Mr. Cohen ordered name tags : pin-on far less expensive than lanyards
- 3 more key roles to fill: Classroom manager, Jr FLL coordinator, Registration Director
- Some committee members need to sign up

Concessions:

- Is the food donation list done?

Hospitality:

- provided concessions with a list of items to request as donations
- Sam's Club shopping scheduled with Mr. Chapman
- developed plan to feed student volunteers (concessions will purchase pizza & sodas which will be distributed by hospitality)
- Were the supplies/ paper goods all found on Saturday?
- When will the donation request be made?

Meeting 11/23/14

Judges:

- Have flyers been distributed?
- Acquired 12 judges. Is that just adults or adults and students?
- Bob Mohr offered his/First assistance in acquiring judges
- Should student training be the day before?
- Do we need to make judges packets?

Refs:

- When are we getting the kits?
- Need to open each kit and verify that each mission model is built and functioning correctly
- Need to make sure the Sure-Lock has been applied to the mission models and the mats
- Need to layout mats to reduce the curl at the ends
- Need to identify which computers will be used for scoring and display. Are we still going to use 3 computers this year?
- Need to load and test scoring software
- Need to get logos in a format the software can use.
- Possibly reduce field set up crew from 8 to 4-5 to allow others to work other needed positions

Teams:

- What are clipboards for?
- Need help getting logos onto the full schedule for the day. Can't download from the drive.
- Need judging rubrics from judges
- Need a practice match "schedule" made

Awards:

- T-shirts, Jr FLL medals, and awards are ordered

Concessions/ Hospitality:

- What has been donated so far?

Volunteers:

- Revised assignments based on revised schedule
- Only 3/71 students unaccounted for
- 47/148 Parents and Mentors registered
- Resolved screening issues with First
- Crossover in assignments midday challenging - solved by “tweaking” assignments and using adults more.
- Are there anymore issues with missing roles or not enough people in each position?

Meeting 11/30/14

Judges:

- Have flyers been distributed?
- Acquired 12 judges. Is that just adults or adults and students?
- Bob Mohr offered his/First assistance in acquiring judges
- Should student training be the day before?
- Do we need to make judges packets?

Refs:

- When are we getting the kits?
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- Are there anymore issues with missing roles or not enough people in each position?

Jobs for Volunteers

- Set up:
  - Competition
  - Hospitality
  - Concessions
  - FLL Pit
  - FRC Pit
  - FTC Pit
- Competition Queuer
- Concessions Food Service
- FLL Pit Crew
- FLL Pit Crew
- FLL Pit Runner
- FLL Team Escort
- Hall Shusher
- Parent Bouncer
- Practice Tables Manager
- Competition Field Crew
- Hospitality Food prep
- Judging Queuer
- Competition Greeter
- FLL Greeter
- Tech Crew
- Clean up:
  - Gym Cleanup
  - Classroom Cleanup
  - Pit Cleanup
  - Hospitality
  - Concessions

Press Release

Power Hawks Robotics hosts FIRST Lego League Competition

South County Showdown tests Maryland students' many talents

Edgewater, MD December 6, 2014: On Saturday, December 6, over 200 Maryland middle and elementary school students will descend upon South River High School ready for battle in the seventh annual South County Showdown, a FIRST Lego League Qualifier and Jr. FIRST Lego League Expo. After eight weeks of preparation, 24 teams will come armed with their research; the LEGO Mindstorm robot they have designed, built and programmed; their contribution to the competition-wide service project and all the creative problem solving skills they have to compete in this exciting event. Hosted by the Power Hawks Robotics Team, this exhibition of great young minds at work is free and open to the public.

Each year in early fall, FIRST LEGO League releases a themed, three-part Challenge based on a real-world scientific topic to develop project-based skills through a Robot Game, a Project, and a signature set of Core Values which comprise the overarching way in which the Challenge is completed. Teams of up to 10 children, with two adult Coaches, participate in the Challenge by programming an autonomous robot to score points on a themed playing field (Robot Game) and developing innovative ideas that improve current conditions and add value to society (Project). This year's challenge, "World Class: Learning Unleashed" calls for teams to research and present their original tools and/or tactics that enrich the current landscape of learning. The competition is judged in five areas: research and presentation; robot performance; technical mechanics of the robot's construction; teamwork; and gracious professionalism. While technological savvy is obviously valued, the highest honor will go to the team that best exemplifies the spirit and values of the program. FLL Core Values emphasize contributions of others, friendly competition, learning, and community involvement.

The host of this exciting competition is the Power Hawks Robotics team from Edgewater, MD. Comprised of over 70 high school students, the team takes time away from their own FIRST competitions at the FIRST Robotics Challenge (FRC) and FIRST Tech Challenge (FTC) levels to sponsor this day-long opportunity for younger enthusiasts. In addition to the South County Showdown and their FIRST contests, the Power Hawks can often be found at community events introducing the excitement and challenge of robotics to the public.

More information about the South County Showdown can be found at www.powerhawks.org/wp/fll-qualifier

More information about the Power Hawks Robotics team can be found at www.powerhawks.org

More information about FIRST Lego League can be found at www.usfirst.org.

Lego League competition

Over 200 Maryland middle and elementary school students will descend upon South River High School on Dec. 6, ready to battle in the seventh annual South County Showdown, a FIRST Lego League Qualifier and Jr. FIRST Lego League Expo.

Each year in early fall, FIRST LEGO League releases a themed, three-part challenge based on a real-world scientific topic to develop project-based skills through a robot game, a project, and a signature set of core values. Teams of up to 10 children, with two adult coaches, participate in the challenge by programming an autonomous robot to score points on a themed playing field and developing innovative ideas.

This year's challenge, "World Class: Learning Unleashed" calls for teams to research and present tools and tactics that enrich the current landscape of learning.

After eight weeks of preparation, 24 teams will come armed with their research. The LEGO Mindstorm robot they have designed, built and programmed their contribution to the competition-wide service project, and all the creative problem solving skills they have to compete in this exciting event. This exhibition of great young minds at work is free and open to the public.

The South River Power Hawks Robotics team is the host for this event. Comprised of over 70 high school students, the team takes time away from their own competitions to sponsor this day-long opportunity for younger enthusiasts. In addition to the South County Showdown and their FIRST contests, the Power Hawks can often be found at community events introducing the excitement and challenge of robotics to the public.

The competition is judged in five areas: research and presentation; robot performance; technical mechanics of the robot's construction; teamwork; and gracious professionalism. While technological savvy is obviously valued, the highest honor will go to the team that best exemplifies the spirit and values of the program. FLL Core Values emphasize contributions of others, friendly competition, learning, and community involvement.

For details, visit **http://www.powerhawks.org/fll-qualifier**.

Qualifier Schedule

Friday 12/5/2014

- 5:00 pm- 9:00 pm- Students met at South River High School and were assigned to different groups with a group leader to set up the first floor for the next day:
    - One group would organize the rooms for judging. There were 10 rooms for judges. One general room for judges to meet as a group which needed rows of chairs facing on direction for the head judges to talk. Three rooms were used for robot design which required a clearing for half a field and walking room for the team and judges. There were three rooms for Core Values and three rooms for the team presentation. Each room needed a table for judges to sit at, space for a team to present, and a projector and screen. This group leader is in charge of taking pictures of all the rooms and desks before moving anything around so we could put it back in order in the end of the event.
    - Another group would go to the cafeteria to prep it for the FLL pits on one side and demos/concessions on the other. There has to be a barrier between the two halves. We fold up the cafeteria tables so we don't need to move the tables too much. At the pits each team gets half a table with a sign with their team name and number on it. Each table had power running to it so they can work on their robot. On the other half of the room there are demos of the Power Hawks' FTC teams and our FRC robot. The FTC teams need a full field set up to run their robots and the FRC team sets up a smaller version of their pit, both needing power. The concessions needed power for the popcorn machine and pizza warmer. They need 4 tables with table clothes to sell the food. There were also tables for parents to sit and wait for matches and to eat food. By barrier there was a table set up to collect team donations.
    - The third group would go to the storage container to unload the field tables and other supplies we store there. After they unload the container they will stage the set up for the gym where the matches will be held. We cannot go in until lunchtime on Saturday so we need to have everything ready to go. In the gym we need the entire sound system which is a full pa sound system and DJ laptop or equivalent software. We use projectors linked live to GoPros® which are hanging over the field tables. There are 2 field tables, with table skirts attached, standing on saw horses. We need stanchions and chain to separate the stands from the fields. An Ethernet cable needs to run from a plug to a screen to show the teams ranks. There are three laptops needed for the referees for scoring as well.

Saturday 12/6/2014

- 7:00am - 7:30am- volunteers arrive
- 7:30am - 8:00am-
    - hospitality room is set up with tables to sit at and room for food so the volunteers can have breakfast
    - food arrives to concessions and is set up to be sold
- 8:00am - 8:30am-
    - teams show up and register with the team's coordinator.
    - Judges meeting in the judges room to be debriefed
- 8:30am - 9:00am- coaches meeting
- 9:15am - 11:45am-
    - Teams go into judging
    - Donations are collected from the team and recorded
    - Lunch orders are placed for the teams so lunches can be prepared
- 11:00am - 11:45am- the gym is set up for the matches. The pa sound system is set up on tables in the back of the gym with the scoring laptops. Three screens are set up, one in the middle and on behind each field. The ones behind the field are linked to the GoPros® above the fields and the one in the middle is linked to the team rankings. All the cords on the floor are taped over and lines are taped to guide teams to their matches. The stations are placed between the stands and the fields to separate the audience and the teams.
- 11:45am - 12:15pm- referees meet in the gym with the field resetters to be briefed
- 12:15pm - 1:15pm- lunch
- 1:15pm - 1:45pm- opening ceremony: the MCs would welcome the audience and teams and then introduce the referees and judges. A thank you goes out to the volunteers and coordinators of the event and the national anthem is sung by a Power Hawks member.
- 1:45pm - 5:15pm-
    - the teams compete
    - the judges meet in the judges room to decide the winner of awards
    - all the judges rooms no longer used are cleaned and put back in order
- 5:30pm - 6:30pm-
    - closing ceremony and awards
    - volunteers clean up and put away everything used for the event and double check nothing is missing or left behind

POWERHAWKS ROBOTICS

6th Annual 'South County Showdown' FLL Qualifier & Jr. FLL Expo

December 6, 2014

Welcome FLL & Jr. FLL Teams

FLL Qualifier Schedule

8:00 am – 9:00 am **– Judges** briefing (Rm D136)

8:00 am – 8:30 am – **FLL Teams** check-in

8:30 am - 9:00 am – **Coaches** meeting (Rm 124)

9:15 am - 11:45 am – **Judging** Robot Design, Project, & Core Values

10:30 am – 12:15 pm – **Referees** competition briefing (gym)

12:15 pm – 1:15 pm **– Lunch**

1:15 pm – 1:45 pm – **Opening Ceremony** (gym)

1:45 pm – 5:15 pm – **FLL Robot Competition** Match Rounds (gym)

5:30 pm – 6:30 pm – **Awards Ceremony** (auditorium)

Jr. FLL Expo

9:00 am – 9:30 am – **Jr. FLL Teams** check-in (auditorium lobby)

9:30 am – 11:30 am – **Jr. FLL Teams**: present to Reviewer

11:30 am – 12:00 pm – **Awards Ceremony** (auditorium)

Thank you to our sponsors!

Motorola Solutions Foundation, & Arundel Self Storage Annapolis

www.powerhawks.org

Contact:
Zachary Cohen
Power Hawks Robotics
Phone 443-924-6475
ZCOHEN@AACPS.org

1498 Lee Way
Edgewater, MD

Press Release

Power Hawks Robotics hosts FIRST Lego League Competition

South County Showdown tests Maryland students' many talents

Edgewater, MD December 6, 2014: On Saturday, December 6, over 200 Maryland middle and elementary school students will descend upon South River High School ready for battle in the seventh annual South County Showdown, a FIRST Lego League Qualifier and Jr. FIRST Lego League Expo. After eight weeks of preparation, 24 teams will come armed with their research; the LEGO Mindstorm robot they have designed, built and programmed; their contribution to the competition-wide service project and all the creative problem solving skills they have to compete in this exciting event. Hosted by the Power Hawks Robotics Team, this exhibition of great young minds at work is free and open to the public.

Each year in early fall, FIRST LEGO League releases a themed, three-part Challenge based on a real-world scientific topic to develop project-based skills through a Robot Game, a Project, and a signature set of Core Values which comprise the overarching way in which the Challenge is completed. Teams of up to 10 children, with two adult Coaches, participate in the Challenge by programming an autonomous robot to score points on a themed playing field (Robot Game) and developing innovative ideas that improve current conditions and add value to society (Project). This year's challenge, "World Class: Learning Unleashed" calls for teams to research and present their original tools and/or tactics that enrich the current landscape of learning. The competition is judged in five areas: research and presentation; robot performance; technical mechanics of the robot's construction; teamwork; and gracious professionalism. While technological savvy is obviously valued, the highest honor will go to the team that best exemplifies the spirit and values of the program. FLL Core Values emphasize contributions of others, friendly competition, learning, and community involvement.

The host of this exciting competition is the Power Hawks Robotics team from Edgewater, MD. Comprised of over 70 high school students, the team takes time away from their own FIRST competitions at the FIRST Robotics Challenge (FRC) and FIRST Tech Challenge (FTC) levels to sponsor this day-long opportunity for younger enthusiasts. In addition to the South County Showdown and their FIRST contests, the Power Hawks can often be found at community events introducing the excitement and challenge of robotics to the public.

More information about the South County Showdown can be found at www.powerhawks.org/wp/fll-qualifier

More information about the Power Hawks Robotics team can be found at www.powerhawks.org

More information about FIRST Lego League can be found at www.usfirst.org.

Power Hawks Robotics Team

Maryland FIRST / Power Hawks Robotics Political Recognition

2015

SOUTH RIVER
POWERHAWKS
ROBOTICS

Team 1111

Introduction

As *FIRST* grows throughout Maryland, the United States of America, and the world, a greater amount of data is proving that programs such as *FIRST* provide unparalleled opportunities for students to gain early and critical exposure to science, technology, engineering, and mathematics (STEM) fields. This enables students to pursue careers in rapidly expanding fields, allowing for local businesses to hire qualified and capable young men and women. States have begun to recognize this, and have provided support to teams and statewide organizations in order to help provide the foundation for future careers in STEM.

What We Have to Demonstrate

One may ask- why is this important to us? The answer is simply that we've seen the significant impact *FIRST* has had on individuals, education, and the community around us. The Power Hawks alone have formed a foundation to spread STEM initiatives using *FIRST* as a vessel. However, the umbrella organization of Maryland *FIRST* has allowed all *FIRST* teams in the state to widen the impact as a collective effort.

Maryland *FIRST*

The Maryland *FIRST* organization represents 4,800 students that compose over 600 teams involved in the *FIRST* program. *FIRST* programs are composed of Jr. *FIRST* Lego League, *FIRST* Lego League, *FIRST* Tech Challenge, and *FIRST* Robotics Competition that offer participation to students aged 6-18. Below is a map of these teams.

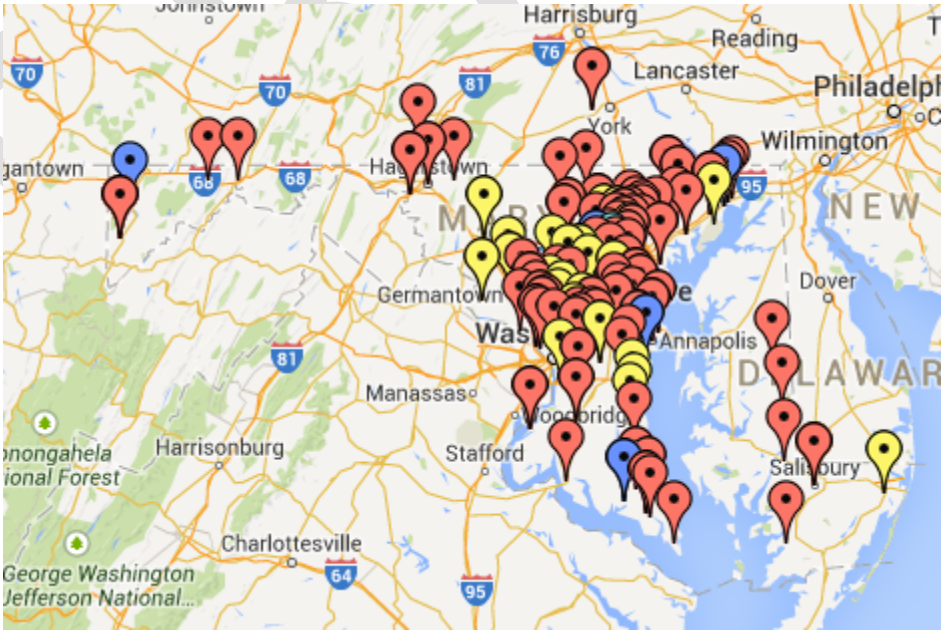

Figure 1 (Maryland FIRST, 2015)

The Impact of the Power Hawks

To give you an idea of the impact a single high school team from Maryland has on its members and the community we'll illustrate our impact. This impact is extended similarly by each of Maryland's 36 FRC teams. Supporting their efforts and even growing the number of teams that could duplicate these efforts would lead to a significant change in STEM culture in Maryland.

Impact on Students

The Power Hawks are centered at South River High School in Edgewater, MD, with two different *FIRST* programs that are composed of 70 middle and high school students. Team members fulfill roles in both robot building and business management, acting as a body that fosters an environment of co-curricular learning.

The growth of our team members through the *FIRST* program is astounding. The tenacity that *FIRST* instills in participants has pushed our members to take four college level classes and three honors classes on average per year, what's more our students maintain a 3.7 median GPA. These rigorous courses reinforce interests developed through robotics as 73% of our students intend on becoming engineers, while 23% more are set on other STEM-related fields.

Impact on Community through *FIRST*

The Power Hawks also include 8 elementary *FIRST* programs from around the area and support around 20 others throughout Anne Arundel County. It's said that most students in the United States who haven't developed a passion for STEM by the eighth grade- won't ever. Our goal by directly mentoring these teams is to prevent that loss in interest in STEM and cultivate a community that focuses on STEM in our future.

Through purely our own influence, the Power Hawks have seen a direct impact from our community involvement. This year, the FLL Qualifier we run each year- the South County Showdown, grew from 20 FLL teams to 24, and from 3 Jr. FLL teams to 11. We also hosted our *FIRST* annual summer camp last summer, igniting a passion in 18 middle school students. This summer, we'll be expanding as we've seen interest skyrocket from 18 students to nearly 60. Each year we also bring our robot to over 25 STEM events throughout Anne Arundel County in order to grow this influence further.

Impact on Community through Outreach

The impact of the Power Hawks is not exclusive to STEM inspiration. Our members have organized several drives to fulfill our outreach mission: "to inspire the next generation through STEM education". *FIRST*, we ran a school supply drive at our 2014 South County Showdown FLL Qualifier to instill service values in younger *FIRST* teams and support local children's educations. Next, we collected over 70 board games to back our local elementary school's positive behavioral reinforcement program and developmental social skills in students. At that same school we also donated four totes full of Legos for their Legos for Literacy program that teaches reading skills through Lego manipulation. Finally, our last drive collected 350lbs of food

for the Backpack Buddies program that provides backpacks full of food for students who normally only have access to food at school.

The Power Hawks are not atypical compared to your average *FIRST* team. Numerous teams throughout the state work hard to instill values that build our community and inspire our next generation.

Events

Numerous *FIRST* events are held in the state of Maryland each year. These events showcase the creativity and enthusiasm that the thousands of students involved exhibit. All events are free and open to the public, and while exact dates change from year to year, the event calendar follows the general format:

- Jr. *FIRST* Lego League (Grades K-3): Expo's occur in December through February, State Championships occur in late February.
- *FIRST* Lego League (Grades 4-8): Qualifiers occur in December through February, State Championships occur in late February.
- *FIRST* Tech Challenge (Grades 7-12): Qualifiers occur in December through February, State Championships occur in late February.
- *FIRST* Robotics Competition (Grades 9-12): Kickoff *FIRST* week of January, Chesapeake Regional occurs in late March or early April

(Maryland FIRST, 2015)

Demographics

Maryland *FIRST* by the Numbers

As of January 2015, the following numbers illustrate the specific impact of *FIRST* in Maryland.

- 36 *FIRST* Robotics Competition Teams (age 14-18)
- 97 *FIRST* Tech Challenge Teams (ages 14-18)
- close to 350 *FIRST* Lego League Teams (ages 9-14)
- 140 Junior *FIRST* Lego League Teams (ages 6-9)
- Over 4830 *FIRST* participants throughout the state of Maryland
- Over 1400 adult volunteer mentors directly supporting co-curricular learning through *FIRST*

(Shade, 2015)

Demographics of *FIRST* nationwide

In a study conducted on *FIRST* participants world-wide, it was found that:

- 55% of participants were non-white
- 41% of participants were female
- 37% of participants came from families where neither parent attended college

(Melchior, Cohen, Cutter, & Leavitt, 2005)

International *FIRST* Impact on Participants

In a study conducted on *FIRST* participants, the following impacts were witnessed.

Leadership Opportunities:

- 89% of participants reported having "real responsibility"
- 76% of participants reported being in a real leadership position
- 95% of participants noticed their value of teamwork increase

STEM Interest:

- 86% of participants had a general increase in STEM interest
- 69% of participants had an increase interest in a STEM career

School:

- 70% of participants became more motivated to succeed in school
- *FIRST* participants maintain an average 3.5/4.0 GPA
- 90% of participants learned new time management skills under pressure
- 99% of participants graduated high school
- 89% of participants went to college compared to the national average of 65%
- *FIRST* participants are seven times more likely to receive an Engineering degree

Outreach:

- 65% of participants reported feeling an increased motivation for spreading STEM to younger students
- 71% of participants performed volunteer service in the past year (compared to 30% in general population)

(Melchior, Cohen, Cutter, & Leavitt, 2005)

FIRST Alignment with Curriculum Standards

A study conducted revealed the following standards alignments with each *FIRST* program.

Educational Standards Addressed	Junior *FIRST* LEGO® League	*FIRST* LEGO® League	*FIRST* Tech Challenge	*FIRST* Robotics Competition
Common Core Mathematics	23/34 - 68%	39/51 - 76%	55/61 - 90% (HS) 20/29 - 70% (MS)	55/61 - 90%
21st Century Skills	73/88 - 83%	74/88 - 84%	67/88 - 76%	67/88 - 76%
National Science Standards	25/60 - 41%	42/60 - 70%	29/60 - 48%	29/60 - 48%

Figure 2 (Loehr, 2012)

FIRST Scholarship Program

FIRST participants are actively sought by colleges, universities, and companies nationwide because of the values and skills they learn that set them above their peers. *FIRST* acts as a platform for over 300 scholarship providers that offer over $35.5 million in scholarships each year to exclusively for *FIRST*ers.
(FIRST, 2015)

What Are We Asking For?

We'd like to continue these positive impacts across all groups in Maryland, but we can't do it ourselves. Other states have already seen the positive influence of *FIRST* and supported it. Below we detail our goals and how politicians can help us reach them.

Existing Legislation Elsewhere

Several states have recognized the profound influence *FIRST* has had on their constituents and taken measures to expand that impression. Michigan, Oregon, Maine, Hawaii and Oklahoma have all seen the value of *FIRST* and bought-in to its success- we'd like to persuade Maryland to do the same.

In 2013, the State of Michigan delegated $3,000,000 in grants through the Michigan State Board of Education in the FY2013 State School Aid Act, P.A. 60 Section 99. The money goes directly towards funding Michigan *FIRST* programs for students in grades 7-12. Through the grant, the Michigan State Board of Education offers funds to support current FTC and FRC teams, start new FTC and FRC teams, finance teacher mentor stipends, and subsidize competition attendance expenses. The requirements to receive the grant included evidence of third party sponsorship so the team's finances are sustainable in the future and registration under *FIRST*. For example, a rookie FRC team received an initial $9,000 in grant money; if they qualified for states, $13,000; if they qualified for world competition, $18,000. These grants were typically be matched by third party sponsors as an FRC team's expenses can easily surpass $18,000 in a single season. The same sort of payment structure was similar for the FTC grant program.

This impact drove a surge in FRC and FTC *FIRST* participation in Michigan. So much so that Michigan teams can now field competitions larger than a normal *FIRST* regional that pulls teams from multiple states.

The State of Oregon took similar action in 2013, opening up eligibility for grant requests for *FIRST* teams involving students in grades 4-12 from any Oregon public school. The 2013 Oregon Legislature entitled teams awarded this grant up to $10,000. Similar to Michigan's system, the grant funds are allowed to be used for teacher stipends, materials, competition expenses, and registration fees.

Maine, Hawaii, and Oklahoma all have similar program support that involves providing endowment to their state board of education's meant to fund *FIRST* programs. The benefits of

these programs are immeasurable and the magnitude of the impact continues to expand with state recognition like this.

Two Year Vision

The Power Hawks envision the following for the political involvement of the State of Maryland in *FIRST* efforts over the next two years (to be reevaluated in March 2017):

1. Recognition from the Maryland State Department of Education. This includes the alignment of *FIRST* to state education standards, support to increase recognition of teachers who run *FIRST* programs, and recognition of the role programs play in improving their school climates.
2. Funding support in the form of state grants to support the Maryland *FIRST* program and the individual teams throughout the state.

How Can Politicians Help in Maryland?

Your support within the Maryland General Assembly could include:

1. Ensuring the allocation of funds to support *FIRST* program grants facilitated by the Maryland Board of Education in their annual budget.
2. Building beneficial relationships between government representatives and Maryland *FIRST* in order to support the growth of the STEM program in Maryland.
3. Establishing partnerships between local governments to increase efficiency of *FIRST* activities.

Benefits for Maryland

The benefits to the state from *FIRST* programs are immense. Consider the improvement of Maryland's:

- Growing economy in STEM fields due to our proximity to Federal agencies and the booming STEM industries within the state.
- Constituent retention from education to employer increases if we can produce more STEM students for the state's demanding STEM industries
- Increases in high school graduation rates
- Students' motivation in school and pursuing higher education
- Students' college readiness and career preparedness through the co-curricular program

Who Are We Asking?

The Power Hawks have compiled a list of representatives that act for the 36 FRC programs in the state in the Maryland General Assembly. Below you'll find the team names, their districts, their representatives, and contact information for each representatives. We've already contacted all of the representatives, inviting them to the 2015 Chesapeake Regional, but plan on using this information to lobby for further government action involving *FIRST* in Maryland.

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Power Hawks Robotics Team
at South River High School
201 Central Ave, East | Edgewater, MD 21037 | 410-956-5600

Dear <<NAME>>,

My name is Zachary Cohen and I'm a teacher at South River High School in Edgewater, MD, and am on the planning committee for the *FIRST Robotics Competition* Chesapeake Regional at University of Maryland on April 3rd and 4th. I'm reaching out to you because the high school in your district, <<HIGHSCHOOL NAME>>, has a *FIRST Robotics Competition* team made up of students and volunteer professional mentors.

FIRST is a not-for-profit organization that inspires young people, ages 6 to 18, to become science and technology leaders and innovators. On behalf of *FIRST*, I would like to personally invite you to attend the Chesapeake Regional which will take place from April 3rd and 4th at the Xfinity Center at the University of Maryland to see the students from your district's high school grow and compete, and for you to learn more about *FIRST*.

While we understand and appreciate your very busy schedule, we sincerely hope that you will be able to take part in this exciting event. It would be wonderful for our student ambassadors to give you a tour of the Robot "pits", watch the teams compete, and interact with students and parents that you represent. It's truly a unique and unforgettable experience, and we would be thrilled to have your participation. Your involvement could be fundamental to accelerating *FIRST*'s ability to impact more students more quickly.

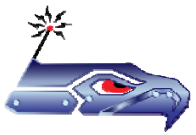
Thank you for your consideration. Attached please find a one-page overview of *FIRST* and our Progression of Programs in addition to an invite to our *FIRST* Stop program which includes a tour of the event and more information. Please do not hesitate to contact me by email at zcohen@aacps.org or by phone 215-284-0898 if you have any questions or if I can provide you with any additional information. I hope you will be able to join us in supporting these diverse, innovative leaders of tomorrow.

Thank you,

Zachary Cohen
Head Mentor and Teacher Advisor
Power Hawks Robotics (FRC Team 1111)
South River High School
Edgewater, MD
443-924-6475 (Google Voice Mobile)
http://www.powerhawks.org

Maryland FIRST Teams Political Representation

Team Information				MD State Senator		MD State Representatives		
Team Name	Team #	School	Address	District	Name	District2	Name 1	Name 2	Name 3
Area 53	53	Eleanor Roosevelt High	7601 Hanover Pkwy, Greenbelt, MD 20770	22	Paul Pinsky	22	Tawanna Gaines	Anne Healey	Alonzo Washington
The Blair Robot Project	449	Montgomery Blair High	51 University Boulevard East, Silver Spring, MD 20901	20	Jaime Raskin	20	Sheila Hixson	David Moon	William Smith
Bovine Intervention	686	Oakdale High School	5850 Eaglehead Drive, Ijamsville, MD 21754	4	Michael Hough	4	Kathy Afzali	Barrie Ciliberti	David Vogt
The RoboBees	836	Forrest Career And Technology Center	24005 Point Lookout Rd, Leonardtown, MD 20650	29	Steve Waugh	29c	Anthony O'Donnell		
Robotiators	888	Glenelg High	14025 Burntwoods Rd, Glenelg, MD 21737	9	Gail Bates	9A	Trent Kittleman	Warren Miller	
The Power Hawks	1111	South River High	201 Central Ave, East, Edgewater, MD 21037	30	John Astle	30B	Seth Howard		
S.O.A.R.	1195	Charles Herbert Flowers High	10001 Ardwick Ardmore Rd, Springdale, MD 20774	24	Joanne Benson	24	Erek Barron	Carolyn Howard	Michael Vaughn
The Body Electric	1389	Walt Whitman High	7100 Whittier Boulevard, Bethesda, MD 20817	16	Susan Lee	16	William Frick	Ariana Kelly	Marc Korman
Garrett Coalition (GaCo)	1629	Southern Garrett High School	345 Oakland Drive, Oakland, MD 21550	1	George Edwards	1A	Wendell Beitzel		
The Umbrella Corporation	1719	Park School Of Baltimore	2425 Old Court Road, Baltimore, MD 21208	11	Bobby Zirkin	11	Shelly Hettleman	Dan Morhaim	Dana Stein
Robo-Lions	2199	Liberty High	5855 Bartholow Rd, Eldersburg, MD 21784	5	Justin Ready	5	Susan Krebs	Haven Shoemaker	
C Company	2377	Chesapeake High	4798 Mountain Rd, Pasadena, MD 21122	31	Bryan Simonaire	31B	Nicholaus Kipke	Meagan Simonaire	
RoboDoves	2528	Western High	4600 Falls Rd, Baltimore, MD 21209	41	Lisa Gladden	41	Jill Carter	Nathaniel Oaks	Samuel Rosenberg
The Lakers	2534	Boys Latin School	822 W Lake Ave, Baltimore, MD 21210	42	Lisa Gladden	42	Jill Carter	Nathaniel Oaks	Samuel Rosenberg
Space RAIDers	2537	Atholton High	6520 Freetown Rd, Columbia, MD 21044	12	Edward Kasemeyer	12	Eric Edersole	Terri Hill	Clarence Lam
Team Dynamite	2819	Oxon Hill High	6701 Leyte Dr, Oxon Hill, MD 20745	26	Anthony Muse	26	Tony Knotts	Kriselda Valderrama	Jay Walker
Ursa Major	2849	Hammond High	8800 Guilford Rd, Columbia, MD 21046	13	Guy Guzzone	13	Vanessa Atterbeary	Shane Pendergrass	Frank Turner
3283 Coyote Robotix	3283	Clarksburg High	22500 Wims Road, Clarksburg, MD 20871	15	Brian Feldman	15	Kathleen Dumais	David Fraser-Hidalgo	Aruna Miller
RoboSpectrum	3389	Parkside High School	1015 Beaglin Park Dr, Salisbury, MD 21804	38	James Mathias	38B	Carl Anderton		
Robo Raptors	3650	North Point High School	2500 Davis Rd, Waldorf, MD 20603	28	Thomas Middleton	28	Sally Jameson	Edith Patterson	C.T. Wilson
Ragnarok Robotics	3748	Mt Hebron High School	9440 Old Frederick Rd, Ellicott City, MD 21042	9	Gail Bates	9A	Trent Kittleman	Warren Miller	
CyberTitans	3793	Tuscarora High	5312 Ballenger Creek Pike, Frederick, MD 21703	3	Ronald Young	3B	William Folden		
The Incredible Hawk	4067	River Hill High	12101 Clarksville Pike (Route 108), Clarksville, MD 21029	13	Guy Guzzone	13	Vanessa Atterbeary	Shane Pendergrass	Frank Turner
Falcons FIRST	4099	Poolsville High	17501 West Willard Road, Poolesville, MD 20837	15	Brian Feldman	15	Kathleen Dumais	David Fraser-Hidalgo	Aruna Miller
Wilde Bunch	4137	Wilde Lake High	5460 Trumpeter Rd, Columbia, MD 21044	12	Edward Kasemeyer	12	Eric Edersole	Terri Hill	Clarence Lam
Worcester Beach Bots	4288	Stephen Decatur High	9913 Seahawk Rd, Berlin, MD 21811	38	James Mathias	38A	Charles Otto		
McDonogh Eagle Robotics	4505	McDonogh School	8600 McDonogh Rd, Owings Mills, MD 21117	11	Bobby Zirkin	11	Shelly Hettleman	Dan Morhaim	Dana Stein
Calvert STEAM Works	4514	Huntingtown High School	4125 Solomons Island Rd, Huntingtown, MD 20639	27	Thomas Mike Miller	27B	Michael Jackson		
CAV-ineers	4541	Archbishop Spalding	8080 New Cut Road, Severn, MD 21144	33	Edward Reilly	33	Tony McConkey	Sid Saab	
Jagbots	4638	Northwest High	13501 Richter Farm Rd, Germantown, MD 20874	39	Nancy King	39	Charles Barkley	Kirill Reznik	Shane Robinson
Jagbots	4638	Northwest High	13501 Richter Farm Rd, Germantown, MD 20874	39	Nancy King	39	Charles Barkley	Kirill Reznik	Shane Robinson
Robo Panthers	4949	Parkdale High	6001 Good Luck Road, Riverdale, MD 20737	22	Paul Pinsky	22	Tawanna Gaines	Anne Healey	Alonzo Washington
High Impact Technologies	5106	Huntingtown High School	4125 Solomons Island Rd, Huntingtown, MD 20639	27	Thomas Mike Miller	27B	Michael Jackson		
Affinity	5115	Wheaton High	12601 Dalewood Dr, Silver Spring, MD 20906	18	Richard Madaleno	18	Alfred Carr	Ana Gutierrez	Jeff Waldstreicher



Created by Power Hawks Robotics Team
Edgewater, MD

v1.5

Building a Team Identity

Agenda

- Intro
- Building the team's foundation
- Building an identity
- Projecting your identity
- Where do we go from here?

Who we are

- Miss Ellie Wood
  - 11th grade STEM student, South River High School
  - Chief Executive Officer of Power Hawks Robotics Team
- Mr. Zachary Cohen
  - Engineering and Technology Teacher, South River High School
  - Head mentor and teacher advisor of Power Hawks Robotics Team

Power Hawks Robotics

- The Power Hawks
  - Made up of 41 FRC students, 30 FTC students, ~30 mentors
  - Based out of South River High School, Edgewater, MD
  - Affiliated with Power Hawks Robotics Club, Inc.
    - Nonprofit not associated with school system
  - 12th year as an FRC team
  - Student led
  - Team run as a corporate entity

What is Team Identity?

- Defines how a team looks and acts
- Incorporates both internal and external factors
- Sets the course for everything the team does
  - Team organization
  - Importance of the robot
  - Importance and type of outreach
  - Overall goal of the team
- Needs to remain consistent throughout all team happenings

Building a Foundation

Building a Foundation

- A team has to have a unified mission
- Should help guide the team in every decision
- Everything a team does should be embodied by the mission and vision statement

POWERHAWKS

Mission Statement

- Short statement that sums up the organization's purpose.
- In essence, why does the organization exist?
- Should embody the overall goal of the organization
- Should be broad—do not go into detail on how the mission is accomplished
- Clear, memorable, and concise.
- Best are often only around 15 words

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Good mission statements

- "Spreading ideas"
  --TED
- "The increase and diffusion of knowledge"
  --Smithsonian
- "Celebrating animals, confronting cruelty"
  --The Humane Society
- "To boldly go where no man has gone before"
  --Star Trek

POWERHAWKS

Bad mission statements

"McDonald's brand mission is to be our customers' favorite place and way to eat and drink. Our worldwide operations are aligned around a global strategy called the Plan to Win, which center on an exceptional customer experience - People, Products, Place, Price, and Promotion. We are committed to continuously improving our operations and enhancing our customer's experience."
--McDonalds

POWERHAWKS

The Power Hawks Mission Statement

"To equip the next generation with the necessary skills to improve the world through competitive robotics."

- Notice what it does and does not mention
- By reading this, what can you infer about the Power Hawk's values?

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Vision Statement

- Short statement that describes the long-term desired change from the organization's work.
- In essence, What should change because of you?
- Should be broad—do not go into detail on how the vision is accomplished
- Inspirational, clear, memorable, and concise.
- Best are also around 15 words.

POWERHAWKS

Good vision statements

- "A hunger-free America"
  --Feeding America
- "A world where everyone has a decent place to live."
  --Habitat for Humanity
- "The United States is a humane community in which all animals are treated with respect and kindness"
  --ASPCA

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Bad vision statements

"Our vision serves as the framework for our Roadmap and guides every aspect of our business by describing what we need to accomplish in order to continue achieving sustainable, quality growth."
--Coca Cola

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The Power Hawks Vision Statement

"We envision: Maryland as a state of forward thinking, global citizens."

- Notice what it does and does not mention
- By reading this, what can you infer about the Power Hawk's values?

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Embodying the Mission and Vision

- Many opportunities can present themselves over the course of the year
- Decide what to do and what not to do
- While it may seem wrong to turn away outreach and demo opportunities, you can grow your team by focusing your efforts

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Embodying the Mission and Vision

- Being selective allows you to focus your efforts
- You'll become stronger in specific areas
- Allows for focused growth and learning
- Better for public perception
  - By doing everything you could appear as scattered
  - Allows you to grow your image in targeted demographics

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Mission and Vision Example

So how do the Power Hawks embody our mission?

- Students before robot
- Each student is required to complete a certain amount of community service
- Students are encouraged to help grow younger programs
- Selective in outreach opportunities
  - Have to differentiate between outreach and potential sponsor opportunities

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Building an Identity

Building a Team Identity

- A clear and consistent team identity helps you to accomplish your mission efficiently
- Team identity is both internal and external
- All individuals, students, parents, mentors, school, etc., have to be on board
- Building a strong team identity will open the team to more student opportunities

Building an Identity

Your team's identity should consider four functions:

1. Should provide visibility and "recognizability"
2. Should symbolize the organization
3. Should be consistent with your surroundings
4. Should reflect and relate to the members of your team

Team Organization

- Strong team organization will help lead to a stronger identity
- Assigning student leaders to "real-world" positions allows for students to gain more experiences, reduce mentor workload, and help to develop a stronger public appearance
- Leadership unifies through mindset and in appearance

Team Organization

Power Hawks organizational chart:

Public Identity

- A strong and unified public identity will help with building a stronger community, better sponsor support, and help develop students
- Full team must be on board
  - Ensure expectations for the appearance of the team are made in the beginning
  - Create documentation to help with unity
    - Team handbook
    - Identity standards document

Team Handbook

- Gives team members clear expectations of what they are to do and their role
- Covers what makes an ideal member, and the reasons for being one
- Briefly covers public identity
- Anne Shade has a great presentation on the topic
- Our handbook is available on our website and Chief Delphi—Welcome to use as you wish, just make it your own and give credit where its due

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Identity Standards Document

- Corporations use them to ensure a consistent product is being delivered to the consumer
- Documentation intended to standardize everything the public may see
- Includes required information for everything from logos, to color palettes, to literature
- May be a bit excessive for a robotics program

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Identity Standards Document

- Very few FRC teams maintain an identity standards document
- We see it as a valuable resource
  - Helps create a concrete identity both for team members and public
  - Creates a database that can be used to easily find files and resources
  - Helps control proper logo and color usage
  - Gives students real-world experiences

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Example Identity Standards Document

- Many many types and formats
- We went through a few and pieced them together to create our layout
- Many examples can be found here:
  - http://www.logodesignlove.com/brand-identity-style-guides
  - http://goo.gl/bEOZTr

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Example Identity Standards Document Contents

- Purpose
- Name standardization
- Team logos
- Color Palettes
- Typography
- Publications
- Sponsor recognition
- Contact information

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Projecting your Identity

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Projecting your Identity

- Now that you've developed your identity, get everyone on the same page
- Ensure team knows of any team literature
- Ensure team is consistent in all public areas
  - –Website
  - –Social media
  - –Team wear
  - –Robot
  - –Pit
  - –Demo events
  - –Etc.

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Public Appearance

- Uniform Appearance
- For example, the Power Hawks Allow:
  - Team T-Shirt
  - Team Spirit Wear ONLY
  - Pants: Khakis and Jeans, no shorts, capris or leggings
- Professional and appropriate
- Reflects team identity more than you'd think
- Displays unity and togetherness

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Starting Fresh

- When developing your identity, may be best to start fresh
- Keep only the bare minimum (name, primary logo, primary colors)
- Create a package for identity
  - –Name
  - –Logos
  - –Colors
  - –Document formats
  - –Emails
  - –Social media

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Identity Package

- Name
  - Ensure its appropriate. What would the public think if they don't know you?
- Logos
  - Formal, informal, text only, etc.
  - Color, grayscale, black and white
- Colors
  - Recommend two primary colors, multiple secondary
  - Adobe Color CC can help here
- Document formats
  - Word, PowerPoint, letterhead, etc.
- Emails
  - Services such as MailChimp allow for tracking and look better
- Social media
  - Ensure whoever is in charge embodies your mission and standards

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Next Steps

- Reevaluate routinely
- Be flexible
  - Allow for minor changes as season progresses
  - Allow image to represent students
  - Continue to enforce the image you created

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Questions?

www.powerhawks.org
Ellie Wood-- lewood.wood@gmail.com
Zachary Cohen-- zcohen@aacps.org

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Use of 3D Printing in FRC

Team 1111: The Power Hawks

POWERHAWKS

Who we are

- Mr. Clayton Cobb
  - 12th grade student, South River High School
  - Build Operations Officer of Power Hawks Robotics Team
- Mr. Nathaniel Chester
  - 12th grade STEM student, South River High School
  - Captain of Design of Power Hawks Robotics Team

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Power Hawks Robotics

- The Power Hawks
  - Made up of 41 FRC students, 30 FTC students, ~30 mentors
  - Based out of South River High School, Edgewater, MD
  - Affiliated with Power Hawks Robotics Club, Inc.
    - Nonprofit not associated with school system
  - 12th year as an FRC team
  - Student led

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Take Advantage of CAD

- Minor part of many teams
- Generally more accurate than fabrication
- Can be used to ensure designs fit the constraints without wasting materials
- Multiple ideas can be designed quickly
- More people can work on one or more problems at once
- Allows team to anticipate problems they will have

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3D Printing Advantages

- Inexpensive ($25 - $45 per kilogram)
- Quick and nobody needs to oversee its construction
- Can be used to easily create custom parts
- Teams without much fabrication (either because of its expense or for lack of time) can now make custom parts through the use of 3D printers

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Disadvantages

- Comparatively weaker than wood and metal
- 3D printers are expensive
- Knowledge of CAD software and how to use the printer is necessary for effective implementation
- The parts have a weak Z-Axis because the plastic is built in layers
- Getting higher tolerances than wood and metal parts takes skill

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Custom Parts

- Can be used to make holders for sensors, fittings, and wire tracks.
- Teams can create plastic spacers, pulleys, and gears for drivetrains and mechanisms.
- Can be used for aesthetic parts and team logos
- Custom parts make a robot stand out


Team 121


Team 2363


Team 222

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Prototyping

- It can make parts extremely quickly
- People can work on other things while it is printing
- Can be used to make molds to mass produce parts
- A team could make a practice arm or other attachment to ensure that it fits the size constraints and intended function
- They could also make practice parts, wheels for example, which could break and still be cheaply replaced

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Questions?

Contact Information:
Clayton Cobb - clayton.cobb@skylinescenes.com
Nathaniel Chester - nathanieltchester@gmail.com

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Scouting

With Casey Troxler from
The Power Hawks

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Agenda

- Selecting Scouts
- What is Scouting?
- Why is it Important?
- Pre-Scouting
- Pit-Scouting
- Stand/Matching Scouting
- Alliance Selection
- Questions

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Who I am

Casey
Lead Scout for The Power Hawks Robotics Team
- 11th grade STEM student, South River High School

The Power Hawks Robotics Team 1111
- Went undefeated at North Carolina Regional until final elimination round
- Was picked or picked in every Competition we participated in

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Selecting Scouts?

Your Scouts need to be a couple things:
Chemistry with your drivers, and coach
Absorb Information
Analytical
Withstand pressure

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What is Scouting?

- Scouting is three things
- Gathering Data
- Preparing Data
- Using Data

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Why is it Important?

Scouting when it comes down to it can win the impossible games, and assure victory in the easy ones.

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How?

There are three kinds of scouting Pre-Scouting, Pit-Scouting and Stand/Match Scouting.

We will go in to more specifics in the following slides.

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Pre Scouting

- Pre Scouting is Scouting the teams before you even get there.
- There are various sites and data that you can find online(Chief Delphi, The Blue Alliance)

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Pit Scout

Pit Scouting is scouting done in… wait for it, the pits. This is typically done by a few people walking through the pits asking questions about the robot or just making general observations.

Important Things:

Manipulator type

Drive Train

Looks

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Stand/Match Scouting

Stand Scouting is very important, its how you figure it out how robots are actually performing. This is better than relying on the illusive match ranking, or shaky pit scouting data. It also gives important insight to how robots perform, what their preferred position is and how they fit in to match strategy.

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Our Match Scouting

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Alliance Selection

This is where you make a pick lists. These are important, and make sure you put plenty of time to it, when the most scouting data is available. Typically this is the night after the first day. The most important part is not getting the best solo team, but the best team for your strategy. If defense is part of your strategy, then make that a your third pick.

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Power Hawks Robotics Team

Power Hawks Engineering Notebook

2015

SOUTH RIVER POWERHAWKS ROBOTICS

Team 1111

Table of Contents

Week 1

Monday

We began to analyze the game down to the details and came to a consensus for how we want to play the game. We did very rough design for the lift mechanism. Next Meeting we would like to begin a final CAD design for the chassis and begin more professional CAD for the smaller subsystems.

-BOO (Build Operations Officer)

Today fabrication worked with design team to brainstorm possible methods of playing RECYCLE RUSH℠. We prototyped two methods of lifting totes: one with hooks and one that grabbed the totes with arms. Both are potential methods, and could possibly be combined into one system. While the hook system is lighter, the grabbing method can pick up totes upside down as well as right side up, while also being able to pick up recycling containers. Finally, we discussed potential ways to grab the recycling containers from the step quickly at the beginning of the match. Next Meeting we need to continue improves the grabbing mechanisms before selecting one next week. We will also continue working on a method of getting the recycling containers from the step, including prototyping some general designs. Finally, a drive train needs to be chosen so that design team can design a chassis that fits the wheels as well as the mechanisms.

-Fabrication

We began designing and prototyping various systems with the help of Fabrications. We worked on various systems to pick up a tote and a can. We also began evaluating the effectiveness of the various systems. By accomplishing this today we could determine whether further prototypes or modifications to the existing mechanisms were necessary. Next Meeting we plan to continue designing subsystems and to account for possible modifications to the mechanisms. We also plan to work on the chassis design.

-Design

We completed a basic test board (blue board) to use the new control system, along with a new way to attach our pneumatic board. Next Meeting we will wire our new talon SRX's, test the new blue board.

-Controls

The full Chairman's team met briefly to discuss their roles. Those working on the Chairmans video stayed behind to decide this year's Chairmans video concept plan and choose the main and supporting topics to be covered in the video. Additionally, the Chairmans mini essay outlines were completed and the drafts were started. PR worked on and completed some pit banner designs and made more progress on the website. The website was reorganized and new pictures were selected. Additionally, the time-lapse photos from the Battle of Baltimore Off-Season competition were uploaded to YouTube. Finance cataloged receipts, updated budgets and held a meeting on sponsorship gathering strategies. Events finished the paperwork for the Troy Regional and re-purposed last year's information packet to be applicable to this year. Next Meeting Chairmans plans on finishing the rough draft for the mini-essay rough drafts and getting the video story board started.PR wants to print the pit banners and the Havik cover and post the selected photos. Events plans on working on planning the college trip to Rensellear Polytech Institute on the Troy regional trip. Finance plans on completing the cataloging of the receipts.

-Business

Thursday

We have determined 2 basic pick-up systems and begun the prototyping phase of design. Programming has completed their first setup of the new Robo-RIO system. Next Meeting we would like to refine our design and prototypes in order to move forward with the construction process of the major mechanisms.

-BOO(Build Operations Officer)

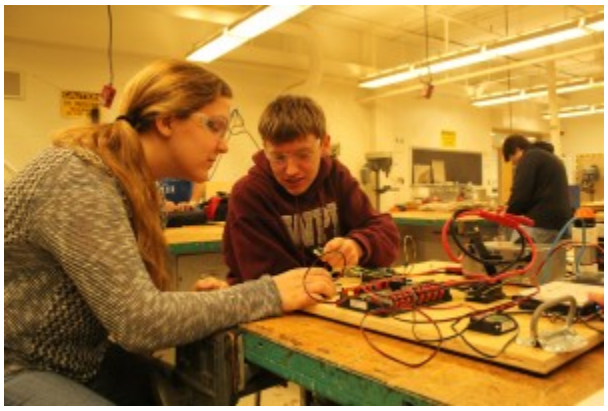
Today Fabrication continued prototyping. We improved the hook design to pick up the Totes. We also began prototyping a parallel grabbing mechanism to orient the totes into position for the hook mechanism. Finally, we decided what type of drive train we would use: a tank drive with the option of omni- wheels on either the front or back. Next meeting we need to continue prototyping these mechanisms. We also need to begin working on how to combine the mechanisms into one cohesive robot.

-Fabrication

We continued work on various prototypes. We developed various systems to pick up the tote and cans. We focused primarily on the possible variations in chassis. We determined that we would create a U-shaped chassis and use chain drive. This now turned our only focus on the chassis to be the general dimensions and the type of wheels. We also now need to consider the structural stability on all of our designs, as a U-shaped chassis is inherently weaker than a rectangular chassis. Next meeting we plan to finish the design for the hook system and the hugger system. We also plan to make decisions on chassis size and wheel type/location.

-Design

We tested the blue board, everything moved the way it should, wired the new talon SRX, put Anderson connectors in the motor wires and power wires, and put PWM connectors on the CAN bus wires. As well as tested one of our new Honeywell encoders, works a lot better than the old EP4. Next meeting we will test more of our new encoders (MA3, E2, CUI) and possibly try putting a second control system.



-Controls

Finance worked on inputting more receipts and updating budgets. PR proofed & printed the pit side panel in addition to uploading the photos chosen last time to the website. Also, off-season and kickoff photos were uploaded to Flickr. Chairman's started work on the mini essay drafts, reviewed the edits already received for the essay, and completed the storyboard/outline for the video. Events fixed field trip permission packet for Troy and finalized Troy itinerary. Next Meeting Finance plans on continuing to input receipts and update budgets respectively. PR plans on printing the top pit banner. Chairmans plans on finishing at least half of the mini essay drafts

and sending out the essay for more review. Events plans on contacting the girl scouts and further plan the girl scouts events.

-Business

Friday

We completed final prototypes of the major mechanisms and are now completing testing on those mechanisms for their functionality. Next Meeting we are hoping to begin construction of the final chassis and figure out our internal structure and size/configuration of the chassis.

-BOO(Build Operations Officer)

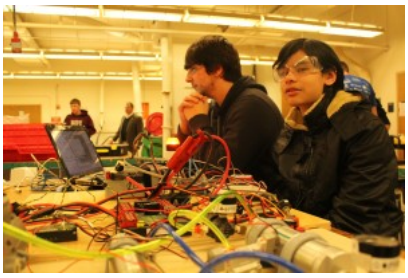
Today, Fabrication prototyped the drive trains using little robots. We continued working on the hook design to lift the totes, and added a specialized hook on top of the prototype to grab the Recycling container from its side. The hook flipped the container up instead of actually picking it up, so it may be a viable method of righting the container. We also continued to work on the parallel aligning device, to align the totes for the hook system to grab it. Finally, a method of getting the containers from the step was prototyped. Next meeting, Fabrication needs to test the wheel drive system on an old chassis. The aligning method also needs to be perfected. We also need to test the method of getting the containers from the step.

-Fabrication

Today we discussed our progress on design and prototyping with the mentors who had missed last meeting. We also continued working on the hook designs and spring designs. We 3D printed two model hooks to test on the boxes, although neither fit. Two designs of the hugger system were worked on, one linear model using pistons and another model using springs. We also designed two U-shapes chassis and attempted to find ways to minimize the structural pitfalls which entailed with our chassis choice. These allowed us to ensure the prototypes were able to accomplish their task and will help us try to narrow down the mechanisms we plan to implement. Next Meeting we plan to finish all current designs and prototypes. We also plan to have the final dimensions and designs for the chassis.

-Design

We went over how to wire the control system. Tested several sensors such as light sensors, encoders, and ultrasonic sensors. Also we started to wire a chassis to be able to drive and test mechanisms that require wheels on the ground. We also tested mech's new prototypes, see mech's day to see! Next Meeting we plan on getting some ip cameras to work, and make sense of our sensor data. and wire a second chassis for more practice.

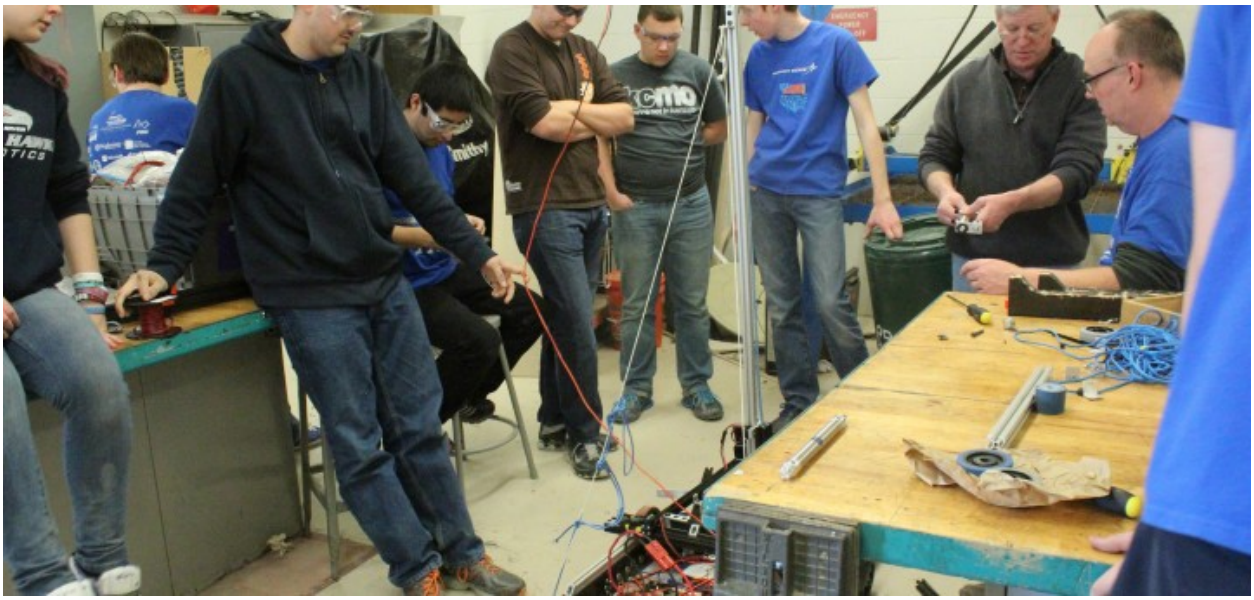


-Controls

Finance inputted more recipes and updated budgets. PR packaged the pit side banner and found sponsor logos and the game logo for the back of this year's shirt. Website rearranged and linked the sponsor logos to their respective sites. Chairmans finished the mini essay drafts.Events brainstormed new community service and outreach events after working on portable inspiration. Next Meeting Finance plans to input more receipts and update more budgets. PR plans to have draft of T-Shirt designs and Thank You notes. Photo will upload its first Flickr dump. Chairmans plans to edit the mini essay drafts and begin work on the Chairmans binder essay. Events plans to work more on portable inspiration, starting worksheets and gathering ideas for the coloring books. Events also hope to work more on the Troy college trips.

-Business

Week 2

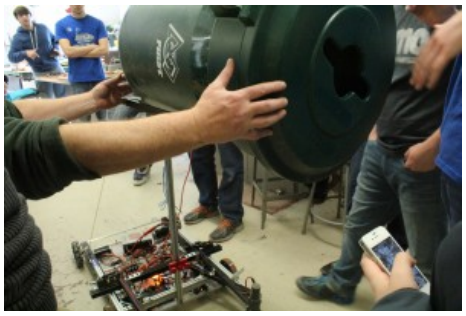


Monday

We continued prototyping our two tele-op manipulating mechanisms. More testing was done and data was collected. From this we should be able to finalize our general design by Friday.

-BOO(Build Operations Officer)

Fabrication worked on prototyping a hook method of stacking totes, where each tote is lifted into a stack by a hook. We also began prototyping a stacking method where the bottom tote of a stack is placed on another tote, continuing until a stack is formed. One method of aligning totes and recycling containers using a pneumatic slide was tested. This method worked well when the totes were mostly oriented correctly, but would not turn the totes much. A second method was begun where wheels were placed on the ends of arms. The arms are mounted to a support using hinges and springs, and are not yet finished. Finally, the chassis was started. It is a long, thin, west coast style chassis. Next meeting, we need to finish the stacking mechanism prototype and test it. We also need to find a better way to slide the hooks for the hook stacking mechanism, as the current slides jam frequently. Finally, we need to finish and test the aligning mechanism with wheels.



-Fabrication

Today we helped to prototype the three designs which would be compared in the design review. We also printed more hooks and began our pretty designs. Next meeting we plan to have all of the designs finished and tested for the design review. When the designs are ready, we will conduct the design review and determine the designs we plan to pursue.

-Design

On Monday Controls met with Clayton, and discussed sensors for the robots mechanisms, and decided the controller button designations with the drivers. They also started setting up our two chassis for test, and final robot.

-Controls

Finance inputted receipts and updated budgets. PR made small changes to and finalized the t shirt background design. They also completed the Pit Closed sign and thank you card designs and made several front pit banner drafts. For the website, a rough draft for the new front page with a new photo slider was made, the sponsor logos were completed and rearranged, and they picked out photos for the new slider and the engineering notebook. The Notebook week 1 was posted with these photos. Video set up a time lapse of the shop and filmed a prototype test. Chairmans integrated mentor edits for the mini essays and began work on the Chairmans binder outline. Events organized the teams Google Drive, picked a new community service project, and created a Portable Inspiration plan. They also worked on an introductory PowerPoint

and created a crossword puzzle for Portable Inspiration. They sent out emails to Rensselear Polytechnical Instituit, Annapolis Mayors office, and the National Electronics Museum. Lastly, they made an itinerary for Robot Sendoff day. Next Meeting Finance plans to input more receipts, update more budgets, and create weekly budget reports for each subteam. PR plans to develop button designs. Chairmans plans to make more progess on the Charimans Binder outline. Events plans to create a fill in the blank worksheet, finish the Powerpoint for, and start redesigning the game for Portable Inspiration. They also plan to contact RPI again and SunniPI.

-Business

Tuesday

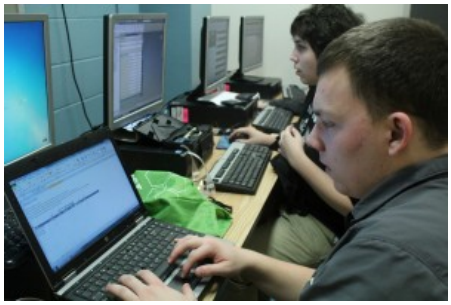
A new idea was introduced for the autonomous recycle bin grabber. We began prototyping this and testing new ideas for it.

-BOO(Build Operations Officer)

Today, Fabrication finished and tested the stacking mechanism that lifts a stack of totes and places on another tote. Using pneumatics, this method is effective, however it is slow and requires the totes to be positioned perfectly to work. The second method, using hooks, was also tested again today using 3-d printed hooks from the Design Team. The hooks slide much better than the COTS sliders and rollers we tested before, and keep the totes stable. This method is quick and reliable, and easy to fix if it breaks. The prototype of the tote aligning mechanism with wheels was tested and is very accurate. Next meeting, the final robot design needs to be made based off of the prototype tests from today and yesterday. We also need to continue working on the chassis, and start building the final robot

-Fabrication

We finished all of the remaining designs and tested the prototypes (mostly the hinge-hugger and the hook design). After this we conducted a preliminary design review and determined to pursue the wheel-hugger as an intake and the hook system for stacking. Next meeting we plan on continuing work on the pretty designs, and upon completion, attaching them to the chassis. We are also pursuing various hook designs to determine their effectiveness.



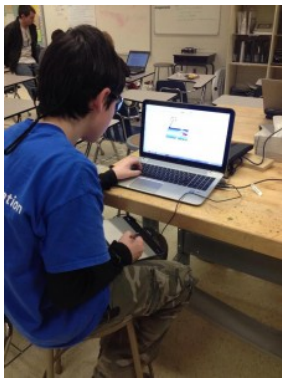
-Design

We wrote test code for sensors, such as the light sensor for the lift, and tested the mechanisms with test code. They also worked on making the PMW cables. PMW cables are used to let the programmer communicate with the talons and the motors.

-Controls

Finance started work on the weekly budget report. PR worked on the outreach poster for the pit, button design concept sketches, and looked at different types of buttons with lights. Website broke the website, spoke choice words at the website, and fixed the website. Video took footage of the prototypes and set up a time lapse in the shop. Photo documented the prototype building and testing and picked out more photos for the website. Graphics worked on the top panel for Havik. Events worked on Portable Inspiration, by starting on the rules for the PI game an

reviewing the resources. They also completed the itinerary, drivers and chaperon forms, and created a preliminary student list for Chesapeake. Events also found more volunteer events for the team, completed the schedule for the study day, and contacted RPI. Chairmans integrated more edits to the main essay and started the 2015 Chairmans binder. Next Meeting Finance plans to work more on the weekly budget reports for each subteam. PR wants to photograph and videotape the progress build is making and any prototype testing. They also want to add the photos selected today onto the website and work more on developing the button designs. Events plans to finish the Portable Inspiration game rules, further develop a volunteer opportunity for people to get hours, and work on the Portable Inspiration itinerary and self-teaching portion. Chairmans plans on finishing the Chairmans Binder and start work on the video and presentation scripts.



-Business

Friday

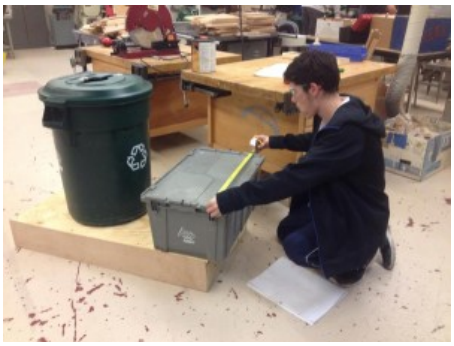
The Chassis perimeter was finalized other than the front most member of it. We know our wheel and drive configuration as traction wheels in the front and omni-wheels in the back.

-BOO(Build Operations Officer)

Today, Fabrication tested all of the prototypes. These tests showed that both the hook system and the grabbing mechanism are plausible methods of stacking totes. We also continued working on a way to get the recycling containers off of the step. Finally, a design review was held, where we decided to continue with the hook mechanism, and work on the other lifting mechanism in CAD. Next meeting, Fabrication needs to continue working on the chassis and begin a final product for the tote acquiring mechanism.

-Fabrication

Today we continued to work on the pretty designs. The wheel-hugger design has been completely designed, and has been attached to the chassis. We also designed parts for other sub teams, including a prototype electrical board and an encoder mount. Various hook designs were also printed to determine the most effective design. Next meeting the pretty versions of every subsystem should be designed, and they should be attached to the chassis. A general hook design will also be decided upon.

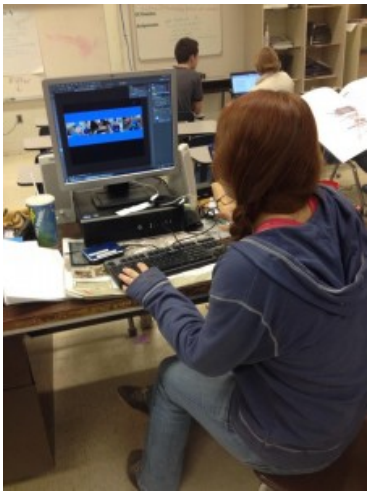


-Design

Today we tested our code with the lift mechanism, and wrote practice code for our sensors, and other mechanisms. We also finished up wiring our two chassis, the competition, and practice one, as well as wiring photo sensors, and kept wiring PWM Cables.

-Controls

PR finalized and printed the event banner, worked on outreach banner, and updated social media icons and banners. They also changed the formatting for the resources page on the website and uploaded 3 new time lapses on the Power Hawks YouTube channel. Chairman's edited the rough video script and set up some basic formatting on the video itself. Events worked on the presentation script and brainstormed new names for Portable Inspiration. They also made up the Chesapeake permission letter and the plan for the Georgetown Hospital service event. In addition to this, they found new fundraising ideas, found new school related demo options, and planned a "Go Casual" fundraising plan and a Baltimore STEM Demo. Finance distributed weekly budget reports to each sub team. Next week PR plans to print and proof the outreach poster, finish the prototype video, and website will work more on the resources page. They will also work on button designs. Finance will update more budgets and start work on fundraising and sponsorship. Events plans to finalize the Chesapeake information packets finish the portable inspiration script and work on the portable inspiration prezi. They also hope to pick the best idea from their fundraising brainstorm.

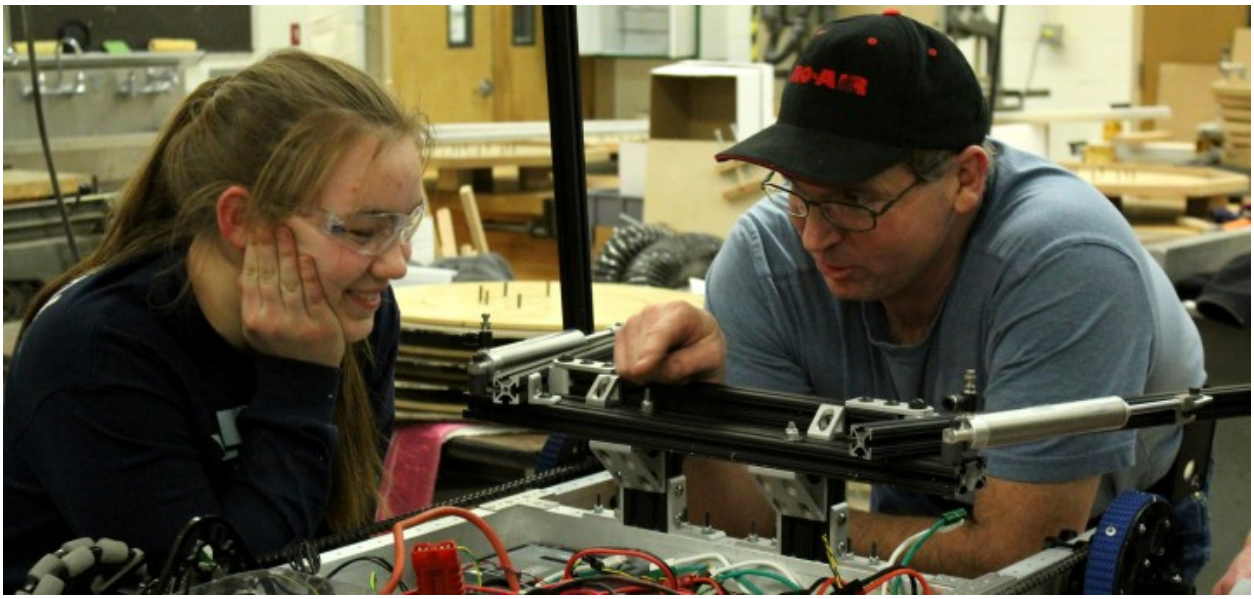


-Business

Week 3

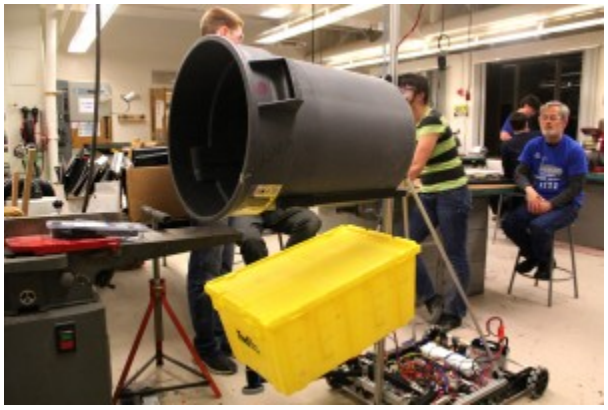
Week 3 was canceled primarily from exams and cancellations.

Week 4



Tuesday

We completed the fabrication of our practice bot chassis and started adding our prototype mechanisms to it. The chassis is the foundation of the robot so this was a large milestone in the process as this was designed by us instead of buying something stock. Next Meeting we will begin the fabrication of the final chassis and continue to develop the final mechanisms that will make it on to the robot for competition.



-BOO(Build Operations Officer)

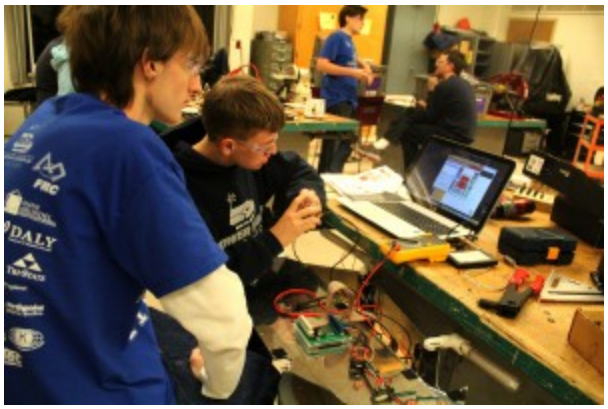
Today, Fabrication worked on building a second chassis. We also worked on mounting the Tote Acquirer to the first chassis. Finally, we made a mast for the hook system. Next meeting , we need to finish the mounting for the tote acquirer, as well as the second chassis. We also need to mount the hook system to the first chassis and test the Tote acquirer.

-Fabrication

Today we continued with prototypes, predominately the mechanism which takes the cans off of the central step. We also continued to modify hooks and have developed a final testing design, which we began printing along with some motor mounts for the hugger system. Next meeting we plan on having finished hooks to test. We also plan to continue work on the mechanism to get the cans off of the step.

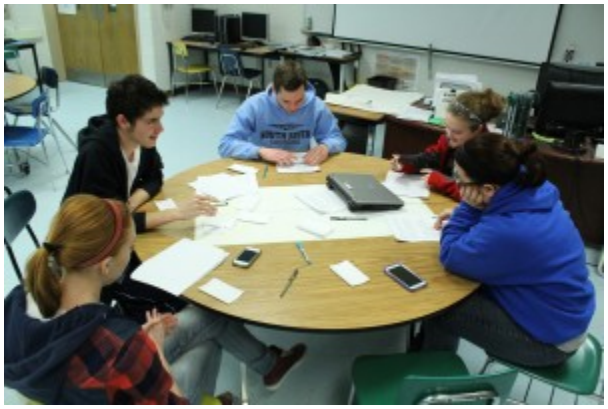
-Design

We had everyone create their own subVi's to decide how to make our mechanisms move. then we tested each of our subVi's on our test bed. we found that we had some issues with calling motors in 2 places causing it not to work properly.



-Controls

Today we practiced our parts of the chairmans script and helped edit it. We did this multiple times in order to get the script as perfect as possible. Next meeting we will continue to work on the script and assess the gantt chart for other tasks.



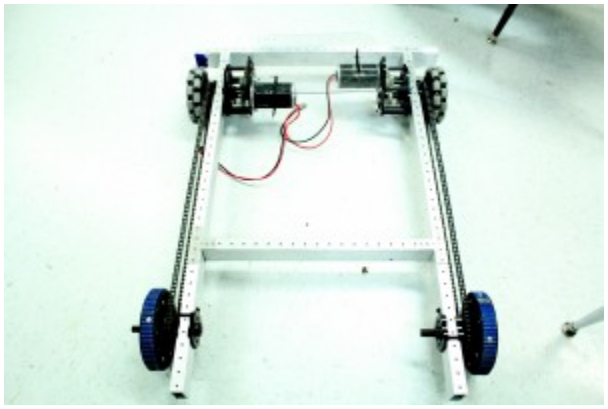
-Competition Prep

Friday

We completed the chassis for the final robot and continued developing and testing the mechanisms on the practice robot. Next Meeting we plan to allocate more resources to the mechanism in the rear in order to grab the recycle containers from the center step as this will be a game changer in competition.

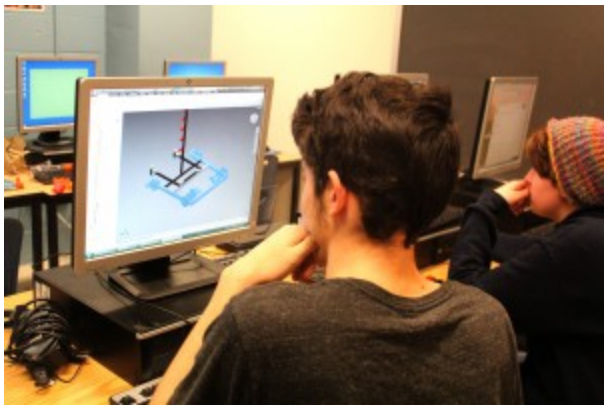
-BOO(Build Operations Officer)

Today, Fabrication, finished mounting the Tote Acquirer to the first chassis, and finished the second chassis. We also began machining a spool for the hook system to pull the hooks up and down. Next meeting, we need to test the Tote Acquirer, as well as finish the mounting of the Hook mast.



-Fabrication

Today, and in the voluntary meetings preceding it, we managed to edit the hugger prototype after a failed attempt to alter the arm length. We also finished printing canted motor mounts for the hugger system. Prototyping continued on with the center step system, mainly focused on how to articulate the movements of the two telescoping arms. Next meeting we plan to print more hooks, along with making many covers for electrical components (the Roborio and nav 6). We plan on having a design review next meeting to discuss the center step strategies and systems, as well as some way to keep the totes from sagging when lifted by the hooks.



-Design

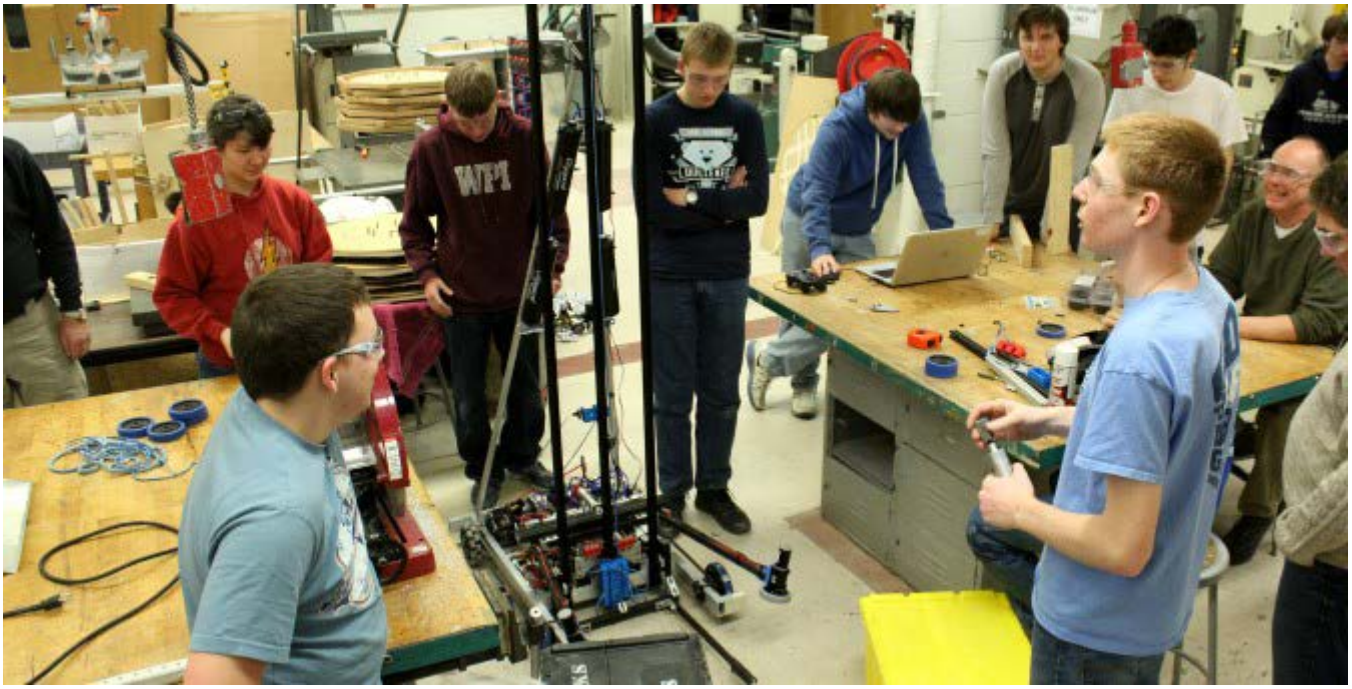
We tested drive encoders with our 3d printed gears and mounts, and we got good results. some of our subVi's include Auto-rotating, moving our hook to a certain position, and bringing the hook down softly.

-Controls

Today we helped review human player questions and added a question to the form. We practice the chairman's script again and made some final edits. Next meeting I hope to build field pieces and finish the human player sign up form.

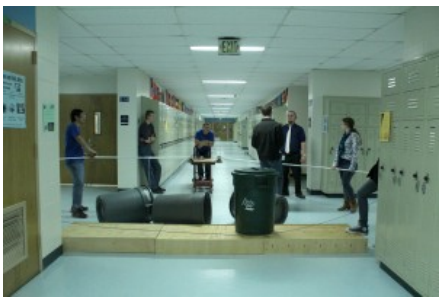
-Competition Prep

Week 5



Monday

Our middle step recycle bin grabbing mechanism prototype was tested and did not meet our performance requirements. It was very large and complex for the task it was trying to complete. Begin the design of the new middle step recycle bin grabber.



-BOO(Build Operations Officer)

Today, Fabrication finished assembling our first robot. After mounting the pneumatics on the Tote Acquirer and the spool to to the frame to lift the hook system. We tested the robot and found out that the spool jammed when it lifted the hooks. Next meeting, we need to fix the spool

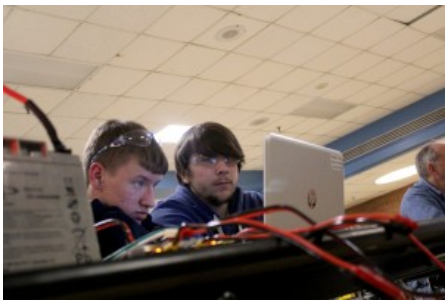
and the slides so that they do not jam. We also need to attach another rope to the spool so that the motor pulls the hooks down instead of trusting gravity.

-Fabrication

Today we worked continued the design of the center grabbing mechanism. We conducted attempted to conduct a test of this mechanism, although it proved unsuccessful. We also continued designing the pulley mechanisms. Next meeting we are conducting another test of the center grabber after slight modifications. This will be the final test of the mechanism, and if it proves effective it will be utilized, otherwise a design review will be conducted to determine new solutions.

-Design

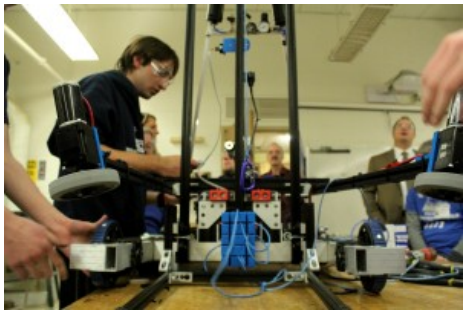
We started to add basic behavior codes to the robots programming in order for it to operate more autonomously during matches. This creates a fluid operation during the driver time of matches allowing our driver to focus on the task not the procedures.



-Controls

Tuesday

We began fabricating the final mechanisms for the second robot. We are consolidating those mechanisms in order to make them lighter so that we can use the weight elsewhere on the robot. We plan to fabricate the first prototype of the new middle step recycle bin design.



-BOO(Build Operations Officer)

Today, Fabrication Tested the Hook system again and made adjustments to ensure it slides well. We also worked on the intake mechanism for the second robot. Next meeting, we need to finish the intake system for the second robot and work on the second hook system.

-Fabrication

We tested the center grabber again, and it ended up failing. After this we conducted a design review to brainstorm solutions and their potential effectiveness. We will finish the design review, as we ran out of time last meeting. We will also work on adding more parts to the integrated chassis.

-Design

We began testing our behavior code on the testing board to make sure it worked the way we planned. This helped us prepare to test it on our first robot made for testing later.

-Controls

Friday

We are almost done with the prototype to grab recycle bins from the center step. Also automation of the lift mechanism was completed by the programming team. We plan to work out all of the minor programming problems and complete automation of all our behavioral systems.

-BOO(Build Operations Officer)

Today, Fabrication began the second hook system and prototyped a system to remove the intake quickly to stay in the size constraints. We also worked on a back drive system to lower the hooks. Tomorrow, we need to finish the back drive, and finish the second intake system, as well as continuing with the second hook system.

-Fabrication

Today, Fabrication began the second hook system and prototyped a system to remove the intake quickly to stay in the size constraints. We also worked on a back drive system to lower the hooks. Tomorrow, we need to finish the back drive, and finish the second intake system, as well as continuing with the second hook system.

-Design

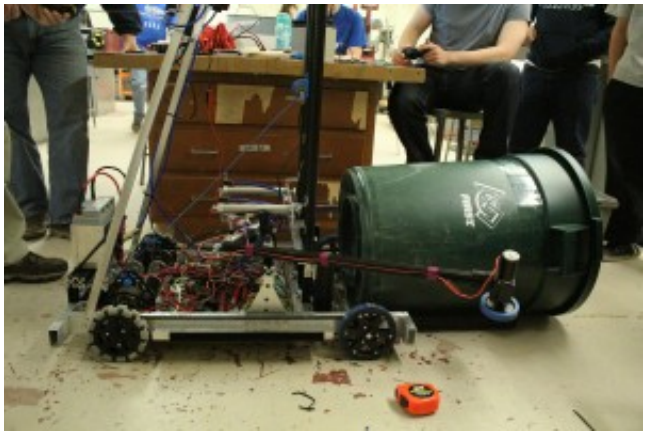
We continued to implement behavioral code in order to automate our systems better. After creating the code we tested it on-board and found minor issues. After correcting these issues we had to add more code to implement and test. As more mechanisms are added to the robot we have to add and implement more automated code for this year's configuration.

-Controls

Week 6

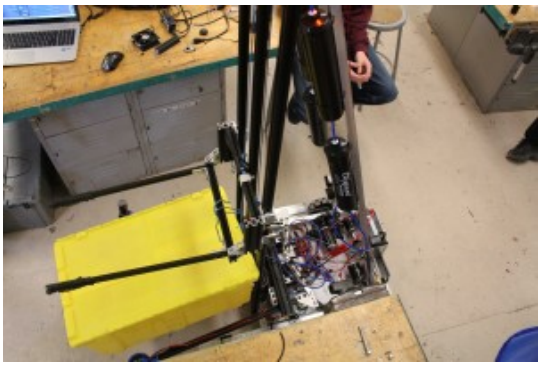
Monday

We changed the height correction system because it was twisting the totes. With this new system the totes are corrected as they are lifted. We plan to continue to test the competition robot as a whole. There are a lot of minor kinks that need to be worked out in the mechanisms.



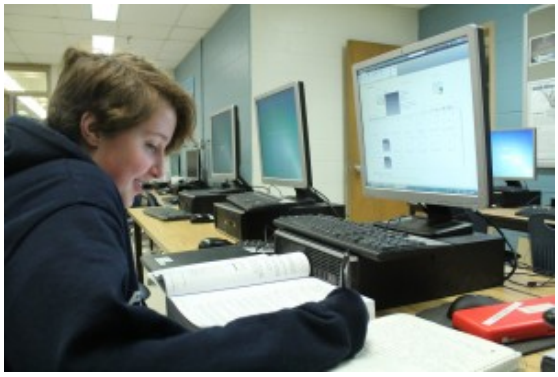
-BOO(Build Operations Officer)

Today, Fabrication, worked on finishing the second robot. We plumbed the pneumatics, and made removable mounts for the Tote acquiring arms so that they fit in the transport configuration. Next time, Fabrication needs to make a removable mount for the can lifter. We also need to ensure the spacing between the hooks is good.



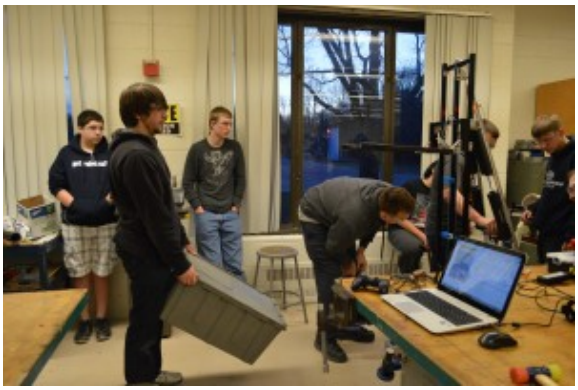
-Fabrication

We continued to design the can grabber and we also edited the hook designs and began printing more. We began to practice with Solidworks, as we hope to be able to incorporate its use into our designs for next year. Next meeting we plan to test the can grabber and the new hook designs. We will modify each appropriately based upon these tests. We will also help fabrications with the two robots, as we are running low on time.



-Design

We got the final robot from mechanisms to test all of the functions with the new improvements, everything worked better than it did with the practice robot. With the new improvements of the final robot from the practice we managed to increase the efficiency of the operations.



-Controls

Friday

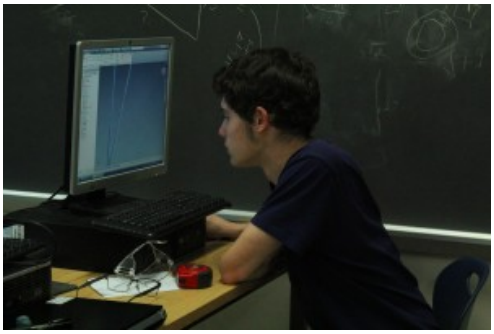
We have continued to implement code and test the mechanisms. The robot is *essentially* finalized but we are working out minor issues and adjustments. We plan to continue this testing process.

-BOO(Build Operations Officer)

Today, Fabrication made a removable mount for the can lifter. We also adjusted the pneumatics so that the totes will be level when they are lifted. A servo mount was also made to hold a servo to secure the recycling container on the lift. Finally, we tested the pneumatics for leaks. Tomorrow, we need to finish the hook spacing, and square the frame on the first robot. We also need to continue working on a mechanism to get the recycling containers from the center step. Finally, we need to test the second robot to ensure everything works properly, and fix anything that doesn't.

-Fabrication

We tested the can grabber and the new hooks. The can grabber was relatively effective, and it only needed small tweaks to the motor mount. The hooks worked, although they jammed on occasion. Next meeting we will discuss various ways of stopping the hooks from jamming and we will continue helping mech, as the robot is scheduled to go to controls by Saturday.

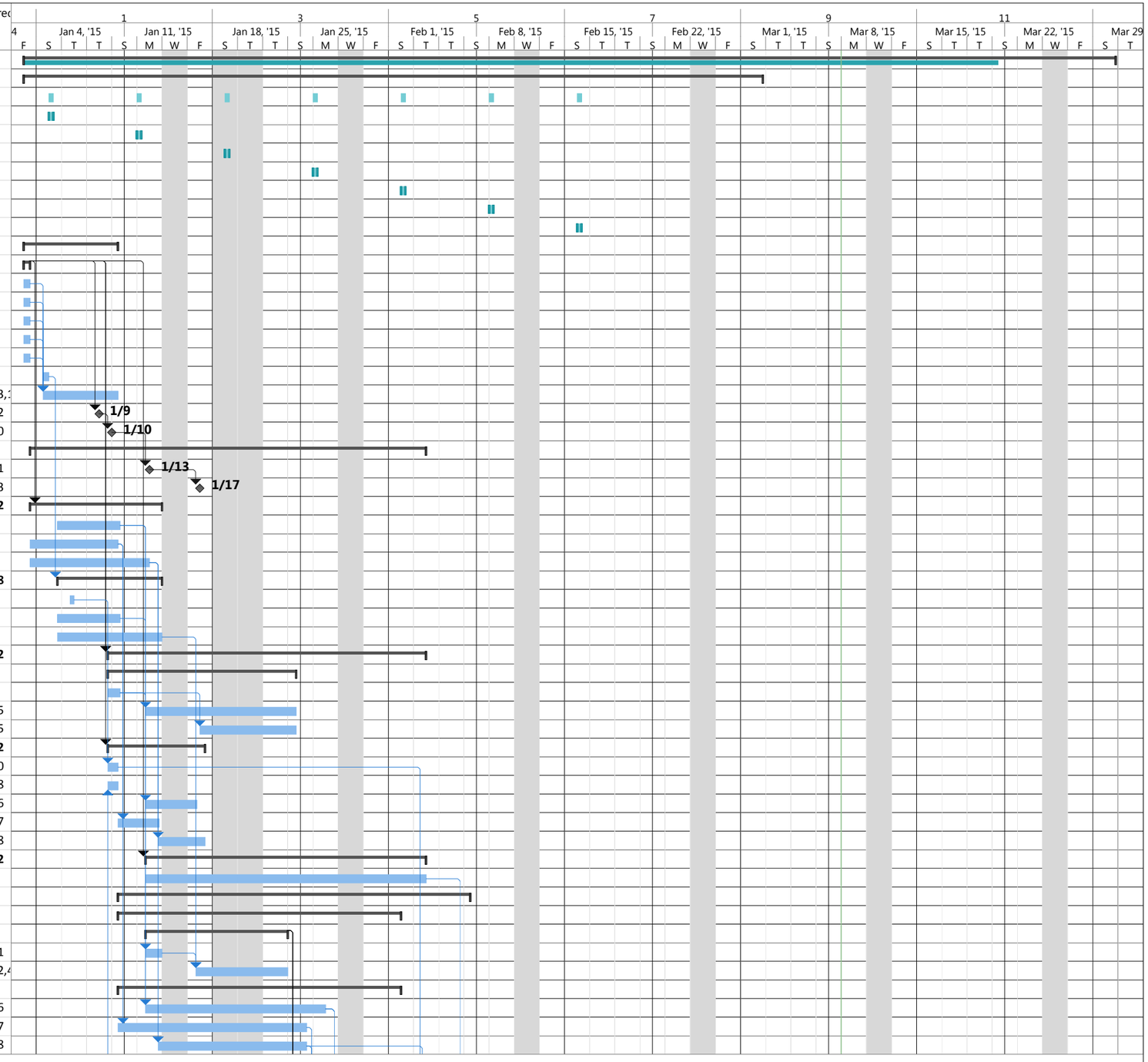


-Design

We are creating a control box that will be use to supply the driver with information on tote and bin placement using TI launchpad. Design and Controls used CAD to create a 3D printed case for our visual proccesing camera that has a 120 degree angle lense for supplying drivers with visual information.

-Controls

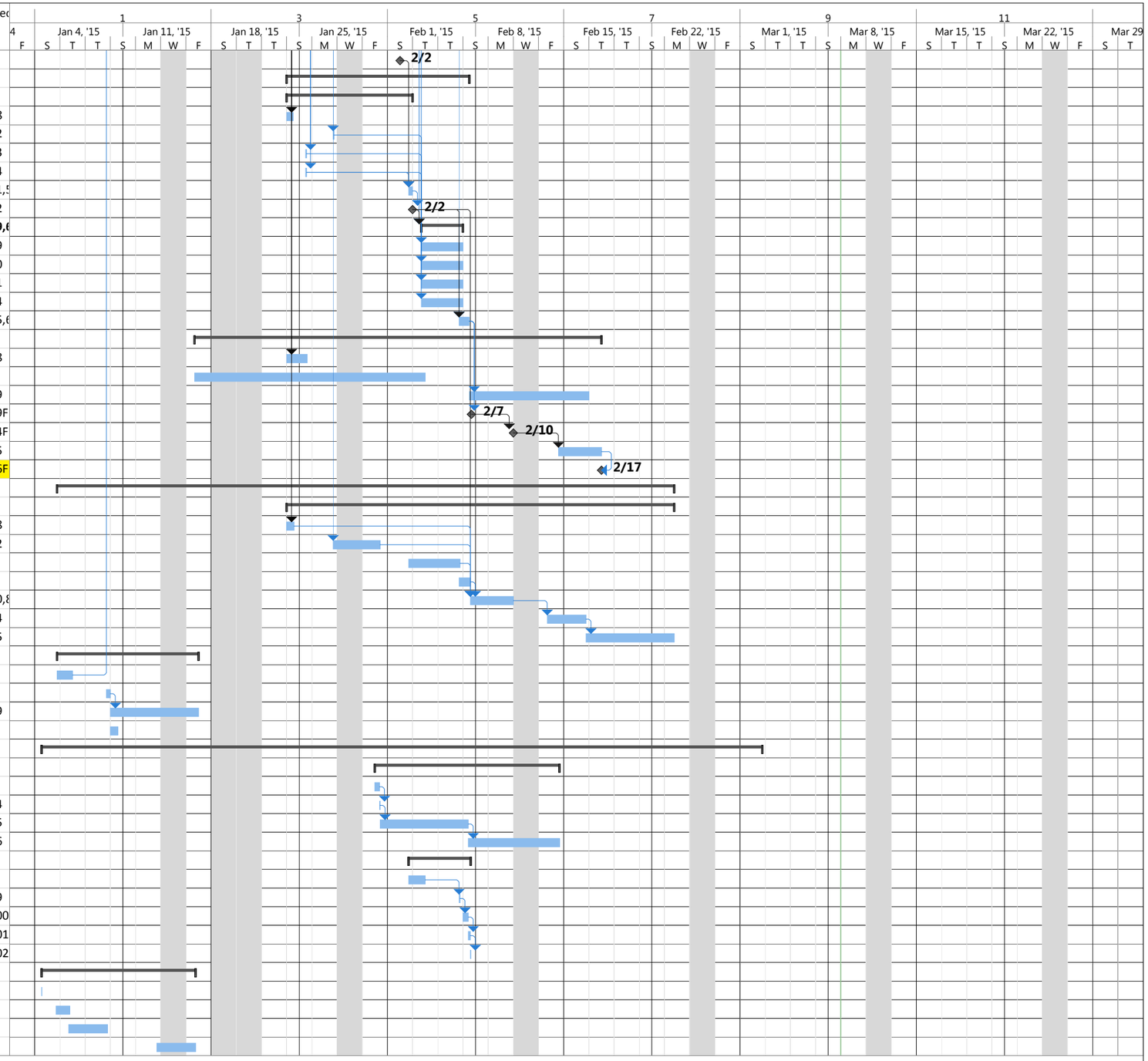
ID	Task Mode	Outline Number	Task Name	Start	Finish	Duration	Predecessors
1		1	**2015 Power Hawks**	**Sat 1/3/15**	**Mon 3/30/15**	**252.5 hrs**	
2		1.1	**Build**	**Sat 1/3/15**	**Mon 3/2/15**	**171 hrs**	
3		1.1.1	**Weekly Design Review**	**Mon 1/5/15**	**Mon 2/16/15**	**117 hrs**	
4		1.1.1.1	Weekly Design Review 1	Mon 1/5/15	Mon 1/5/15	0.5 hrs	
5		1.1.1.2	Weekly Design Review 2	Mon 1/12/15	Mon 1/12/15	0.5 hrs	
6		1.1.1.3	Weekly Design Review 3	Mon 1/19/15	Mon 1/19/15	0.5 hrs	
7		1.1.1.4	Weekly Design Review 4	Mon 1/26/15	Mon 1/26/15	0.5 hrs	
8		1.1.1.5	Weekly Design Review 5	Mon 2/2/15	Mon 2/2/15	0.5 hrs	
9		1.1.1.6	Weekly Design Review 6	Mon 2/9/15	Mon 2/9/15	0.5 hrs	
10		1.1.1.7	Weekly Design Review 7	Mon 2/16/15	Mon 2/16/15	0.5 hrs	
11		1.1.2	**Analyze**	**Sat 1/3/15**	**Sat 1/10/15**	**28 hrs**	
12		1.1.2.1	**Create Build Information Package**	**Sat 1/3/15**	**Sat 1/3/15**	**4 hrs**	
13		1.1.2.1.1	Determine scoring priorities	Sat 1/3/15	Sat 1/3/15	4 hrs	
14		1.1.2.1.2	Minimum point-goal	Sat 1/3/15	Sat 1/3/15	4 hrs	
15		1.1.2.1.3	Determine game level objectives	Sat 1/3/15	Sat 1/3/15	4 hrs	
16		1.1.2.1.4	Determine high-level requirements	Sat 1/3/15	Sat 1/3/15	4 hrs	
17		1.1.2.1.5	Determine robot sub-systems	Sat 1/3/15	Sat 1/3/15	4 hrs	
18		1.1.2.2	Drive system requirements established	Sun 1/4/15	Sun 1/4/15	4 hrs	
19		1.1.2.3	Preliminary sub system requirements	Sun 1/4/15	Sat 1/10/15	20 hrs	13,1
20		1.1.2.4	Initial requirements documentation	Fri 1/9/15	Fri 1/9/15	0 hrs	12
21		1.1.2.5	Requirements analysis review	Sat 1/10/15	Sat 1/10/15	0 hrs	20
22		1.1.3	**Design**	**Sat 1/3/15**	**Tue 2/3/15**	**93 hrs**	
23		1.1.3.1	Preliminary Design Review	Tue 1/13/15	Tue 1/13/15	0 hrs	21
24		1.1.3.2	Detail Design Review	Sat 1/17/15	Sat 1/17/15	0 hrs	23
25		1.1.3.3	**Fabrication**	**Sat 1/3/15**	**Tue 1/13/15**	**36 hrs**	**12**
26		1.1.3.3.1	Part A game piece positioner	Mon 1/5/15	Sat 1/10/15	20 hrs	
27		1.1.3.3.2	Part B Lifting mechanism	Sat 1/3/15	Sat 1/10/15	24 hrs	
28		1.1.3.3.3	Part C Can Grabber	Sat 1/3/15	Mon 1/12/15	32 hrs	
29		1.1.3.3.4	**Chassis**	**Mon 1/5/15**	**Tue 1/13/15**	**28 hrs**	**18**
30		1.1.3.3.4.1	Determine gearing requirements	Tue 1/6/15	Tue 1/6/15	4 hrs	
31		1.1.3.3.4.2	Preliminary chassis	Mon 1/5/15	Sat 1/10/15	20 hrs	
32		1.1.3.3.4.3	Final chassis	Mon 1/5/15	Tue 1/13/15	28 hrs	
33		1.1.3.4	**Controls**	**Fri 1/9/15**	**Tue 2/3/15**	**77 hrs**	**12**
34		1.1.3.4.1	**Electrical**	**Fri 1/9/15**	**Sat 1/24/15**	**44 hrs**	
35		1.1.3.4.1.1	Electrical Board Schematic	Fri 1/9/15	Sat 1/10/15	12 hrs	
36		1.1.3.4.1.2	Electrical Prototyping	Mon 1/12/15	Sat 1/24/15	32 hrs	35
37		1.1.3.4.1.3	Electrical Board Layout	Sat 1/17/15	Sat 1/24/15	20 hrs	35
38		1.1.3.4.2	**Programming**	**Fri 1/9/15**	**Sat 1/17/15**	**26 hrs**	**12**
39		1.1.3.4.2.1	Chassis	Fri 1/9/15	Sat 1/10/15	8 hrs	30
40		1.1.3.4.2.2	Test blueboard	Fri 1/9/15	Sat 1/10/15	8 hrs	88
41		1.1.3.4.2.3	Behaviors Part A	Mon 1/12/15	Fri 1/16/15	10 hrs	26
42		1.1.3.4.2.4	Behaviors Part B	Sat 1/10/15	Tue 1/13/15	10 hrs	27
43		1.1.3.4.2.5	Behaviors Part C	Tue 1/13/15	Sat 1/17/15	10 hrs	28
44		1.1.3.4.3	**Control integration**	**Mon 1/12/15**	**Tue 2/3/15**	**65 hrs**	**12**
45		1.1.3.4.3.1	Controls layout	Mon 1/12/15	Tue 2/3/15	65 hrs	
46		1.1.4	**Build**	**Sat 1/10/15**	**Sat 2/7/15**	**77 hrs**	
47		1.1.4.1	**Fabrication**	**Sat 1/10/15**	**Mon 2/2/15**	**61 hrs**	
48		1.1.4.1.1	**Drive system**	**Mon 1/12/15**	**Fri 1/23/15**	**24 hrs**	
49		1.1.4.1.1.1	Drive train perimeter	Mon 1/12/15	Tue 1/13/15	8 hrs	31
50		1.1.4.1.1.2	Full drive train	Fri 1/16/15	Fri 1/23/15	16 hrs	32,4
51		1.1.4.1.2	**Mechanisms**	**Sat 1/10/15**	**Mon 2/2/15**	**61 hrs**	
52		1.1.4.1.2.1	Part A game piece positioner	Mon 1/12/15	Mon 1/26/15	41 hrs	26
53		1.1.4.1.2.2	Part B Lifting mechanism	Sat 1/10/15	Sun 1/25/15	37 hrs	27
54		1.1.4.1.2.3	Part C Can Grabber	Tue 1/13/15	Sun 1/25/15	29 hrs	28



Project: 2015 Build Sea
Date: Mon 3/9/15

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Progress | Manual Progress

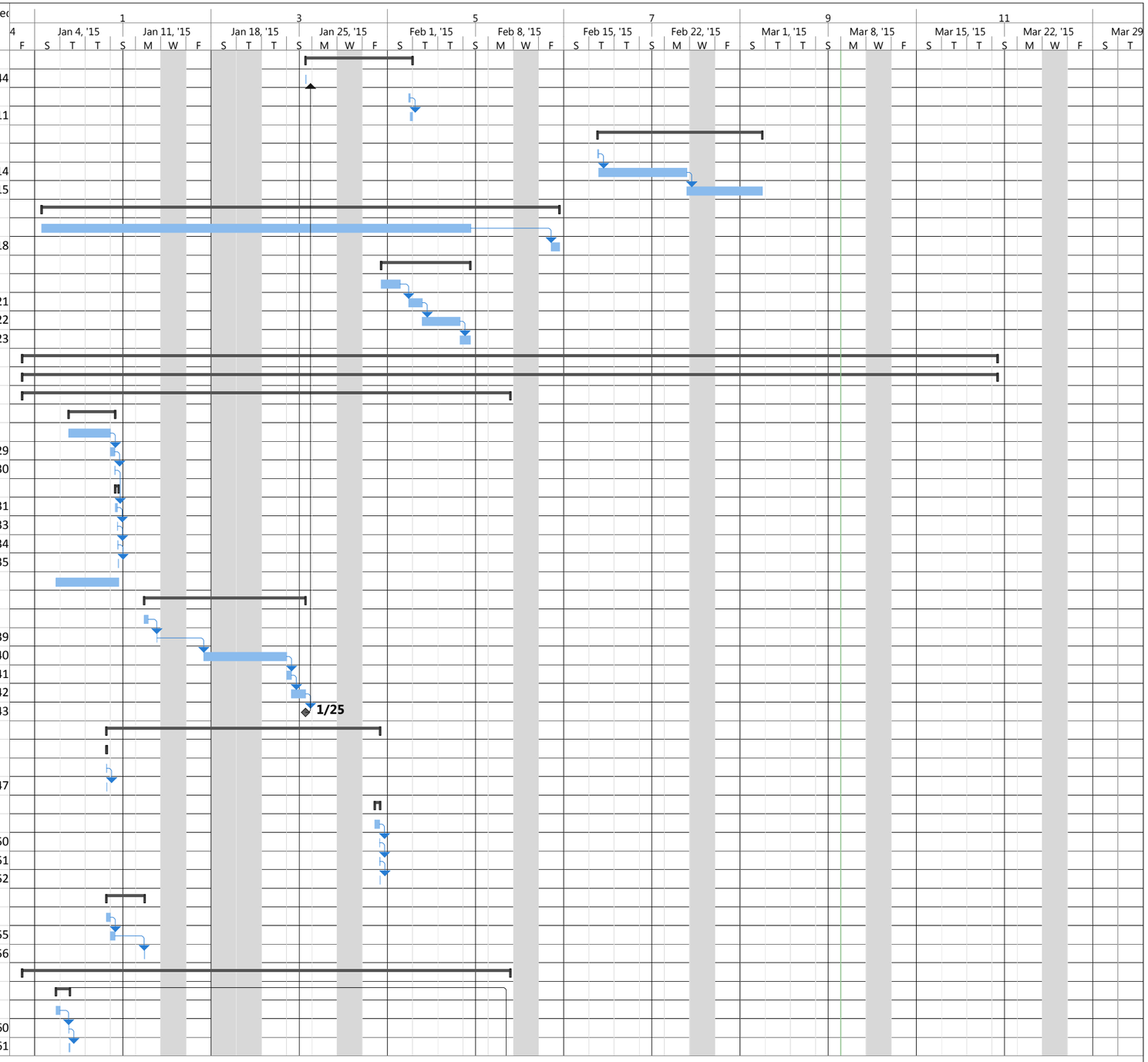
ID	Task Mode	Outline Number	Task Name	Start	Finish	Duration	Predecessors
55		1.1.4.1.2.4	Robot delivered to electrical	Mon 2/2/15	Mon 2/2/15	0 hrs	
56		**1.1.4.2**	**Controls**	**Sat 1/24/15**	**Sat 2/7/15**	**49 hrs**	
57		**1.1.4.2.1**	**Electrical**	**Sat 1/24/15**	**Mon 2/2/15**	**37 hrs**	
58		1.1.4.2.1.1	Drive system	Sat 1/24/15	Sat 1/24/15	4 hrs	48
59		1.1.4.2.1.2	Part A game piece positioner	Tue 1/27/15	Tue 1/27/15	2 hrs	52
60		1.1.4.2.1.3	Part B Lifting mechanism	Sun 1/25/15	Sun 1/25/15	2 hrs	53
61		1.1.4.2.1.4	Part C Can Grabber	Sun 1/25/15	Sun 1/25/15	2 hrs	54
62		1.1.4.2.1.5	Integration	Mon 2/2/15	Mon 2/2/15	4 hrs	61,5
63		1.1.4.2.1.6	Robot delivered to programming	Mon 2/2/15	Mon 2/2/15	0 hrs	62
64		**1.1.4.2.2**	**Programming**	**Tue 2/3/15**	**Fri 2/6/15**	**8 hrs**	**39,6**
65		1.1.4.2.2.1	Chassis	Tue 2/3/15	Fri 2/6/15	8 hrs	59
66		1.1.4.2.2.2	Behaviors part A	Tue 2/3/15	Fri 2/6/15	8 hrs	60
67		1.1.4.2.2.3	Behaviors part B	Tue 2/3/15	Fri 2/6/15	8 hrs	61
68		1.1.4.2.2.4	Behaviors part C	Tue 2/3/15	Fri 2/6/15	8 hrs	54
69		1.1.4.2.3	Control Integration	Fri 2/6/15	Sat 2/7/15	8 hrs	45,6
70		**1.1.5**	**Test**	**Fri 1/16/15**	**Tue 2/17/15**	**97 hrs**	
71		1.1.5.1	Drive System Verified	Sat 1/24/15	Sun 1/25/15	12 hrs	48
72		1.1.5.2	Sensor and Motor Testing	Fri 1/16/15	Tue 2/3/15	57 hrs	
73		1.1.5.3	Remedy Issues	Sat 2/7/15	Mon 2/16/15	28 hrs	69
74		1.1.5.4	Practice Bot Available	Sat 2/7/15	Sat 2/7/15	0 hrs	69F
75		1.1.5.5	Competition Bot Available	Tue 2/10/15	Tue 2/10/15	0 hrs	74F
76		1.1.5.6	Execute Test Plan	Sat 2/14/15	Tue 2/17/15	10 hrs	75
77		1.1.6	Bag and Tag	Tue 2/17/15	Tue 2/17/15	0 hrs	76F
78		**1.1.7**	**Support**	**Mon 1/5/15**	**Mon 2/23/15**	**137 hrs**	
79		**1.1.7.1**	**CAD Presentation**	**Sat 1/24/15**	**Mon 2/23/15**	**95 hrs**	
80		1.1.7.1.1	Finalize drivetrain	Sat 1/24/15	Sat 1/24/15	6 hrs	48
81		1.1.7.1.2	Finalize Part A game piece positioner	Tue 1/27/15	Sat 1/31/15	10 hrs	52
82		1.1.7.1.3	Finalize Part B Lifting mechanism	Mon 2/2/15	Fri 2/6/15	10 hrs	
83		1.1.7.1.4	Finalize Part C Can Grabber	Fri 2/6/15	Sat 2/7/15	10 hrs	
84		1.1.7.1.5	Finalize Electrical layout	Sat 2/7/15	Tue 2/10/15	10 hrs	80,8
85		1.1.7.1.6	Integrate systems	Fri 2/13/15	Mon 2/16/15	14 hrs	84
86		1.1.7.1.7	Render robot	Mon 2/16/15	Mon 2/23/15	20 hrs	85
87		**1.1.7.2**	**Electrical**	**Mon 1/5/15**	**Fri 1/16/15**	**30 hrs**	
88		1.1.7.2.1	Wire new batteries	Mon 1/5/15	Tue 1/6/15	6 hrs	
89		1.1.7.2.2	Wire new speed controllers	Fri 1/9/15	Fri 1/9/15	4 hrs	
90		1.1.7.2.3	Organize wiring	Sat 1/10/15	Fri 1/16/15	20 hrs	89
91		1.1.7.2.4	Construct custom circuits	Sat 1/10/15	Sat 1/10/15	6 hrs	
92		**1.1.8**	**Competition Prep**	**Sun 1/4/15**	**Mon 3/2/15**	**163 hrs**	
93		**1.1.8.1**	**Pit**	**Sat 1/31/15**	**Sat 2/14/15**	**48 hrs**	
94		1.1.8.1.1	Setup old pit	Sat 1/31/15	Sat 1/31/15	1 hr	
95		1.1.8.1.2	Solicit pit changes	Sat 1/31/15	Sat 1/31/15	1 hr	94
96		1.1.8.1.3	Make pit changes	Sat 1/31/15	Sat 2/7/15	20 hrs	95
97		1.1.8.1.4	Practice pit setup	Sat 2/7/15	Sat 2/14/15	26 hrs	96
98		**1.1.8.2**	**Human Player Selection**	**Mon 2/2/15**	**Sat 2/7/15**	**19 hrs**	
99		1.1.8.2.1	Signups	Mon 2/2/15	Tue 2/3/15	8 hrs	
100		1.1.8.2.2	Test	Fri 2/6/15	Fri 2/6/15	2 hrs	99
101		1.1.8.2.3	Interviews	Sat 2/7/15	Sat 2/7/15	2 hrs	100
102		1.1.8.2.4	Tryouts	Sat 2/7/15	Sat 2/7/15	4 hrs	101
103		1.1.8.2.5	Decision	Sat 2/7/15	Sat 2/7/15	1 hr	102
104		**1.1.8.3**	**Field pieces**	**Sun 1/4/15**	**Fri 1/16/15**	**34 hrs**	
105		1.1.8.3.1	Determine field piece needs	Sun 1/4/15	Sun 1/4/15	0.5 hrs	
106		1.1.8.3.2	Build piece 1	Mon 1/5/15	Tue 1/6/15	6 hrs	
107		1.1.8.3.3	Build piece 2	Tue 1/6/15	Fri 1/9/15	6 hrs	
108		1.1.8.3.4	Build piece 3	Tue 1/13/15	Fri 1/16/15	6 hrs	



Project: 2015 Build Sea
Date: Mon 3/9/15

Task	Summary	Inactive Milestone	Duration-only	Start-only	External Milestone	Manual Progress
Split	Project Summary	Inactive Summary	Manual Summary Rollup	Finish-only	Deadline	
Milestone	Inactive Task	Manual Task	Manual Summary	External Tasks	Progress	

ID	Task Mode	Outline Number	Task Name	Start	Finish	Duration	Predecessors
109		**1.1.8.4**	**Spirit**	**Sun 1/25/15**	**Mon 2/2/15**	**28 hrs**	
110		1.1.8.4.1	Purchase Buttons	Sun 1/25/15	Sun 1/25/15	1 hr	144
111		1.1.8.4.2	Check over Hats	Mon 2/2/15	Mon 2/2/15	3 hrs	
112		1.1.8.4.3	Order new hats	Mon 2/2/15	Mon 2/2/15	1 hr	111
113		**1.1.8.5**	**Scouting**	**Tue 2/17/15**	**Mon 3/2/15**	**38 hrs**	
114		1.1.8.5.1	Determine game needs	Tue 2/17/15	Tue 2/17/15	2 hrs	
115		1.1.8.5.2	Write up scouting website	Tue 2/17/15	Tue 2/24/15	20 hrs	114
116		1.1.8.5.3	Test website	Tue 2/24/15	Mon 3/2/15	16 hrs	115
117		**1.1.8.6**	**Robot Cart**	**Sun 1/4/15**	**Sat 2/14/15**	**121 hrs**	
118		1.1.8.6.1	Build cart	Sun 1/4/15	Sat 2/7/15	100 hrs	
119		1.1.8.6.2	Adjust for this year robot	Sat 2/14/15	Sat 2/14/15	8 hrs	118
120		**1.1.8.7**	**Havik**	**Sat 1/31/15**	**Sat 2/7/15**	**22 hrs**	
121		1.1.8.7.1	Mount new gearbox	Sat 1/31/15	Sun 2/1/15	4 hrs	
122		1.1.8.7.2	Mount side panels	Mon 2/2/15	Tue 2/3/15	6 hrs	121
123		1.1.8.7.3	Mount top panel	Tue 2/3/15	Fri 2/6/15	4 hrs	122
124		1.1.8.7.4	Make battery mount	Fri 2/6/15	Sat 2/7/15	8 hrs	123
125		**1.2**	**Business**	**Sat 1/3/15**	**Sat 3/21/15**	**224 hrs?**	
126		**1.2.1**	**Public Relations**	**Sat 1/3/15**	**Sat 3/21/15**	**224 hrs**	
127		**1.2.1.1**	**Graphics**	**Sat 1/3/15**	**Tue 2/10/15**	**115 hrs**	
128		**1.2.1.1.1**	**Pit closed signs**	**Tue 1/6/15**	**Sat 1/10/15**	**9.25 hrs**	
129		1.2.1.1.1.1	Rough draft	Tue 1/6/15	Fri 1/9/15	8 hrs	
130		1.2.1.1.1.2	Proofing	Sat 1/10/15	Sat 1/10/15	0.25 hrs	129
131		1.2.1.1.1.3	Final prints	Sat 1/10/15	Sat 1/10/15	1 hr	130
132		**1.2.1.1.2**	**Thank you cards**	**Sat 1/10/15**	**Sat 1/10/15**	**6.5 hrs**	
133		1.2.1.1.2.1	Rough draft	Sat 1/10/15	Sat 1/10/15	4 hrs	131
134		1.2.1.1.2.2	Proofing	Sat 1/10/15	Sat 1/10/15	0.5 hrs	133
135		1.2.1.1.2.3	Final prints	Sat 1/10/15	Sat 1/10/15	1 hr	134
136		1.2.1.1.2.4	Send to printer	Sat 1/10/15	Sat 1/10/15	1 hr	135
137		1.2.1.1.3	Organize stack cards	Mon 1/5/15	Sat 1/10/15	20 hrs	
138		**1.2.1.1.4**	**Button design**	**Mon 1/12/15**	**Sun 1/25/15**	**33 hrs**	
139		1.2.1.1.4.1	Rough sketch	Mon 1/12/15	Mon 1/12/15	4 hrs	
140		1.2.1.1.4.2	Sketch approval	Tue 1/13/15	Tue 1/13/15	0.25 hrs	139
141		1.2.1.1.4.3	Colored Rough draft	Sat 1/17/15	Fri 1/23/15	10 hrs	140
142		1.2.1.1.4.4	Proofing	Sat 1/24/15	Sat 1/24/15	1 hr	141
143		1.2.1.1.4.5	Final prints	Sat 1/24/15	Sun 1/25/15	8 hrs	142
144		1.2.1.1.4.6	Send to printer	Sun 1/25/15	Sun 1/25/15	0 hrs	143
145		**1.2.1.1.5**	**Havik graphics**	**Fri 1/9/15**	**Sat 1/31/15**	**63.25 hrs**	
146		**1.2.1.1.5.1**	**Side panels**	**Fri 1/9/15**	**Fri 1/9/15**	**1 hr**	
147		1.2.1.1.5.1.1	Proof side panels	Fri 1/9/15	Fri 1/9/15	0.5 hrs	
148		1.2.1.1.5.1.2	Print side panels	Fri 1/9/15	Fri 1/9/15	0.5 hrs	147
149		**1.2.1.1.5.2**	**Top panel**	**Sat 1/31/15**	**Sat 1/31/15**	**2.25 hrs**	
150		1.2.1.1.5.2.1	Draft top panel	Sat 1/31/15	Sat 1/31/15	1 hr	
151		1.2.1.1.5.2.2	Proof top panel	Sat 1/31/15	Sat 1/31/15	0.25 hrs	150
152		1.2.1.1.5.2.3	Finalize top panel	Sat 1/31/15	Sat 1/31/15	0.5 hrs	151
153		1.2.1.1.5.2.4	Print top panel	Sat 1/31/15	Sat 1/31/15	0.5 hrs	152
154		**1.2.1.1.6**	**T-shirts**	**Fri 1/9/15**	**Mon 1/12/15**	**13 hrs**	
155		1.2.1.1.6.1	Add sponsors and logo	Fri 1/9/15	Fri 1/9/15	4 hrs	
156		1.2.1.1.6.2	Proof	Sat 1/10/15	Sat 1/10/15	1 hr	155
157		1.2.1.1.6.3	Send to printer	Mon 1/12/15	Mon 1/12/15	1 hr	156
158		**1.2.1.1.7**	**Banners**	**Sat 1/3/15**	**Tue 2/10/15**	**115 hrs**	
159		**1.2.1.1.7.1**	**Side pit banner**	**Mon 1/5/15**	**Tue 1/6/15**	**6.5 hrs**	
160		1.2.1.1.7.1.1	Design rough	Mon 1/5/15	Mon 1/5/15	4 hrs	
161		1.2.1.1.7.1.2	Proofing	Tue 1/6/15	Tue 1/6/15	0.5 hrs	160
162		1.2.1.1.7.1.3	Final prints	Tue 1/6/15	Tue 1/6/15	2 hrs	161



Project: 2015 Build Sea
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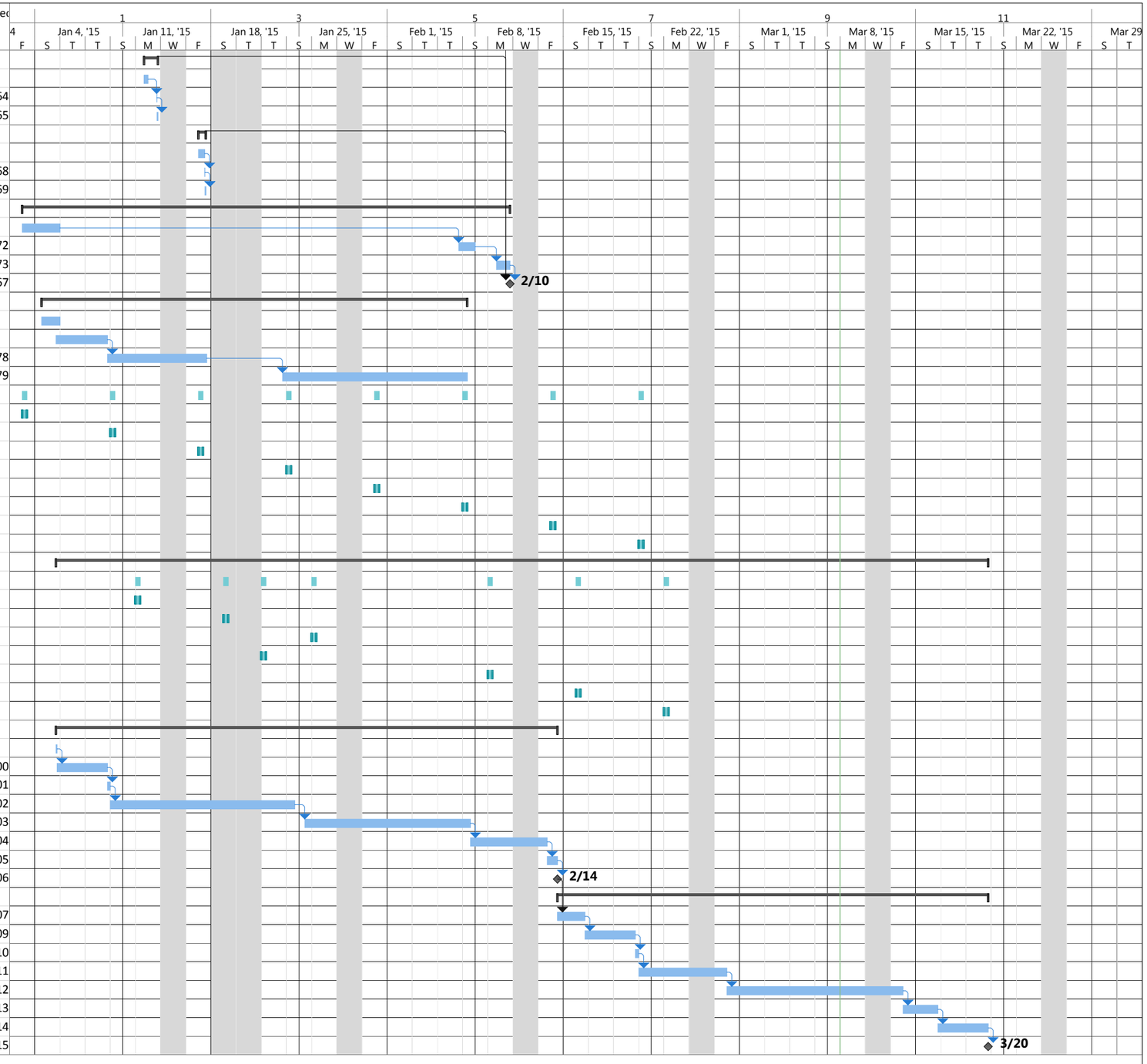
Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

ID	Task Mode	Outline Number	Task Name	Start	Finish	Duration	Predecessors
163		**1.2.1.1.7.2**	**Front pit banner**	**Mon 1/12/15**	**Tue 1/13/15**	**6.5 hrs**	
164		1.2.1.1.7.2.1	Design rough	Mon 1/12/15	Mon 1/12/15	4 hrs	
165		1.2.1.1.7.2.2	Proofing	Tue 1/13/15	Tue 1/13/15	0.5 hrs	164
166		1.2.1.1.7.2.3	Final prints	Tue 1/13/15	Tue 1/13/15	2 hrs	165
167		**1.2.1.1.7.3**	**Event banner**	**Sat 1/17/15**	**Sat 1/17/15**	**6.5 hrs**	
168		1.2.1.1.7.3.1	Design rough	Sat 1/17/15	Sat 1/17/15	4 hrs	
169		1.2.1.1.7.3.2	Proofing	Sat 1/17/15	Sat 1/17/15	0.5 hrs	168
170		1.2.1.1.7.3.3	Final prints	Sat 1/17/15	Sat 1/17/15	2 hrs	169
171		**1.2.1.1.7.4**	**Outreach banner**	**Sat 1/3/15**	**Tue 2/10/15**	**115 hrs**	
172		1.2.1.1.7.4.1	Design rough	Sat 1/3/15	Mon 1/5/15	16 hrs	
173		1.2.1.1.7.4.2	Proofing	Fri 2/6/15	Sat 2/7/15	12 hrs	172
174		1.2.1.1.7.4.3	Final prints	Mon 2/9/15	Tue 2/10/15	6 hrs	173
175		1.2.1.1.7.5	Send to printer	Tue 2/10/15	Tue 2/10/15	0 hrs	167
176		**1.2.1.2**	**Website**	**Sun 1/4/15**	**Sat 2/7/15**	**94 hrs**	
177		1.2.1.2.1	Fix about us	Sun 1/4/15	Mon 1/5/15	8 hrs	
178		1.2.1.2.2	Finish logos on website	Mon 1/5/15	Fri 1/9/15	10 hrs	
179		1.2.1.2.3	Redo front page	Fri 1/9/15	Sat 1/17/15	30 hrs	178
180		1.2.1.2.4	Proof each page	Fri 1/23/15	Sat 2/7/15	50 hrs	179
181		**1.2.1.3**	**Documentation Notebook Post**	**Sat 1/3/15**	**Sat 2/21/15**	**142 hrs**	
182		1.2.1.3.1	Documentation Notebook Post 1	Sat 1/3/15	Sat 1/3/15	1 hr	
183		1.2.1.3.2	Documentation Notebook Post 2	Sat 1/10/15	Sat 1/10/15	1 hr	
184		1.2.1.3.3	Documentation Notebook Post 3	Sat 1/17/15	Sat 1/17/15	1 hr	
185		1.2.1.3.4	Documentation Notebook Post 4	Sat 1/24/15	Sat 1/24/15	1 hr	
186		1.2.1.3.5	Documentation Notebook Post 5	Sat 1/31/15	Sat 1/31/15	1 hr	
187		1.2.1.3.6	Documentation Notebook Post 6	Sat 2/7/15	Sat 2/7/15	1 hr	
188		1.2.1.3.7	Documentation Notebook Post 7	Sat 2/14/15	Sat 2/14/15	1 hr	
189		1.2.1.3.8	Documentation Notebook Post 8	Sat 2/21/15	Sat 2/21/15	1 hr	
190		**1.2.1.4**	**Video**	**Mon 1/5/15**	**Fri 3/20/15**	**207 hrs**	
191		**1.2.1.4.1**	**Weekly Build Time-lapse**	**Mon 1/12/15**	**Mon 2/23/15**	**117 hrs**	
192		1.2.1.4.1.1	Weekly Build Time-lapse 1	Mon 1/12/15	Mon 1/12/15	1 hr	
193		1.2.1.4.1.2	Weekly Build Time-lapse 2	Mon 1/19/15	Mon 1/19/15	1 hr	
194		1.2.1.4.1.3	Weekly Build Time-lapse 3	Mon 1/26/15	Mon 1/26/15	1 hr	
195		1.2.1.4.1.4	Weekly Build Time-lapse 4	Thu 1/22/15	Thu 1/22/15	1 hr	
196		1.2.1.4.1.5	Weekly Build Time-lapse 5	Mon 2/9/15	Mon 2/9/15	1 hr	
197		1.2.1.4.1.6	Weekly Build Time-lapse 6	Mon 2/16/15	Mon 2/16/15	1 hr	
198		1.2.1.4.1.7	Weekly Build Time-lapse 7	Mon 2/23/15	Mon 2/23/15	1 hr	
199		**1.2.1.4.2**	**Chairman's Video**	**Mon 1/5/15**	**Sat 2/14/15**	**114 hrs**	
200		1.2.1.4.2.1	Develop concept/ideas	Mon 1/5/15	Mon 1/5/15	2 hrs	
201		1.2.1.4.2.2	Draw Storyboards	Mon 1/5/15	Fri 1/9/15	8 hrs	200
202		1.2.1.4.2.3	Write Script	Fri 1/9/15	Fri 1/9/15	2 hrs	201
203		1.2.1.4.2.4	Pick photos	Sat 1/10/15	Sat 1/24/15	40 hrs	202
204		1.2.1.4.2.5	Editing	Sun 1/25/15	Sat 2/7/15	44 hrs	203
205		1.2.1.4.2.6	Rough Draft	Sat 2/7/15	Fri 2/13/15	10 hrs	204
206		1.2.1.4.2.7	Final Draft	Fri 2/13/15	Sat 2/14/15	8 hrs	205
207		1.2.1.4.2.8	Release to format	Sat 2/14/15	Sat 2/14/15	0 hrs	206
208		**1.2.1.4.3**	**Robot Reveal Video**	**Sat 2/14/15**	**Fri 3/20/15**	**93 hrs**	
209		1.2.1.4.3.1	Develop concept/ideas	Sat 2/14/15	Mon 2/16/15	4 hrs	207
210		1.2.1.4.3.2	Draw Storyboards	Mon 2/16/15	Fri 2/20/15	8 hrs	209
211		1.2.1.4.3.3	Shoot Script	Fri 2/20/15	Fri 2/20/15	3 hrs	210
212		1.2.1.4.3.4	Shoot Video	Sat 2/21/15	Fri 2/27/15	20 hrs	211
213		1.2.1.4.3.5	Editing	Sat 2/28/15	Fri 3/13/15	40 hrs	212
214		1.2.1.4.3.6	Rough Draft	Sat 3/14/15	Mon 3/16/15	10 hrs	213
215		1.2.1.4.3.7	Final Draft	Mon 3/16/15	Fri 3/20/15	8 hrs	214
216		1.2.1.4.3.8	Release online	Fri 3/20/15	Fri 3/20/15	0 hrs	215



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Task
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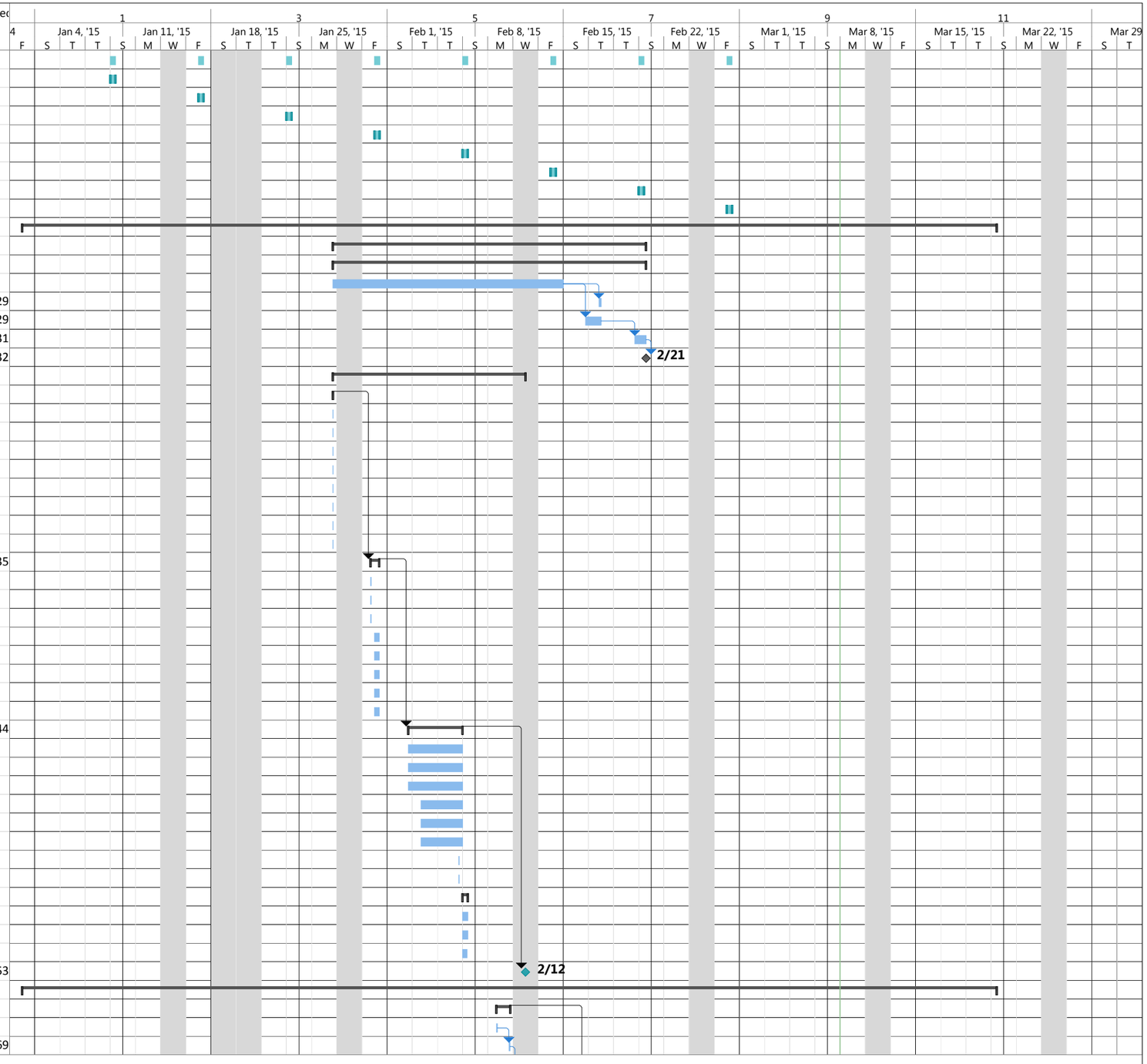
External Tasks
External Milestone
Deadline
Progress
Manual Progress

ID	Task Mode	Outline Number	Task Name	Start	Finish	Duration	Predecessors
217		**1.2.1.5**	**Photo**	**Sat 1/10/15**	**Sat 2/28/15**	**139 hrs**	
218		1.2.1.5.1	Photo Dump to Flickr 1	Sat 1/10/15	Sat 1/10/15	2 hrs	
219		1.2.1.5.2	Photo Dump to Flickr 2	Sat 1/17/15	Sat 1/17/15	2 hrs	
220		1.2.1.5.3	Photo Dump to Flickr 3	Sat 1/24/15	Sat 1/24/15	2 hrs	
221		1.2.1.5.4	Photo Dump to Flickr 4	Sat 1/31/15	Sat 1/31/15	2 hrs	
222		1.2.1.5.5	Photo Dump to Flickr 5	Sat 2/7/15	Sat 2/7/15	2 hrs	
223		1.2.1.5.6	Photo Dump to Flickr 6	Sat 2/14/15	Sat 2/14/15	2 hrs	
224		1.2.1.5.7	Photo Dump to Flickr 7	Sat 2/21/15	Sat 2/21/15	2 hrs	
225		1.2.1.5.8	Photo Dump to Flickr 8	Sat 2/28/15	Sat 2/28/15	2 hrs	
226		**1.2.1.6**	**Awards**	**Sat 1/3/15**	**Sat 3/21/15**	**224 hrs**	
227		**1.2.1.6.1**	**Entrepreneurship Award**	**Tue 1/27/15**	**Sat 2/21/15**	**74 hrs**	
228		**1.2.1.6.1.1**	**Business Plan**	**Tue 1/27/15**	**Sat 2/21/15**	**74 hrs**	
229		1.2.1.6.1.1.1	Working Copy	Tue 1/27/15	Sat 2/14/15	56 hrs	
230		1.2.1.6.1.1.2	Cover	Tue 2/17/15	Tue 2/17/15	0.5 hrs	229
231		1.2.1.6.1.1.3	Feedback	Mon 2/16/15	Tue 2/17/15	6 hrs	229
232		1.2.1.6.1.1.4	Final Essay	Fri 2/20/15	Sat 2/21/15	10 hrs	231
233		1.2.1.6.1.1.5	Business Plan released online	Sat 2/21/15	Sat 2/21/15	0 hrs	232
234		**1.2.1.6.1.2**	**Mini Essays**	**Tue 1/27/15**	**Thu 2/12/15**	**44 hrs**	
235		**1.2.1.6.1.2.1**	**Outlines**	**Tue 1/27/15**	**Tue 1/27/15**	**0.5 hrs**	
236		1.2.1.6.1.2.1.1	Team Mission Statement	Tue 1/27/15	Tue 1/27/15	0.5 hrs	
237		1.2.1.6.1.2.1.2	Team Origin	Tue 1/27/15	Tue 1/27/15	0.5 hrs	
238		1.2.1.6.1.2.1.3	Organizational Structure	Tue 1/27/15	Tue 1/27/15	0.5 hrs	
239		1.2.1.6.1.2.1.4	Relationships	Tue 1/27/15	Tue 1/27/15	0.5 hrs	
240		1.2.1.6.1.2.1.5	Deployment of Resources	Tue 1/27/15	Tue 1/27/15	0.5 hrs	
241		1.2.1.6.1.2.1.6	Future Plans	Tue 1/27/15	Tue 1/27/15	0.5 hrs	
242		1.2.1.6.1.2.1.7	Financial Statement	Tue 1/27/15	Tue 1/27/15	0.5 hrs	
243		1.2.1.6.1.2.1.8	Risk Analysis	Tue 1/27/15	Tue 1/27/15	0.5 hrs	
244		1.2.1.6.1.2.2	**Rough Drafts**	Fri 1/30/15	Sat 1/31/15	5 hrs	235
245		1.2.1.6.1.2.2.1	Team Mission Statement	Fri 1/30/15	Fri 1/30/15	1 hr	
246		1.2.1.6.1.2.2.2	Team Origin	Fri 1/30/15	Fri 1/30/15	1 hr	
247		1.2.1.6.1.2.2.3	Organizational Structure	Fri 1/30/15	Fri 1/30/15	1 hr	
248		1.2.1.6.1.2.2.4	Relationships	Sat 1/31/15	Sat 1/31/15	1 hr	
249		1.2.1.6.1.2.2.5	Deployment of Resources	Sat 1/31/15	Sat 1/31/15	1 hr	
250		1.2.1.6.1.2.2.6	Future Plans	Sat 1/31/15	Sat 1/31/15	1 hr	
251		1.2.1.6.1.2.2.7	Financial Statement	Sat 1/31/15	Sat 1/31/15	1 hr	
252		1.2.1.6.1.2.2.8	Risk Analysis	Sat 1/31/15	Sat 1/31/15	1 hr	
253		1.2.1.6.1.2.3	**Final Drafts**	Mon 2/2/15	Fri 2/6/15	12 hrs	244
254		1.2.1.6.1.2.3.1	Team mission Statement	Mon 2/2/15	Fri 2/6/15	12 hrs	
255		1.2.1.6.1.2.3.2	Team Origin	Mon 2/2/15	Fri 2/6/15	12 hrs	
256		1.2.1.6.1.2.3.3	Organizational Structure	Mon 2/2/15	Fri 2/6/15	12 hrs	
257		1.2.1.6.1.2.3.4	Relationships	Tue 2/3/15	Fri 2/6/15	8 hrs	
258		1.2.1.6.1.2.3.5	Deployment of Resources	Tue 2/3/15	Fri 2/6/15	8 hrs	
259		1.2.1.6.1.2.3.6	Future Plans	Tue 2/3/15	Fri 2/6/15	8 hrs	
260		1.2.1.6.1.2.3.7	Financial Statement	Fri 2/6/15	Fri 2/6/15	1 hr	
261		1.2.1.6.1.2.3.8	Risk Analysis	Fri 2/6/15	Fri 2/6/15	1 hr	
262		1.2.1.6.1.2.4	**Photos**	Sat 2/7/15	Sat 2/7/15	2 hrs	
263		1.2.1.6.1.2.4.1	Pick rough photos	Sat 2/7/15	Sat 2/7/15	2 hrs	
264		1.2.1.6.1.2.4.2	Edit photos	Sat 2/7/15	Sat 2/7/15	2 hrs	
265		1.2.1.6.1.2.4.3	Final photo approval	Sat 2/7/15	Sat 2/7/15	0.5 hrs	
266		1.2.1.6.1.2.5	Award Submitted	Thu 2/12/15	Thu 2/12/15	0 hrs	253
267		1.2.1.6.2	**Chairman's**	Sat 1/3/15	Sat 3/21/15	224 hrs	
268		1.2.1.6.2.1	**Photos**	Mon 2/9/15	Tue 2/10/15	6.5 hrs	
269		1.2.1.6.2.1.1	Pick rough photos	Mon 2/9/15	Mon 2/9/15	2 hrs	
270		1.2.1.6.2.1.2	Edit photos	Tue 2/10/15	Tue 2/10/15	2 hrs	269



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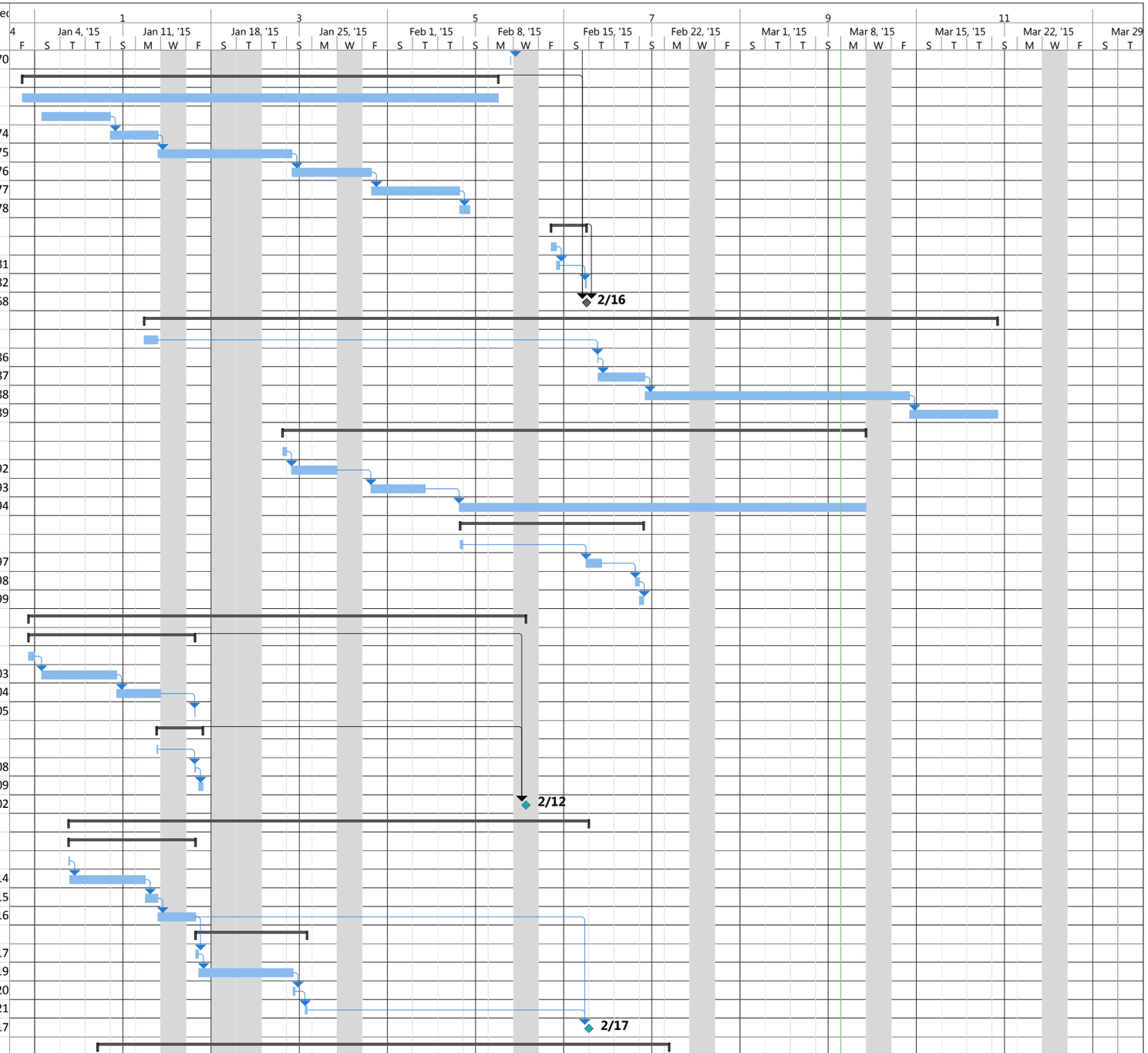
271		1.2.1.6.2.1.3	Final photo approval	Tue 2/10/15	Tue 2/10/15	0.5 hrs	270
272		1.2.1.6.2.2	**Essay**	Sat 1/3/15	Mon 2/9/15	112 hrs	
273		1.2.1.6.2.2.1	Working copy	Sat 1/3/15	Mon 2/9/15	112 hrs	
274		1.2.1.6.2.2.2	Inside review	Sun 1/4/15	Fri 1/9/15	16 hrs	
275		1.2.1.6.2.2.3	Inside edits	Sat 1/10/15	Tue 1/13/15	14 hrs	274
276		1.2.1.6.2.2.4	Outside edit integration	Tue 1/13/15	Sat 1/24/15	20 hrs	275
277		1.2.1.6.2.2.5	Final draft	Sat 1/24/15	Fri 1/30/15	20 hrs	276
278		1.2.1.6.2.2.6	Final formatting	Fri 1/30/15	Fri 2/6/15	20 hrs	277
279		1.2.1.6.2.2.7	Cover made	Fri 2/6/15	Sat 2/7/15	8 hrs	278
280		1.2.1.6.2.3	**Mini essays**	Sat 2/14/15	Mon 2/16/15	11 hrs	
281		1.2.1.6.2.3.1	Outline	Sat 2/14/15	Sat 2/14/15	2 hrs	
282		1.2.1.6.2.3.2	Rough draft	Sat 2/14/15	Sat 2/14/15	6 hrs	281
283		1.2.1.6.2.3.3	Final draft	Mon 2/16/15	Mon 2/16/15	3 hrs	282
284		1.2.1.6.2.4	Essay/mini essay/photos due	Mon 2/16/15	Mon 2/16/15	0 hrs	268
285		1.2.1.6.2.5	**Chairman's Binder**	Mon 1/12/15	Sat 3/21/15	192 hrs	
286		1.2.1.6.2.5.1	Develop outline	Mon 1/12/15	Tue 1/13/15	6 hrs	
287		1.2.1.6.2.5.2	Approve outline	Tue 2/17/15	Tue 2/17/15	1 hr	286
288		1.2.1.6.2.5.3	Send data inquiries	Tue 2/17/15	Sat 2/21/15	10 hrs	287
289		1.2.1.6.2.5.4	Compile rough document	Sat 2/21/15	Sat 3/14/15	60 hrs	288
290		1.2.1.6.2.5.5	Finalize binder	Sat 3/14/15	Sat 3/21/15	20 hrs	289
291		1.2.1.6.2.6	**Presentation**	Fri 1/23/15	Tue 3/10/15	145 hrs	
292		1.2.1.6.2.6.1	Select Presenters	Fri 1/23/15	Fri 1/23/15	4 hrs	
293		1.2.1.6.2.6.2	Speech Scripts (draft)	Sat 1/24/15	Tue 1/27/15	20 hrs	292
294		1.2.1.6.2.6.3	Speech Scripts Final	Fri 1/30/15	Tue 2/3/15	20 hrs	293
295		1.2.1.6.2.6.4	Script practice	Fri 2/6/15	Tue 3/10/15	100 hrs	294
296		1.2.1.6.2.6.5	**Visual Aide**	Fri 2/6/15	Sat 2/21/15	42.5 hrs	
297		1.2.1.6.2.6.5.1	Design	Fri 2/6/15	Fri 2/6/15	2 hrs	
298		1.2.1.6.2.6.5.2	Rough	Mon 2/16/15	Tue 2/17/15	6 hrs	297
299		1.2.1.6.2.6.5.3	Final	Fri 2/20/15	Fri 2/20/15	4 hrs	298
300		1.2.1.6.2.6.5.4	Print	Sat 2/21/15	Sat 2/21/15	0.5 hrs	299
301		1.2.1.6.3	**Woodie Flowers Award**	Sat 1/3/15	Thu 2/12/15	113 hrs	
302		1.2.1.6.3.1	**Essay**	Sat 1/3/15	Fri 1/16/15	37 hrs	
303		1.2.1.6.3.1.1	Rough draft	Sat 1/3/15	Sat 1/3/15	4 hrs	
304		1.2.1.6.3.1.2	Outside feedback	Sun 1/4/15	Sat 1/10/15	20 hrs	303
305		1.2.1.6.3.1.3	Edits	Sat 1/10/15	Tue 1/13/15	12 hrs	304
306		1.2.1.6.3.1.4	Final draft	Fri 1/16/15	Fri 1/16/15	1 hr	305
307		1.2.1.6.3.2	**Photos**	Tue 1/13/15	Sat 1/17/15	8.5 hrs	
308		1.2.1.6.3.2.1	Pick rough photos	Tue 1/13/15	Tue 1/13/15	2 hrs	
309		1.2.1.6.3.2.2	Edit photos	Fri 1/16/15	Fri 1/16/15	2 hrs	308
310		1.2.1.6.3.2.3	Final photo approval	Sat 1/17/15	Sat 1/17/15	0.5 hrs	309
311		1.2.1.6.3.3	Submit award	Thu 2/12/15	Thu 2/12/15	0 hrs	302
312		1.2.1.6.4	**Dean's List**	Tue 1/6/15	Tue 2/17/15	117 hrs	
313		1.2.1.6.4.1	**Student 1**	Tue 1/6/15	Fri 1/16/15	26 hrs	
314		1.2.1.6.4.1.1	Write outline	Tue 1/6/15	Tue 1/6/15	2 hrs	
315		1.2.1.6.4.1.2	Write rough draft	Tue 1/6/15	Mon 1/12/15	16 hrs	314
316		1.2.1.6.4.1.3	Receive feedback	Mon 1/12/15	Tue 1/13/15	4 hrs	315
317		1.2.1.6.4.1.4	Write Final draft	Tue 1/13/15	Fri 1/16/15	4 hrs	316
318		1.2.1.6.4.2	**Student 2**	Fri 1/16/15	Sun 1/25/15	26 hrs	
319		1.2.1.6.4.2.1	Write outline	Fri 1/16/15	Fri 1/16/15	2 hrs	317
320		1.2.1.6.4.2.2	Write rough draft	Sat 1/17/15	Sat 1/24/15	16 hrs	319
321		1.2.1.6.4.2.3	Receive feedback	Sat 1/24/15	Sat 1/24/15	4 hrs	320
322		1.2.1.6.4.2.4	Write final draft	Sun 1/25/15	Sun 1/25/15	4 hrs	321
323		1.2.1.6.4.3	Submit award	Tue 2/17/15	Tue 2/17/15	0 hrs	317
324		1.2.2	**Finance**	Fri 1/9/15	Mon 2/23/15	129 hrs?	



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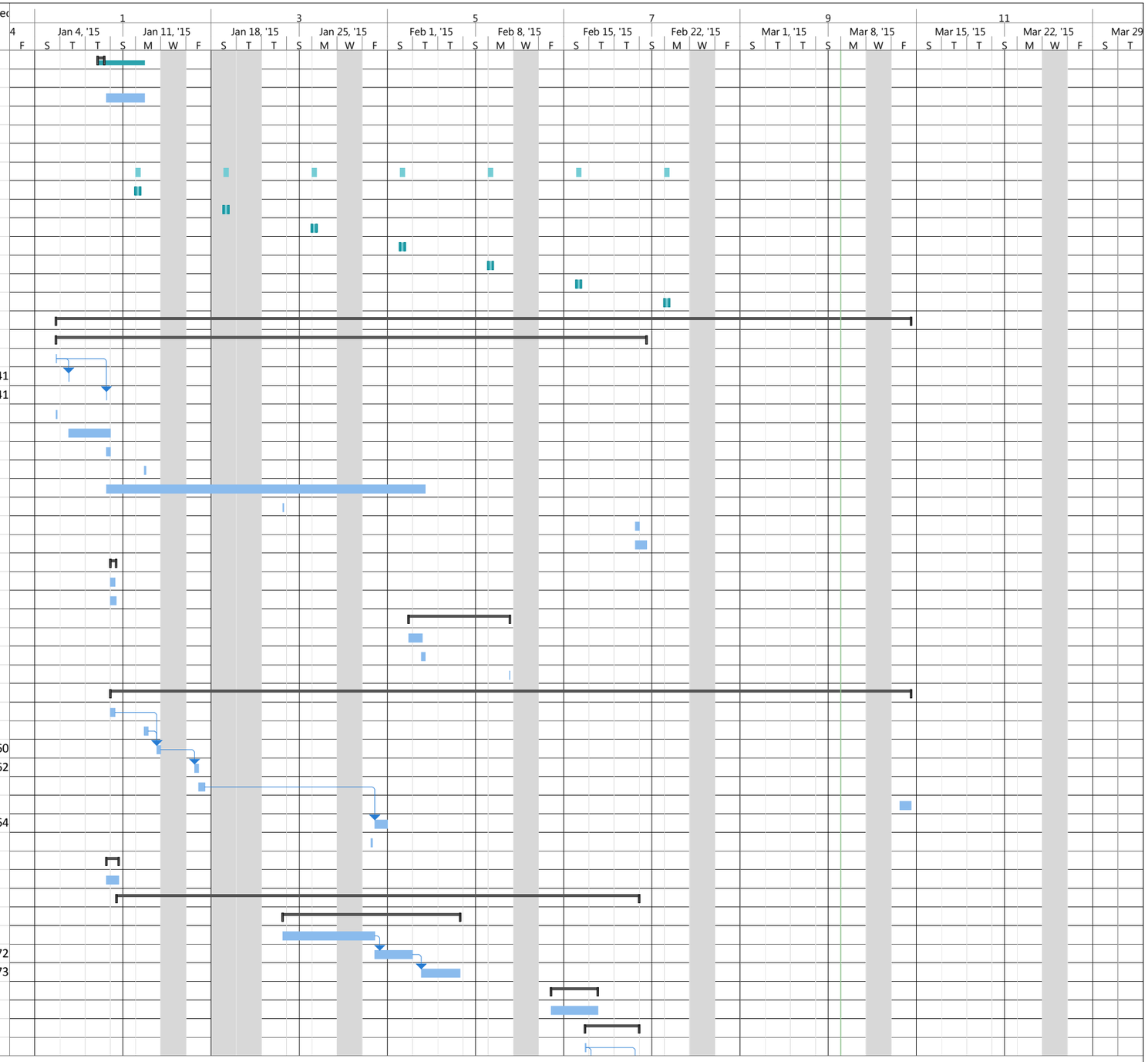
ID	Task Mode	Outline Number	Task Name	Start	Finish	Duration	Predecessors
325		1.2.2.1	**Fundraising**	Fri 1/9/15	Fri 1/9/15	4.5 hrs?	
326		1.2.2.1.1	Car Smash!				
327		1.2.2.1.2	Flocking	Fri 1/9/15	Mon 1/12/15	12.5 hrs?	
328		1.2.2.1.3	Gift Cards				
329		1.2.2.1.4	Group Event				
330		1.2.2.2	Sponsorship				
331		1.2.2.3	**Weekly budget review**	Mon 1/12/15	Mon 2/23/15	117 hrs	
332		1.2.2.3.1	Weekly budget review 1	Mon 1/12/15	Mon 1/12/15	1 hr	
333		1.2.2.3.2	Weekly budget review 2	Mon 1/19/15	Mon 1/19/15	1 hr	
334		1.2.2.3.3	Weekly budget review 3	Mon 1/26/15	Mon 1/26/15	1 hr	
335		1.2.2.3.4	Weekly budget review 4	Mon 2/2/15	Mon 2/2/15	1 hr	
336		1.2.2.3.5	Weekly budget review 5	Mon 2/9/15	Mon 2/9/15	1 hr	
337		1.2.2.3.6	Weekly budget review 6	Mon 2/16/15	Mon 2/16/15	1 hr	
338		1.2.2.3.7	Weekly budget review 7	Mon 2/23/15	Mon 2/23/15	1 hr	
339		1.2.3	**Events**	Mon 1/5/15	Sat 3/14/15	195 hrs?	
340		1.2.3.1	**Troy Regional**	Mon 1/5/15	Sat 2/21/15	135 hrs	
341		1.2.3.1.1	Finalize chaperone list	Mon 1/5/15	Mon 1/5/15	1 hr	
342		1.2.3.1.2	Turn in field trip package to school	Tue 1/6/15	Tue 1/6/15	1 hr	341
343		1.2.3.1.3	Chaperone background checks	Fri 1/9/15	Fri 1/9/15	0.5 hrs	341
344		1.2.3.1.4	Create itinerary	Mon 1/5/15	Mon 1/5/15	2 hrs	
345		1.2.3.1.5	Create preliminary student list	Tue 1/6/15	Fri 1/9/15	8 hrs	
346		1.2.3.1.6	Finalize student field trip package	Fri 1/9/15	Fri 1/9/15	4 hrs	
347		1.2.3.1.7	Contact local colleges for tours	Mon 1/12/15	Mon 1/12/15	3 hrs	
348		1.2.3.1.8	Plan dinners	Fri 1/9/15	Tue 2/3/15	77 hrs	
349		1.2.3.1.9	Finalize student list	Fri 1/23/15	Fri 1/23/15	2 hrs	
350		1.2.3.1.10	Finalize room list	Fri 2/20/15	Fri 2/20/15	4 hrs	
351		1.2.3.1.11	Create student job list	Fri 2/20/15	Sat 2/21/15	10 hrs	
352		1.2.3.2	**Study day**	Sat 1/10/15	Sat 1/10/15	3 hrs	
353		1.2.3.2.1	Send student email	Sat 1/10/15	Sat 1/10/15	1 hr	
354		1.2.3.2.2	Plan schedule	Sat 1/10/15	Sat 1/10/15	3 hrs	
355		1.2.3.3	**Robot Send off**	Mon 2/2/15	Tue 2/10/15	25 hrs	
356		1.2.3.3.1	Plan itinerary	Mon 2/2/15	Tue 2/3/15	6 hrs	
357		1.2.3.3.2	Send invites	Tue 2/3/15	Tue 2/3/15	4 hrs	
358		1.2.3.3.3	Purchase cake	Tue 2/10/15	Tue 2/10/15	1 hr	
359		1.2.3.4	**Chesapeake Regional**	Sat 1/10/15	Sat 3/14/15	183 hrs	
360		1.2.3.4.1	Decide transportation	Sat 1/10/15	Sat 1/10/15	1 hr	
361		1.2.3.4.2	Create chaperone list	Mon 1/12/15	Mon 1/12/15	4 hrs	
362		1.2.3.4.3	Create field trip form	Tue 1/13/15	Tue 1/13/15	4 hrs	360
363		1.2.3.4.4	Create student information package	Fri 1/16/15	Fri 1/16/15	4 hrs	362
364		1.2.3.4.5	Create preliminary student list	Sat 1/17/15	Sat 1/17/15	4 hrs	
365		1.2.3.4.6	Create student job list	Fri 3/13/15	Sat 3/14/15	10 hrs	
366		1.2.3.4.7	Create car list	Sat 1/31/15	Sat 1/31/15	8 hrs	364
367		1.2.3.4.8	Finalize student list	Fri 1/30/15	Fri 1/30/15	3 hrs	
368		1.2.3.5	**Community service**	Fri 1/9/15	Sat 1/10/15	12 hrs	
369		1.2.3.5.1	Find next community service event	Fri 1/9/15	Sat 1/10/15	12 hrs	
370		1.2.3.6	**Demo events**	Sat 1/10/15	Fri 2/20/15	113 hrs?	
371		1.2.3.6.1	**Girl scouts**	Fri 1/23/15	Fri 2/6/15	47 hrs	
372		1.2.3.6.1.1	Find demo date	Fri 1/23/15	Fri 1/30/15	29 hrs	
373		1.2.3.6.1.2	Create game	Sat 1/31/15	Mon 2/2/15	12 hrs	372
374		1.2.3.6.1.3	Create information packages	Tue 2/3/15	Fri 2/6/15	6 hrs	373
375		1.2.3.6.2	**Power Hawks 5K**	Sat 2/14/15	Tue 2/17/15	12.5 hrs?	
376		1.2.3.6.2.1	Set date	Sat 2/14/15	Tue 2/17/15	12.5 hrs?	
377		1.2.3.6.3	**Electronic Museum**	Mon 2/16/15	Fri 2/20/15	12 hrs	
378		1.2.3.6.3.1	Verify participation	Mon 2/16/15	Mon 2/16/15	2 hrs	



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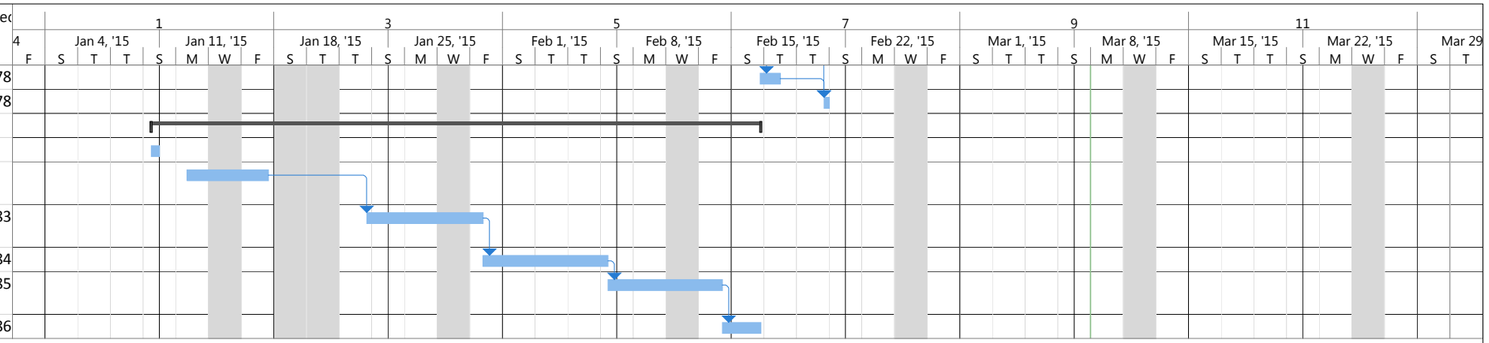
ID	Task Mode	Outline Number	Task Name	Start	Finish	Duration	Predecessors
379		1.2.3.6.3.2	Plan event details	Mon 2/16/15	Tue 2/17/15	6 hrs	378
380		1.2.3.6.3.3	Create student list	Fri 2/20/15	Fri 2/20/15	4 hrs	378
381		1.2.3.6.4	**Portable Inspiration**	Sat 1/10/15	Mon 2/16/15	104 hrs	
382		1.2.3.6.4.1	Portable Inspiration Directive Sheet	Sat 1/10/15	Sat 1/10/15	4 hrs	
383		1.2.3.6.4.2	Research Dawgma Portable Inspiration (Chief Delphi)	Mon 1/12/15	Sat 1/17/15	20 hrs	
384		1.2.3.6.4.3	Design VEX Activity(Based on Summer Game)	Fri 1/23/15	Fri 1/30/15	28 hrs	383
385		1.2.3.6.4.4	Make Portable Kit	Fri 1/30/15	Sat 2/7/15	24 hrs	384
386		1.2.3.6.4.5	Make Powerhawks Educational Handouts	Sat 2/7/15	Sat 2/14/15	20 hrs	385
387		1.2.3.6.4.6	Find Demonstration	Sat 2/14/15	Mon 2/16/15	8 hrs	386



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Task	Summary	Inactive Milestone	Duration-only	Start-only	External Milestone	Manual Progress
Split	Project Summary	Inactive Summary	Manual Summary Rollup	Finish-only	Deadline	
Milestone	Inactive Task	Manual Task	Manual Summary	External Tasks	Progress	

POWERHAWKS ROBOTICS

2015 Build Information Sheet

This document was created by the Power Hawks leadership group to detail the plan of action for the Power Hawks 2015 Build Season. It is intended to correlate with the team's strategy sessions from Kickoff and the 2015 Build Season Gantt Chart

Version 1.2 on February 24, 2015

Game Play – Strategic game analysis has prescribed the following game play approach:

Autonomous:

- Threshold: One game piece and robot in the auto zone.
- Objective: Manipulating the tote and can into the zone.
- Reach 1: Stacking all three totes and taking into the zone.
- Reach 2: Stacking all three totes and can into the zone.

Tele-Op:

- Threshold:
  - Stacking totes
  - Manipulating the can
  - Drive over the bump
  - Removing noodliedoodlies from non-litter zone
- Objective:
  - Stacking totes with a can
  - Driving over the bump WITH tote(s)
  - Moving the cans off of the center platform (ASAP)
  - Stacking the noodliedoodlies on the can (with the human player)
- Reach:
  - Stacking six totes with a can
  - **Double stacking (stacking two wide)**
  - Reorienting cans/totes

Coopertition:

- Threshold: Getting a set on the center platform.
- Objective: Stacking on the center platform.
- Reach: Stacking the three totes on top of another tote on the center platform.

Scoring Priorities – This is a ranking on how we want to get points. Priorities are used to resolve conflicts between respective sub-system designs, schedules, and resources.

1. Getting totes to scoring zones (tote sets).
2. Stack totes
    a. Tele-op
    b. Autonomous
3. Stack can on top of totes
    a. Tele-op
    b. Autonomous (not stack but include as a set)
4. Coopertition set
5. Scoring noodliedoodlie in can (human player input)
6. Coopertition stack
7. Pushing noodliedoodlie into landfill zone

Minimum Desired Point-Goal

(Our Robot's Contribution to Alliance Final Match Score)

The Point-Goal is what we should strive to make in order to be competitive (win 90% of matches), given the expected strategic capabilities of our opponents (and alliance-mates).

Game Period	Regionals (Qualifications)	Championships (Qualifications)	Regionals (Playoffs)	Championship (Playoffs)
Auto Mode	10	12	24	32
Tele-Op	80 vs 100 (coop)	92 vs 132 (coop)	92	92
Total	***90***	***104***	***116***	***124***

Game Level Objectives (GLO) – The GLO are the *operational capabilities* the Robot must have in order to support the Team Strategy / Game Play. This is a list, not a priority ranking.

1. Scoring
    a. Stack totes
    b. Double stack totes
    c. Stack totes with can
    d. Double stack tote with can
    e. Put noodliedoodlie in can
    f. Stacking yellow totes for coopertition
2. Game piece manipulation
    a. Push noodliedoodlies
    b. Receive tote from chute
    c. Pick-up tote from ground near chute
    d. Pick-up multi-oriented totes and cans
        i. Upside down
        ii. On side
    e. Possessing can
    f. Securing cans off coopertition section
3. Drive
    a. Drive over/Push pool noodles (don't get caught)
    b. Drive over bumps
    c. Drive over bumps with totes
    d. Maneuvers minutely for better object placement
    e. Something that lets us move (preferably with wheels)

High-Level Requirements – These requirements were established at the Requirements Discussion on 1/5/14. The *Objective value* is the level of performance we want to achieve, and will be the design goal, given no conflicts or constraints beyond our control. Constraints include expenses, schedule, and our own team personnel capabilities. The *Threshold value* is the minimum level of performance we must meet – failing this requires we fall back and re-think our technical approach to what we are building. The *range* between these two values defines the space where trade-offs can be made to resolve conflicts between requirements.

Requirement	Threshold	Objective
• Top drive speed:	12 fps	14 fps
• 360 Rotate speed	1 sec	<1 sec
• Pick up from ground	2 sec	1 sec
• Robot Height	78"	76"
• Robot Weight	120 lbs	<100 lbs
• Payload Capacity	6 Totes and 1 Can	12 Totes and 1 Can
• Transport Dimensions	42x28x78	40x26x76
• 6 tote and 1 can stack time		
○ With convenience	20 sec	18 sec
○ Pieces everywhere	35 sec	30 sec
• Moving a stack onto score zone	10 sec	5 sec

POWER HAWKS ROBOTICS TEAM HANDBOOK

This handbook is intended to give you an understanding of the Power Hawks Robotics Team and the responsibilities of its members, including students, parents, and mentors. In the following pages you'll find information relating to the team overview, expectations, key roles, procedures, and many other aspects of the team.

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Introduction

Welcome to the Power Hawks Robotics Team! This team handbook is a guide for you so that you have an understanding of what the Power Hawks do and what is expected of you. While this handbook is primarily written for students, there are sections for parents and mentors as well. It would be a good idea to read all sections as a parent or mentor so you are familiar with the team's policies.

Mission

The Power Hawks Robotics Team's mission is to prepare individuals to be contributing members of society through the experiences of cooperation and competitive robotics programs and year round community outreach.

Values

The Power Hawks Robotics Team's members display the following values in everything they do:

Responsibility

Students are responsible for their actions and should always make decisions that lead to the betterment of themselves and others.

Respectfulness

Students are respectful of those around them, and are always working to help each other and those less fortunate.

Engagement

Students are engaged in their classes, extracurricular programs, home life, and community to help better our world.

Teamwork

Students work as a team, helping each other to achieve and are ready and willing to work together to overcome any obstacle.

Leadership

Students work to be leaders, both within themselves and in their community in order to make our world a better place.

Integrity

Students show integrity through honesty and display a commitment and dedication to helping others.

Safety

Students will always use safe practices in whatever they do to protect themselves and those around them.

FIRST Values

In addition to our team's values, the Power Hawks Robotics Team's students display the values of FIRST in everything they do:
Taken directly from FIRST (http://www.usfirst.org/aboutus/gracious-professionalism)

Gracious Professionalism

Dr. Woodie Flowers, *FIRST* National Advisor and Pappalardo Professor Emeritus of Mechanical Engineering, Massachusetts Institute of Technology, coined the term "Gracious Professionalism®." Gracious Professionalism is part of the ethos of *FIRST*. It's a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community.
With Gracious Professionalism, fierce competition and mutual gain are not separate notions. Gracious professionals learn and compete like crazy, but treat one another with respect and kindness in the process. They avoid treating anyone like losers. No chest thumping tough talk, but no sticky-sweet platitudes either. Knowledge, competition, and empathy are comfortably blended.
In the long run, Gracious Professionalism is part of pursuing a meaningful life. One can add to society and enjoy the satisfaction of knowing one has acted with integrity and sensitivity.

Coopertition

Coopertition® produces innovation. At *FIRST*, Coopertition is displaying unqualified kindness and respect in the face of fierce competition. Coopertition is founded on the concept and a philosophy that teams can and should help and cooperate with each other even as they compete.

Coopertition involves learning from teammates. It is teaching teammates. It is learning from Mentors. And it is managing and being managed. Coopertition means competing always, but assisting and enabling others when you can.

Team Overview

What do we do?

The Power Hawks compete in FIRST Robotics Competition, a worldwide competition where teams build a robot for a game that completely changes every year. But its way more than the robot – our team operates like a business, giving our students real world experiences while developing into a close nit family.

Why?

First and foremost, it's fun! You'll make lifelong friendships and have the opportunity to get well ahead of your peers who aren't in robotics. You can learn technical skills, business skills, or both! Most importantly though, you'll learn about teamwork, leadership, respect, and integrity, and develop into an amazing individual who can go out and change the world.

What are the basics?

The Power Hawks works with industry professionals to teach and inspire our team. During the fall FTC has their Build season, the FRC do a lot of workshops and training opportunities, in addition to outreach events. In the winter, we have the FRC "build season" where we have just six weeks to design, build, test, and troubleshoot a 120 pound robot. Then in the spring, we compete with the robot and show off our team to the world. During the summer, we do outreach and fundraising activities as well.

What do team members do?

They run the team! While the teams have coaches and have adults helping to lead it, the majority of the team is run by you, the student. Therefore, you can help build or program a robot, or help out with prototyping new ideas. You can also help with our FRC business team, which does everything from maintaining our budgets, to managing and exploring community service, fundraising, and demo events, to designing the graphics for the teams, and even running our social media and website.

What's in it for you?

You'll get hands-on learning from people working in the real world. You'll make connections with businesses that may help you in college and beyond. You'll get opportunities at multiple colleges who are looking for students like you. You'll have access to over $15 million in scholarship money exclusively for students who participate in FIRST Robotics. Above all, you make lifelong friendships and have a lot of fun!

History

The Power Hawks Robotics FRC Team 1111 was founded in 2003 by Mr. John Jacobson, a physics teacher at South River High School, and eight students. Each year since the team has grown both in members and in abilities. In 2009 we started the FTC teams 3583 & 3796 and in 2010 we added one more FTC team 5178. Currently, the Power Hawks main focus is to inspire our community through multiple outreach efforts in partnership with our funding arm, the Power Hawks Robotics Club, Inc.

Awards Won

The Power Hawks are proud of the awards won over the years as they help to recognize the hard work we do towards bettering our community.

FRC Awards Won

2014 Awards

North Carolina Regional	Raleigh, NC	Regional Finalists Entrepreneurship Award
Chesapeake Regional	College Park, MD	Imagery Award

2013 Awards

Finger Lakes Regional	Rochester, NY	Engineering Inspiration

2012 Awards

Chesapeake Regional	Baltimore, MD	Judges' Award

2011 Awards

Chesapeake Regional	Baltimore, MD	Excellence in Design
Virginia Regional	Richmond, VA	Judges' Award

2010 Awards

Washington DC Regional	Washington, DC	Engineering Inspiration

2009 Awards

Chesapeake Regional	Annapolis, MD	Creativity Award Team Spirit

2008 Awards

Chesapeake Regional	Annapolis, MD	Regional Finalists Innovation in Control

2007 Awards

Chesapeake Regional	Annapolis, MD	Sportsmanship

FTC Awards Won

2012 - 2013 Awards

Capital Collage Qualifier	Beltsville, MD	Team 5178	Inspire Award
		Team 3796	Think Award
Naval Academy Qualifier	Annapolis, MD	Team 3583	Connect Award
		Team 5178	Motivate Award

2011 - 2012 Awards

Collage of Southern	La Plata, MD	Team 3583	Motivate Award
Maryland Qualifier		Team 3796	Think Award
	Teams 3583, 3796 & 5178		Judges Award
Naval Academy Qualifier	Annapolis, MD	Team 3796	Connect Award
Maryland State Championship	Laurel, MD	Team 5178	Finalist Alliance Award
		Team 3583	Judges Award
		Coach Kathy Kelly	Compass Award

2010 - 2011 Awards

Maryland State Championship	La Plata, MD	Team 3583	Spirit Award
York Pennsylvania Qualifier	York, PA	Team 3796	Inspire Award

Qualifications

A student on the Power Hawks Robotics would portray the following qualities:

Grade Point Average

A student must have a grade point average of at least 2.5 weighted upon being selected to the Power Hawks Robotics Team. Additionally, students must maintain a 2.5 GPA each marking period and semester. During the course of the competition season, team activities will comprise of a large portion of students free time. A strong ethic in study habits and a history of achievement or desire for achievement is therefore essential in maintaining and improving a student's academic progress in the classroom.

Demonstration of Positive Learning Habits

Positive learning habits are related to study skills, classroom assignments, grades, classroom, and school improvement. A student's current grades and past achievements, as well as demonstrated ethics are powerful statements about their learning habits. A team member is making an effort in their school work in addition to their team work.

Good Attendance, Punctually, and Dependability

Attendance and punctually are indicators of a student's commitment to their education and future. A team member needs to be available and ready to participate as much as possible. When asked to participate, establishing a record of dependability and punctuality is essential to team

organization and efficiency. For our attendance policy, please see the Minimum Requirements section under Procedures.

Consistent Demonstration of Being Responsible, Respectful, and Engaged

Each team member is an ambassador of our team. Team members need to be role models for other students to emulate and respect. Solid behavior choices should be demonstrated at all times, in and out of school activities.

Ability to Commit to a Project

Starting a project and following it through to the end is critical to team performance. Team members need to dedicate themselves and not get side tracked or discouraged.

Ability to Work Both Independently and as a Team Member

Being able to be a team player, doing what is needed for the team is an asset to all. However, working independently with little or no direction shows dedication and willingness to learn.

Demonstration of Honesty and Integrity

A person of good character consistently demonstrates honesty and integrity in their personal, academic, and work lives.

Acceptance of Failure as a Tool for Learning

Many successful people fail quite often, but then learn from the mistakes made and move forward, taking their failure in stride. A team member who has this ability can go far in the team and beyond.

Team Organization

The Power Hawks Organization is broken into a number of different programs as shown in the figure below.

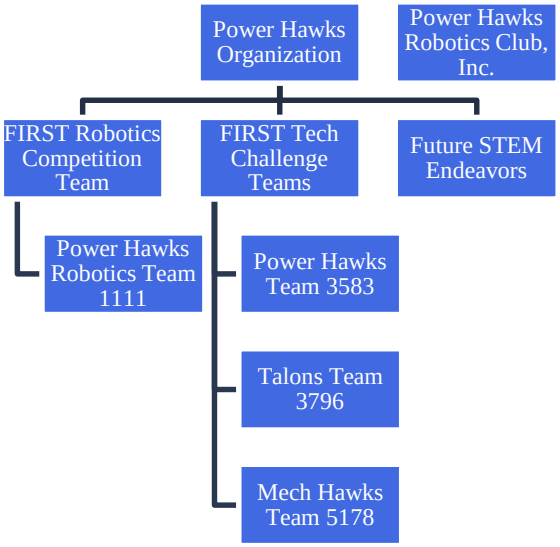


Figure 1 Team Organization

Power Hawks Organization

The Power Hawks Organization is the school program that makes up all school activities in the organization. While most of the teams under the Power Hawks Organization largely operate on their own, The Power Hawks Organization runs large events that span all programs such as our annual FIRST Lego League Qualifier, fundraisers in the school, and community service projects. It is run by the leaders or captains of each program under its control.
The Power Hawks Organization's purpose is to create unity in the organization when completing large projects.

Power Hawks Robotics Club, Inc.

The Power Hawks Robotics Club, Inc. is a 501(c)(3) nonprofit run by parents and community members. It is not associated in any way with Anne Arundel County Public Schools or South River High School. The goal of the nonprofit organization is to provide funding opportunities to help STEM and Robotics programs throughout Anne Arundel County. It is the primary monetary mechanism for the Power Hawks Organization, providing the majority of the organization's funding and materials. While separate from the Power Hawks Organization, The Power Hawks Robotics Club, Inc. works closely with the programs under the Organization to ensure both missions are being met. Further, The Power Hawks Organization often volunteers for the nonprofit's fundraisers and community service projects, providing volunteers and services to help the club in its endeavors.

FIRST Robotics Competition Team

Our FIRST Robotics Competition (FRC) Team is considered the pinnacle of the Power Hawks Organization. The Power Hawks Organization fields one team—Team 1111, the Power Hawks, which competes yearly in the FIRST Robotics Competition.

FIRST Tech Challenge Teams

Our FIRST Tech Challenge (FTC) Teams are considered our starter teams. They help students get acclimated with robotics and allow students who have other major time commitments still participate. The Power Hawks Organization fields three FIRST Tech Challenge teams;

- Team 3583—Power Hawks
- Team 3796—The Talons
- Team 5178—Mech Hawks

Future STEM Endeavors

The Power Hawks Organization is continuing to look for other ways to further inspire more students. Currently though we do not have the adult mentors to run the teams. If you are interested or may be interested in starting another program under the Power Hawks Organization, Please contact the Head Mentor. Programs may include;

- Vex Robotics Competition (VRC)
- Technology Student Association (TSA)

Selection Process

There is a selection process for joining the Power Hawks. This process starts with the student completing an application. Each year, dates will be set on when applications are to be turned in. This process starts in the winter/spring with the selection of leadership. This will be done through interviews and applications. Selected executive leadership and leadership students will shadow students they are replacing for the rest of the year to learn their roles. Once leadership is selected applications will be sent out and an application night will be held for FRC and FTC students who are new to the team. Selecting a team is an extremely difficult task for the leadership and mentors. While being a member of the team the previous year gives you a good expectation to be on the team the next year, it is in no way a guarantee.

FRC Executive Leadership Selection

Towards the end of build season the current Executive Leadership Team and head mentor will work to select the following year's Executive Leadership Team. This is done so that the new Executive Leadership Team can both learn directly from the current leaders and so that they can have a role in the selection of the team that they will be running the next year. The current Executive Leadership Team will create an application for all current members who are interested, conduct interviews, speak with mentors, and make the decision of Chief Executive Officer and Vice Executive Officer. Those two individuals, along with the current leadership team, will then choose the Business and Build Operations Officers to ensure student compatibility.

FRC Leadership Position Selection

The process starts with current members submitting applications and mentors submitting reports on the students. All applications from current members are due on or before the published date and time advertised. Late applications will not be accepted.

Once applications are handed in the current Chief Executive Officer and Head Mentor will review the applications and interview every student. A review is also conducted of the student's grades.

The Chief Executive Officer and Head Mentor, along with input from the mentors and the next year's Executive Leadership Team will then select the students for the leadership positions to be filled for the following year. If a current leader is on the team for the next year, their position is not guaranteed and they must reapply just as other students would.

Prospective New Students

The application process will be started as soon as the current member application process is completed for both FRC and FTC. The team will advertise throughout the school and surrounding middle schools, and hold a night meeting where prospective students will be given the opportunity to show off their abilities and potentials. Once finished, the new Executive Leadership Team will make decisions on where students may be placed, either FTC or FRC. These decisions will then be emailed out to both new students and new parents.

It may be possible that we cannot take every student who applies. If this is the case we highly recommend that students apply to our FIRST Tech Challenge Teams.

All students, new and returning, will then be expected to attend an orientation meeting to get to know each other and the team as a whole.

Expectations

There are key expectations that you will be held to as a member of the Power Hawks. It is imperative that you follow all of the following expectations at all times.

Member Expectations

School

Success in class is an important aspect of the Power Hawks. Team members are successful only when they succeed in the classroom, and then participate in team activities. Therefore, all team members are expected to make school work and academic performance a priority over any team event or activity. This does not mean that students are permitted to miss many team events and meetings though in order to do school work. Students are expected to manage their time appropriately in order to be successful both in school and on the team.
To implement this, every student will maintain eligibility through both school policies and team policies. Students will therefore be expected to maintain a minimum 2.5 GPA in order to maintain their position on the Power Hawks. If a student does not maintain that GPA they will be placed on probation. They will be assigned tutoring services to help them get their grades up and they may be assigned other services to help them (help with organization, for instance). They will be expected to show grade improvement within one marking period or they may face removal from the team.
The key is to discuss concerns with school work with the Head Mentor as soon as possible to ensure your continued success both academically and on the team.

Any student who is struggling with school is strongly encouraged to seek help. Team members will gladly help tutor you to ensure success and you will not be looked down on for doing so. For that reason, please ask if you need help!

Events

Events like competitions are key parts of the robotics program. This is one area where gracious professionalism and our other team values come into play and are extremely visible to everyone. All eyes are on you every minute you are in public. Your behavior is a direct reflection on your character and on our team. A judge or member of another team may overhear what you say to one another and how you say it. Even the expressions on your face and body language may bring unwanted negative attention and bad impressions.

We are a very close family when we travel and conflicts may arise as a result. Students must refrain from rumors, he-said-she-said, and negative comments about one another. If a problem arises with another student you are requested to speak to the Head Mentor immediately. Students are not allowed to have physical conflicts with each other. If a problem such as this arises, both students will be disciplined as per school rules, which may include being sent home at your parents' expense.

Volunteerism

Community service and volunteerism is central to the mission of the Power Hawks Robotics Team. Members are expected to volunteer for a number of hours each year as part of their membership in STEM and robotics related outreach areas in order to help our community grow and prosper. To ensure students volunteer, a minimum number of volunteer hours is required each year in order to participate at regional and championship events.

Cooperation

Students are requested to cooperate at all times. This means that if a mentor or captain makes a request, you will comply with the request to the best of your ability. Ignoring directions or requests of a mentor or captain is not in the team's best interest. If you feel a request is out of order, you are encouraged to respectfully talk it through with the captain or mentor making the request. You also have the option to speak with the Head Mentor or Chief Executive Officer.

Behavior

Students are expected to behave responsibly at all times. This means that students will not partake in the following behaviors, among others:
Running in hallways, pushing and shoving, name calling (negative), making messes, fighting, swearing, stealing, and all other activities that reflect negatively on you and the team

Team Image

You as a member of the Power Hawks represent not only yourself but the team as a whole. Therefore you are expected to act responsible, respectful, and engaged at all times. Additionally, our "brand" is incredibly important to our continued image. Thus, any published material or anything that may be seen by the public must be appropriate at all times and must follow all rules set by the team's Identity Standards Document. If you have any questions, please ask the FRC graphics captain or mentor for help.

Uniform

Our uniform is an important part of our image and brand and thus must be maintained with dignity and care. There are several parts to our uniform that may be worn in several combinations.

The team uniform consists of a team T-shirt and khaki pants or shorts of an appropriate length. Underwear shall not be seen at any point. Yoga pants or leggings should not be worn at any team functions as well. Further, no manipulation of the team shirts may be made.

FIRST or team hats are allowed and encouraged. Other hats may be approved on a case by case basis by the Head Mentor.

Power Hawks outerwear is encouraged but not required. If you do not have Power Hawks or FIRST outerwear your outerwear must be respectful and not have any large logos or sayings on it. Outerwear will not permitted at any time in the Pits at competition.

Closed toed shoes and Power Hawks safety glasses are required at all competitions and while building the robot. Long hair must be tied back at all times when safety glasses are required.

The care and cleaning of the uniform is the students' responsibility and it is expected to be appropriately maintained at all times.

Game Playing

While students are encouraged to play social games outside of team time, it is unacceptable to play any sort of game during team meetings or events. This includes 30 minutes before any meeting, during any meeting, any event, fundraiser, outreach event, or competition. In the event that you are found to be playing any sort of board, card, video, or other type of game, the game will be confiscated and will be given to your parent. Additionally, if you continue to violate this policy your standing on the team may be compromised. You represent our community, school, and team wherever you go. By playing games at an event instead of helping, you are portraying a negative image on both yourself and the rest of the team.

Relationships

In the event that a relationship develops or is ongoing, there are certain guidelines that must be adhered to at all times when engaged in team activities. Competitions and team events are also not the time nor the place to pursue new personal relationships beyond friendship. Handholding, extensive hugging, kissing, and other public displays of affection are strictly prohibited at all times. Couples may not wander off or sit alone. In other words, they should not appear as a couple but as part of the team. Common sense should prevail at all times.

Communication

Students are required to have an email address and check it daily. They should read all emails from robotics members carefully and completely. Great care should be given to your email address when you create it. Cute game related or nickname emails are often looked at in a negative manner by employers. All email correspondence should be formal as well. Emails should include a subject, salutation, proper grammar, and signature. Make sure to read all emails before sending and look for professionalism. For tips in writing emails, visit

http://writingcenter.unc.edu/handouts/effective-e-mail-communication/. In addition, students should frequently check the team website, including the calendar and the FRC team Edmodo. It is also recommended to be a member of the Power Hawks Robotics Group on Facebook.

Student and Mentor Interactions

For the Power Hawks to be successful there needs to be an excellent working relationship between the students and the mentors. This means that both the students and the mentors must treat each other with respect and work together. The Power Hawks are a student led team meaning the students get to make many of the decisions as well as take responsibility for those decisions. The mentors are there to guide and teach the students. If a mentor feels some guidance and teaching is necessary, then the students are obligated to stop, listen, and consider the guidance. If the student disagrees with the guidance, then the mentor needs to let the student learn by experience whether positive or negative.

When it comes to working on the robot or other projects, students should be doing the bulk of the work. Mentors can help students with specific tasks on the robot but should not be working on the robot individually. If a student feels a mentor is doing too much of the work, then they must respectfully talk to the mentor, bring this up with the student leadership and/or the Head Mentor.

Failure to Adhere to Expectations

Occasionally, students fail to adhere to the expectations set by South River High School, The Power Hawks Robotics Teams, and Power Hawks Robotics Club, Inc. In that case certain disciplinary measures may be taken against offending students at the judgment of the head mentor, teacher advisor, school administration, and/or the board of directors.

Probationary measures

If students are struggling with certain areas of the team or are not holding up to expectations, they may be put on probation. Probation will be assessed on a case by case basis, but will always include a written document specifying why the student is on probation, and expectations for improvement along with a timeline for improvement. This document will be signed by the Head Mentor, Chief Executive Officer, a parent or guardian, and the student. Failure to show improvement could lead to removal from the team or further probationary measures.

Removal from Team

If students do not show improvement from probationary measures placed upon them, they may be removed at the discretion of the head mentor as detailed in the probationary document and in accordance with school policies.

In rare circumstances, students may be removed from the team without going through probationary measures. This will only be done in the following situations:

- If a student cause significant safety risks to themselves or others without making changes when prompted.

- If a student causes significant disturbances to the team and fails to make changes when prompted.
- If a student lies or cheats a significant amount of time or about a major topic.
- If a student threatens or harasses any other student, mentor, or individual in any way.
- If a student commits any major offences as discussed in the AACPS student handbook in relation to the team.
- Any other situation that is first approved by the head mentor, Chief Executive Officer, the Board of Directors, and school administration.

Key Roles

To ensure the continued success of the Power Hawks, each person associated with the team will fall under one or more of the key roles listed below.

Parents/ Guardians

Parents are an integral part of the Power Hawks and are extremely important to our continued success. By supporting their child in all aspects of their team involvement and life, parents ensure their child gets the most out of their education and the Power Hawks.
Parents have several responsibilities, including:

- Provide **timely** transportation for the student. Parents are expected to have the student at the designated location at the prescribed time for all events and meetings. Your child will suffer by missing out on major events if they are late. This includes transportation after events as well.
- Parents are expected to assist their student in fundraising activities.
- Parents are expected to participate in the South County Showdown FIRST Lego League Qualifier by assisting in any way needed during the event.
- Parents are expected to provide transportation to local events, including meetings both on weekdays and weekends.
- Parents are expected to attend parent meetings throughout the year. Typically, this includes one meeting for new students to the team in May, a beginning of the year meeting in September, and a Kickoff meeting in January. Additionally, parents are welcome to attend our Kickoff for the build season and are asked to attend the robot Send Off Day which will be the last Sunday of the build season.
- Parents are expected to provide accurate medical information when requested and to keep mentors informed of all changes to ensure student safety.
- Parents are expected to check email on a regular basis and read all pertinent Power Hawks emails.
- Parents are expected to fill out all required paperwork in a timely manner.

- Parents are encouraged to participate in team activities whenever possible.
- Parents are encouraged to participate in Saturday Lunches during build season.
- Parents are strongly encouraged to discuss any concerns they may have with the Head Mentor.

Teacher & Coaches Roles/ Responsibilities

Teachers & Coaches are an important asset to our team. They are responsible for:

- Facilitating communication with the school
- Filling out and signing the school permission forms and driver forms with the events manager.
- Explaining school rules and implementing them
- Being the head chaperone for trips
- Helping with recruiting efforts and promoting any events or activities within the school
- Maintaining order and appropriate student behavior at team meetings and events.

The main teacher & coach acts as the school and county liaison, and will attend team meetings whenever possible or delegate another AACPS employee to be present when he or she cannot attend. Additionally teacher support can be used to help facilitate subteams, as well as to help divide up supervision of competitions and other school-related duties.

Mentors

A mentor is an adult or graduated student who has been invited and approved by the team leadership to be an active participant on the Power Hawks Robotics Team. He or she can provide assistance in any of the following areas:

- Tutoring for students in their area of expertise
- Leadership of a subteam
- Active during robot build season, helping with either the build or business side of the team.
- Additional limited supervision during events and activities
- Assistance in planning and team operation

A mentor must have the following qualities:

- Proven leadership skills
- Experience or desire to work with youth
- Strong moral character
- Reliable, trustworthy, and organized
- Enthusiasm for the program
- Time, availability, and commitment

- Ability to pass an AACPS background check
- Ability to pass an AAC Parks & Rec. background check for PHRC

All mentors are expected to behave appropriately at all times. They are role models for the students and should exhibit a commitment to the team as well as enthusiasm for the program. Interaction with the students should always be professional and must never be on a personal/romantic relationship level at any time. Failure to adhere to this policy or any above will be grounds for your removal from the team and barring from any team events.

All mentors are expected to fill out the following at either the beginning of the year or when they first come on. A packet of forms may be given to each mentor to aid in the process.
These forms include, but are not limited to,

- Mentor website bio
- Background check (redone every 2 years)
- Child abuse video form
- TIMS registration
- TIMS Consent form
- Signed driver permission form

While slightly dated, FIRST has put together a helpful guide for new mentors called the FIRST Mentoring Guide. It is highly recommended that all mentors read through this guide for advice on how to teach and inspire adolescents. The guide may be found HERE. It may also be found by searching "FIRST Mentoring Guide" on Google or www.usfirst.org.

To encourage continued success with the Power Hawks, particularly with the team's robust mentor network, a system of mentor levels have been setup. There are three levels of mentors. Each level has its own privileges and responsibilities.

Level 1

Level 1 mentors are usually students that have recently graduated from high school, typically South River High School, but other schools apply as well. They are encouraged to share their first hand experiences and expertise with the team. They will assist specific subteams with their particular skills and be active consultants on a subteam. A level 1 mentor can attend local events, not involving overnight travel with the team, but may travel on their own. Food expenses will be covered where appropriate.

Level 2

Level 2 mentors are extensively involved in the planning and overall operation of a subteam and participate with the team on a regular basis. They actively participate in the decision making process for many team operations. Level 2 mentors are given extended responsibilities compared

to level 1 mentors, which may include limited supervision or chaperoning of students. They can attend local events as well as overnight events, but must pay for an appropriate portion of their travel expenses. Level 2 mentors make up the majority of the team's mentors.

Level 3

Level 3 mentors are extensively involved in the planning and overall operation of the team on a regular basis. They are active participants in the decision making process for many team operations. Level 3 mentors are given extensive responsibilities, which may include limited supervision of students and leadership of one or more subteams. They are asked to travel to all events and have appropriate expenses paid for by the team. While there are few level 3 mentors, level 2 mentors are highly encouraged to consider taking on the responsibilities of a level 3 mentor to help the continued success of the Power Hawks.

Leadership

As a student led team, strong student leadership is the foundation of the Power Hawks Robotics Team. Therefore, certain procedures and policies have been put in place to ensure an organized and efficient leadership team.

FRC Team Organization

The FRC team is organized as a business as discussed below.

FRC Student Executive Leadership Team

Student Executive Leadership comprises of four students in different roles as the chart in figure 1 specifies.

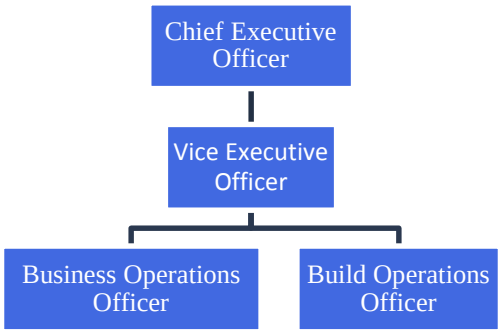


Figure 2: FRC Student Executive Leadership Team

Each role is filled through the annual application process and is determined by the application process, mentor input, and the previous year's Executive Leadership. While significant consideration will be given to the Vice Executive Officer to become the Chief Executive Officer each year, the position of Vice Executive Officer does not necessarily guarantee the position and others are welcome to apply for the position of Chief Executive Officer each year.
The Executive Leadership Team is expected to complete the following tasks, amongst others;

- Running team meetings
- Making decisions for and about the overall team

- Creating and distributing team emails and newsletters
- Developing a foundation for the college and career opportunities
- Maintaining and updating the team calendar
- Delegating appropriately to other portions of the team leadership.

Overall, the primary role of the Executive Leadership is to sustain the Power Hawks and keep the team in good standing. The Executive Leadership Team is expected to complete this role first and foremost, as it pertains to the continued success of the Power Hawks Robotics.
Further, each position has its own set of responsibilities which include, but do not encompass, all roles and tasks that the student may be expected to complete. These tasks are discussed below;

FRC Chief Executive Officer (CEO)

The FRC CEO is the leader of the entire Power Hawks organization. This person is responsible for maintaining a positive working environment for the total program and being a liaison to the school system. They should work to ensure the team is always moving in a forward direction and that the student leaders and adult mentors are helping to ensure every student is growing to their full potential. Further responsibilities include, but are not limited to:

- Overseeing all operations of the organization
- Overseeing all internal & public relations
- Reporting to school administration, parents, sponsors and business partners, and team members
- Maintaining a safe and productive learning environment for all participants
- Helping to recruit and train new teachers, mentors, and students
- Setting and maintaining the calendar and schedule
- Ensuring all subteams are completing objectives in a timely manner

FRC Vice Executive Officer (VEO)

The FRC VEO assists the CEO with all tasks, filling in for the CEO when absent, and helping to maintain a healthy workload for both of them. They are to be the one to carry out the CEO's plans, working side by side with students and mentors to help the team in their growth. Further responsibilities include, but are not limited to:

- Creating and maintaining all team organization data
- Creating and maintaining data on student progress
- Creating and maintaining data on team progress
- Tracking attendance at meetings
- Filling in for the CEO when necessary
- Filling in for team captains when necessary
- Assisting subteams when deadlines approach

FRC Business Operations Officer (BOO)

The BOO oversees all aspects which involve the business side of the Power Hawks Robotics Team. Responsibilities include, but are not limited to:

- Develop and maintain an annual and five year business plan
- Assist in developing a business budget
- Assist in developing approved fundraising campaigns
- Maintaining all identity and media standards
- Enforcing identity standards with all media that the public will see
- Ensuring all social media and internet presences are maintained and appropriate

FRC Build Operations Officer (BUOO)

The BUOO oversees all aspects which involve the build side of the Power Hawks Robotics Team. Responsibilities include, but are not limited to:

- Plan build schedules
- Assist in developing a build budget
- Create and maintain robot bill of materials
- Create and maintain the team Gantt chart
- Ensure all safety rules are followed in team areas
- Be an expert in all rules
- Maintain a demo robot
- Ensure students maintain and properly use all tooling

FRC Student Leadership Team

Below the Student Executive Leadership Team is the Power Hawks Student Leadership Team. These are generally single person leadership positions that are responsible for overseeing the wellbeing and success of each subteam. The hierarchy of these roles is shown in figure 2.

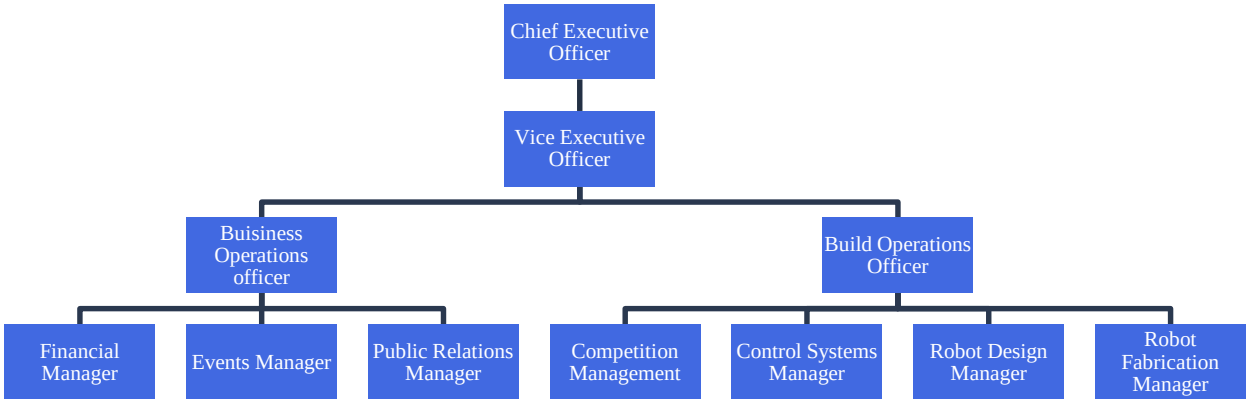


Figure 3: FRC Student Leadership Team

In general, each of these roles is fulfilled by students who have shown particular potential in the previous season, but they may be filled when a new student shows specific qualities during the application process. Each position is filled with one student only, with an assistant assigned at

the request of the student in the position and with the agreement of the Executive Leadership Team. Each student in the Student Leadership Team is expected to aid the Executive Leadership Team's primary role of continuing the success of the Power Hawks Robotics. While this is their primary role, each position also has more specific roles as detailed. Please note, this is by no means an exhaustive list and more may be expected of each position.

FRC Financial Manager

The financial manager is responsible for all financial procurement to support the Power Hawks and tracking spending for the program. Responsibilities include, but are not limited to:

- Maintaining and communicating the team budget
- Liaison with PHRC treasurer
- Liaison with SRHS financial secretary
- Maintain contact with new and existing sponsors
- Coordinate the procurement of new sponsors
- Invite sponsors to team events
- Plan and coordinate fundraising events

FRC Events Manager

The events manager is responsible for planning and coordinating all events that the Power Hawks participate in. Responsibilities include, but are not limited to:

- Planning and coordinating community service events
- Connecting with sponsors for demonstrations
- Organize volunteers and paperwork for specific events
- Coordinate design and ordering of spirit wear
- Liaison with yearbook
- Organize team-building activities
- Coordinate all travel arrangements for field trips

FRC Public Relations Manager

The public relations manager is responsible for all media that represents the team to the public. This includes printed and web materials, plus photo, video, and social media. Responsibilities include, but are not limited to:

- Organizing and completing all award submissions
- Create videos for team events
- Document all team activates through photography
- Release appropriate photos to the public
- Document all team activities through videography
- Release appropriate videos to the public
- Ensure identity standards are held by all persons
- Maintain existing graphics
- Create new graphics as necessary

FRC Competition Management

The competition manager is responsible for all of the tasks that happen during a competition. Responsibilities include, but are not limited to:

- Coordinating drive team
- Completing all prerequisites for scouting
- Organizing scouting at events
- Managing back of house pit
- Managing front of house pit
- Coordinating judging speakers
- Coordinating award presentations
- Organizing photography during events
- Organizing videography during events
- Manage stands and spirit
- Collect data for drive team
- Coordinate battery charging
- Ensure pit and drive team are hydrated and fed

FRC Control Systems Manager

The controls system manager is responsible for the design and implementation of all programing and electrical components on the robot. Responsibilities include, but are not limited to:

- Coordinate design of control system
- Plan and integrate sensor systems
- Coordinate programming of robot
- Coordinate and manage wiring and integration of electrical systems
- Coordinate user input systems
- Coordinate management of battery systems

FRC Robot Design Manager

The robot design manager is responsible for the design and testing of the robot. Responsibilities include, but are not limited to:

- Coordinate robot design with team
- Implement design of robot
- Manage 3D printing systems
- Manage CAD of robot
- Digitally design and test robot
- Design robot components and upgrades
- Render robot and release to public with public relations subteam
- Maintain Power Hawks design standards

FRC Robot Fabrication Manager

The robot fabrication manager is responsible for the manufacturing and implantation of the robot subsystems. Responsibilities include, but are not limited to:

- Coordinating creation of drivetrain
- Coordinating building of bumpers
- Coordinating the building of robot mechanisms
- Coordinate building of mock field components
- Maintain and upgrade demo robot
- Maintain and upgrade practice robot
- Keep all storage rooms clean and organized
- Keep inventory of all parts and tools

FTC Team Organization

The FIRST Tech Challenge team maintains leaders to ensure the team succeeds to the fullest. Other members may have more unofficial roles on the team.

FTC Team Captain

Leads team meetings, organizes events, liaisons with other Power Hawks teams, PHRC, and teams, ensures the wellbeing of team students and ensures deadlines are met.

FTC Team Assistant Captain

Assists Team Captain in all tasks, works closely with students to ensure tasks are being completed. Fills in for Team Captain when they are absent.

FTC Build Captain

Runs the design and creation of the competition robot. Ensures it constraints to all rules and will work most effectively. Keeps students on task and ensure goals are met in a timely fashion.

FTC Programming Captain

Runs the programming of the competition robot. Ensures it constraints to all rules and will work most effectively. Keeps students on task and ensure goals are met in a timely fashion.

Role of Student Leaders

Each student in the student leadership team is tasked with running their group of students as they see fit while still maintaining the team's goals and outcomes. Student leaders are to organize their team with input from the Executive Leadership Team and mentors so that they may do the best they can for the students and the team.

Procedures

Community Service

The Power Hawks strive to help our community by bettering

Fundraising

All students are required to participate in team fundraising activities. The funds raised are typically used for student expenses and materials for the team. Fundraising often also helps us to get our name out in the community, and so it is required that all students are responsible, respectful, and engaged during fundraising activities, including during setup and teardown.

Fundraising may include such activities such as demonstrations, car washes, school sales, meals, flocking, or other such programs. Students are encouraged to bring any fundraising ideas to the fundraising captain to help develop more opportunities.

Meeting Procedures

Team meetings are where the majority of the work for the Power Hawks is completed. Therefore, it is essential that every student make every attempt to attend our meetings. While a certain amount of missed meetings is accepted, frequent absences, especially when not discussed prior, can result in removal from the Power Hawks or loss of privileges and position.

Meeting Schedule

While the meeting schedule may change year to year, often it is as follows:

FRC Pre build Season

Pre-build season is from the beginning of school in August to the first Saturday of January when build season starts. Meetings will be every Thursday, with build and business alternating so that the majority of students only have to attend every other week. Students on both sides of the team are expected to come every week. We will also occasionally have full team meetings throughout the fall.

FRC Build Season

Build season lasts the time between when the new FRC game is announced until Stop Build Day, approximately six weeks later. Due to the limited time we have to build a robot we will be meeting most during this time period. All students will meet at least four days a week unless otherwise specified. Exact times will be discussed each year.

FTC Build Season

Build season starts at kickoff on the first weekend in September and runs through to our first qualifier in December or January depending on the schedule for Maryland FTC Qualifiers. All students will meet Tuesday, Thursday and Saturday unless otherwise specified. Exact times will be discussed each year.

Post build Season

It is extremely difficult to plan this part of the year before we know what competitions we are going to. Generally, it's a middle ground between pre build season and build season in terms of when the team will be meeting. More information will be given during the build season.

Meeting Regulations

To ensure the wellbeing of the Power Hawks certain procedures have been put in place. It is imperative that all students follow all regulations to the fullest or they risk losing privileges and roles.

Students are to respect and follow all wishes and requests that mentors make at all times. Mentors are there to help you learn, and so it is imperative that you respect them to the fullest. While the mentors try not to touch the robot or tell students what to do instead of teaching them what to do, sometimes mentors do need to be hands on. This is fully acceptable, and it is expected for you to work with them accordingly. If you feel that the mentors are too hands on and are starting to limit your experiences, please talk to the Head Mentor and they will address the issue.

While there may be some free time occasionally, the mentors and leadership work hard to ensure that you will always have work to do. Therefore, please do all work to the fullest, and if you have down time, use that to help other teams, clean, or organize.

There is to be no game playing during meeting times or 30 minutes before meetings. Any students who are playing games will have their games confiscated and parents must pick them up.

Students, especially captains, are expected to start setting up materials and tools up to 30 minutes before the meeting officially begins. These way students can get right to work when mentors arrive and not have to take more time to setup when learning could be happening.

Students should never be eating during a meeting except during scheduled food breaks. If students cannot eat before they attend a meeting they are expected to go elsewhere in the school and eat so that they do not distract other team members. They are still expected to be on time at the meeting though, without food.

Above all else, **safety is our first priority!** If at any time you feel unsafe please tell your mentor and/or the Head Mentor. If you do not know how to use a tool or certain equipment please let us know before using it! Proper tool safety is imperative to running a safe facility. Additionally, safety glasses are **required** at all times in the shop area, where any tools are being used, or where the robot is being operated.

Travel Procedures

Traveling as a team can be an extremely exciting and rewarding portion of our season. A great deal of effort, planning, and organization is required to coordinate all of the associated activities though, so please make every effort to make the trip easy for all. You are encouraged to have fun, but be smart about it. A strong effort is made to make the travel experience educational and culturally interesting as well as fun.

All team members are eligible to travel to all events unless otherwise exempted. A student may be exempted from travel due to a prior commitment or disciplinary reasons from the mentors and/or school administration. All team members are expected to attend all events unless discussed with the Head Mentor. If finances are an issue, please talk to the Head Mentor and we will work to see what we can do. Failure to attend an event without prior discussion may result in dismissal from the team or loss of team privileges.

Packing

It is very important to pack efficiently. That means bring only clothes and items that are necessary and required. Do not show up with many different bags. It is wise to have only one piece of luggage and a carryon bag for the bus/competition. All luggage must be identified with the name on a tag prior to loading. A recommended packing list will be distributed before each event.

Bus Travel

We use busses as our mode of transportation to most events. It is important that you continue to be responsible, respectful, and engaged on the bus.

If having a snack or drink, please dispose of the waste when finished in order to keep the bus clean. When leaving the bus, make sure to check the area to make sure all belongings and trash has been accounted for.
Students are allotted a single seat only. If extra seats exist on the bus they will first be given to mentors and chaperones. Then, only if every adult has an extra seat, students may be given an extra seat.

Students must stay in their seats as much as possible. Under no circumstances are students allowed to sleep on the floor.

Students may bring personal media players or devices to listen to music or watch videos. However, they must be used with personal listening devices and others should not be able to hear what you are listening to. Failure to follow this policy will result in the confiscation of your device for the duration of the trip.

Most busses have video capabilities for use during travel. The choice of movies will be controlled by the mentors, with input from the students.

Personal Vehicles

Often, parents, mentors, or other students will transport students to local events. At all times seatbelts must be worn and all other laws and regulations must be followed. In addition, a driver permission form must be on file with the Head Mentor for each individual trip.

Competition Procedures

Typically, the Power Hawks attends one or two regional competitions and/or the Championship competition and FTC attends two qualifiers.

FRC Regional Events

Which regional event we attend is dependent upon location and timing of the events. Typically, one of the events we attend will be the Chesapeake Regional and the other will be further away.

Championship Event

The Championship event is very similar to a regional but on a significantly larger scale. There will be teams from all over the world. We will generally only attend the Championship event if we have won an award to warrant going or if we are invited.

Minimum Requirements for Attending Events

Team members must be in good standing with the team in order to attend any events. This includes meeting the necessary grade requirements, attending a minimum number of work days during build season, and completing a minimum number of volunteer hours during the year.

Absences

Students must attend a minimum number of work days during build season. Students are not allowed to miss the following number of days:

- Local regional event no more than 12 total absent days, including 9 excused and 3 unexcused
- Travel regional event no more than 11 total absent days. Including 8 excused and 3 unexcused.
- Championship event no more than 9 total absent days, including 7 excused and 2 unexcused.

An excused absence is any absence that is made known to the Head Mentor and/or Chief Executive Officer at least one hour before a meeting begins. The absence must be for a legitimate excuse such as a family affair, meeting or event for another group that a student is a part of, or another major aspect of the student's life. Excused absences do not include things such as wanting to be with a group of friends instead of being at a meeting, or excessive missed days for school work. While an occasional day missed for a major project is acceptable, students should not be missing multiple days for school work as this would be attributed to poor time

management by the student. Further, students are expected to check in when they arrive and check out when they leave. Students are expected to be on time for meetings and stay until the end. Hours will be tracked and students will be receive the equivalent of one absent day for every four hours that they are late.

Volunteer Hours

Team members must be complete a minimum number of volunteer hours in approved STEM or robotics outreach events. Students must complete the following number of hours:

- Local regional event more than 10 hours of volunteer hours.
- Travel regional event more than 15 hours of volunteer hours.
- Championship event more than 20 hours of volunteer hours.

All volunteer hours must be approved by the Head Mentor to count. Students are responsible for filling out the required paperwork and are required to hand it in within one calendar week of the volunteering.

FRC Competition Schedule and Procedures

Most events follow a set pattern:

Wednesday

The day before competition starts is when we try to arrive in the event city. There is also setup time during the evening where a small group may attend the regional to unload our trailer and set up our pit.

Thursday

A small group of team members will enter the pit early to setup. Another small group will arrive shortly after to run the event for the day. The rest of the students will either not be required to attend (if local) or will have another activity to do during the day. On away trips, all members will eat dinner that night together and have a meeting that night at the hotel to discuss the day's events.

Friday

In the morning, the team will have breakfast together for away events. Team members will be expected to meet at South River High School for bus transportation to local events. The entire team will arrive at the competition as soon as the venue is open. The pit crew, drive team and any other members who need to go to the pit will go to the pit immediately. The rest of the team will find a location in the stands. All members will be present in the stands for opening ceremonies.

All team members are expected to attend opening and closing ceremonies on both Friday and Saturday!

All students will be present in the stands for every match that we play on to cheer on the team. The only exception to this is when the awards team is presenting.

All team members are expected to complete any tasks assigned to them.

Saturday

In general for local events, we travel in a caravan using self-transportation forms. Unless otherwise approved, students will meet at the school at the stated time for transportation. Upon entering the event venue, students should go to their designated locations, either being in the pits or in the stands.
All students are required to be present in the stands for all matches that the Power Hawks competes in, as well as the opening and closing ceremonies.

FTC Competition Schedule

Most qualifiers and state championship are held on a Saturday or Sunday and last from 7am until 5pm and can run later if there are issues with the field control system.

Thursday

The week of our scheduled event, we pack for the event.

Saturday or Sunday

We generally depart from South River High School at 6:30am by bus to our qualifier. Upon entering the event venue, students should go to their designated locations, either being in the pits or in the stands.
All students are required to be present in the stands for all matches that the Power Hawks competes in, as well as the opening and closing ceremonies.

FTC Super Regionals and World Championships Competition

Super Regional Eastern Division is a two day events and world championship are a four day event starting on Wednesday at noon and end on Saturday. For these events will follow the general competition rules.

General Competition

The following are rules and policies that apply to **all** students during the entirety of the competition.
As stated above, students are to be together in the stands for both the opening and closing ceremonies for Friday and Saturday. Additionally, students are expected to be in the stands for every single match that the Power Hawks participate in throughout the competition. The only exception to this is if students are presenting or interviewing for awards, or are on the drive team or field team. Lastly, all students but the designated alliance captain is to be in the stands for alliance selection on Saturday.

At no times are students to be playing any sort of video, board, or card game during competition. Remember, you represent our community, school, and team, and playing games during competition is highly looked down on by others. If anyone is caught playing any sort of game, those games will be confiscated for the remainder of the competition and given back only to the student's parents. If the student is caught again, they may risk forfeiting any positions they have on the team. In other words, do not bring games to competition!

There are many roles and jobs throughout the competition and every person's role is vital to the success of the Power Hawks. If anyone is unclear of what their position is, please talk to the Head Mentor and Chief Executive Officer, but do not just start doing a job because you feel like it or are bored with your current one.

During competition if you do not have a specific role for some time, please look into helping scouting. Scouting is an essential operation for the success of the Power Hawks on the field and we need as many students as possible to help out throughout the competition. These positions will be assigned accordingly by the Chief Executive Officer and the scouting captain.

At all times students are to be in groups of three or more, unless specifically allowed by the Head Mentor for certain tasks. (Sometimes scouting requires only two people for certain jobs, for instance.) While it is okay for students to go get food or see certain surrounding areas, it is essential that you let your chaperone know, and it is essential that you make sure you are still back for all matches. If you are part of the pit crew, lunch times will be arranged for you so that we always have a presence in the pits.

When in the stands please cheer for our team! It makes a huge difference to the people on the field hearing our team cheer for our success, so please go all out, keeping in mind gracious professionalism, and cheer for our team!

Above all, please think! If you think it may be a bad idea, it probably is!

Hotel Procedures

When we travel, we often stay at a hotel for several nights. Students will be organized into rooms of either three or four students. There are no co-ed rooms. Each room will have an adult assigned to monitor and coordinate activities, including random room inspections. Students are expected to follow all AACPS rules and regulations at all times.

Check in

When we arrive at the hotel, students will go to a designated location to wait for keys. At that location students will need to be very quiet as to not disturb the other guests. Students are to proceed to their rooms and unpack as soon as possible. Please alert the Head Mentor if there are any room issues.

At the Hotel

Often there is free time in the hotel to get snacks, play games, swim, or be with friends. Students are expected to act responsible during this time as they are always representing the Power Hawks. They are to not go outside of the hotel at any time. At no point should only one boy and one girl be in a room alone. Whenever there are two sexes in the room at the same time the door

must be completely open. Students are also expected to be in their rooms at the end of the night (often 11:11) when they are expected to go to sleep shortly afterwards.

Check out

Students are expected to be packed and ready to go at our departure time. All rooms are to be clean and tidy.

College and Career Opportunities

Along with the mission of FIRST, the Power Hawks strive to provide opportunities and guidance in college and career readiness.

Scholarships

Leadership will work with the school's counselors to publish information on the scholarships offered for FIRST students. Mentors will also be available to write recommendation letters for any students applying to college or for scholarships. "Scholarship Opportunities" meetings will be made available on a semi regular basis to inform and instruct students in the scholarship process. Scholarship information is also available online at http://www.usfirst.org/aboutus/scholarships.

Engineering Opportunities

Leadership will look for opportunities such as job shadowing programs in conjunction with the school's STEM program to give students better insight into their chosen professional interest areas.

Resume and College Essay Help

As resumes and college essays are an integral part to the application process, students are encouraged to seek help when writing either document or help with editing. Please see the Head Mentor and they will point you in the right direction for a professional mentor to review your work.

Letters of Recommendation

Letters of recommendation from a program such as the Power Hawks can carry significant weight in internships and college applications. If you would like a letter of recommendation, please see the Head Mentor to ask for one. When you speak with the Head Mentor, please make sure to give them at least three weeks' notice, an address for where to mail the letter or website link to upload the letter, and a short description of what the letter should discuss.

Contact Information

Social Media

It is recommended to follow the Power Hawks on social media to keep track of what's going on and what events we are doing.

- **Facebook:** PowerHawks
- **Twitter:** @PowerHawks1111
- **Instagram:** powerhawks
- **Flickr:** Power Hawks

Communications Contact

For information about the team, go to www.powerhawks.org or email zcohen@aacps.org

Resources

www.powerhawks.org

www.usfirst.org

www.mdfirst.org

www.robotevents.com

www.chiefdelphi.com

www.firstnemo.org

Acknowledgements

Thank you to FRC teams 45, 47, 51, 1241, 1511, and 2377 and Anne Shade, Maryland Senior Mentor for ideas for the team handbook.

Note: This handbook may change during the course of the year. All updates and changes will be made available and apparent to all individuals associated with the team and a time period as discussed by the Head Mentor will be put in place for new rules and regulations to come into effect.

Any questions or comments may be addressed to:
Zachary Cohen, FRC Head Mentor and teacher advisor, at zcohen@aacps.org
Richard Chapman Jr. FTC Head Mentor, at powerhawksrobotics@verizon.net

Revision 1.5. Last updated 2/16/2015

Signature of Understanding

All students are required to have this page on file with the Power Hawks each year. Print out this page or remove this page from the handbook, fill it out, and hand it in by the specified due date.

I, _____ (student name) *have read the Power Hawks Team Handbook in its entirety for the current competition season year and agree to follow all rules, regulations, and guidelines in the book or suffer appropriate consequences as discussed in the handbook or by the Head Mentor. I have also shared the handbook with my parent or guardian and they understand what is expected of both their child and them.*

Signed,

_____	_____	_____
Student name printed	Student name signed	Date
_____	_____	_____
Parent/Guardian name printed	Parent/Guardian name signed	Date

POWER HAWKS ROBOTICS

2014-2015

SPONSORSHIP PACKAGE

Power Hawks Robotics Club, Inc.
1498 Lee Way, Edgewater, MD 21037

Power Hawks Robotics Club, Inc. is a 501(c)(3) non-profit organization. Donations to the Power Hawks Robotics Club, Inc. are tax deductible to the extend provided by current IRS tax laws and regulations (EIN 27-1125596)

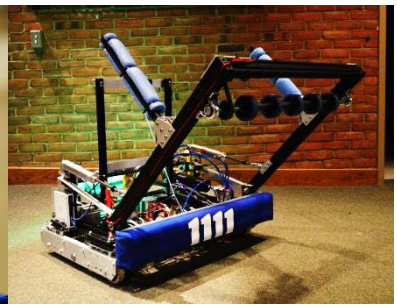
Just follow these steps to get started...

Step 1:
Learn About our Team
(Pages 2-7)

Step 2:
Choose your Sponsorship Level
(Pages 8-9)

Step 3:
Complete the Sponsorship Form
(Page 10)





Step 1: Learn About our Team

October 20th, 2014
Ellie Wood, Student Chief Executive Officer
Zachary Cohen, Head Mentor & Teacher Advisor
Power Hawks Robotics Team
zcohen@aacps.org

To whom this may concern:

We are Power Hawks Robotics, part of the FIRST (For Inspiration and Recognition of Science and Technology) organization, an international organization whose goal is to promote interest in engineering and technology. The Power Hawks Robotics Club, Inc. is a non-profit organization that not only inspires students to pursue their interests in STEM (Science, Technology, Engineering, and Math) fields, but also helps to prepare students with the tools they need to succeed in college and the working world. Our mission is to create a student-led organization that fosters teamwork, critical thinking, problem-solving, creativity, and curiosity. Power Hawks Robotics Club, Inc. provides funding to our four robotics teams based at South River High School in Edgewater, Maryland, and numerous other robotics teams throughout Anne Arundel County.

In addition to building a robot, our team is actively involved in promoting community involvement through tutoring middle school students, mentoring and sponsoring elementary, middle, and high school robotics teams, and hosting a yearly competition for middle and elementary school robotics teams. Alongside these efforts, we participate in numerous other outreach events to inspire our area's next generation.

Maintaining this life-changing program requires an immense amount of capital and materials, requiring an annual budget of over $86,000 to operate at maximum potential. Please continue reading about all the ways you can support our team and take part in our initiative to inspire future generations.

Please contact me if you are interested in sponsoring the Power Hawks Robotics Club, Inc. or if you have any questions.

Thank you for your time and consideration.

Sincerely,

Ellie Wood

Step 1: Learn About our Team

Team Mission

The Power Hawks Robotics Team's mission is to equip the next generation with the necessary skills to improve the world through competitive robotics.

Team Vision

We envision: Maryland as a state of forward thinking, global citizens.

Team Values

Our students uphold the following values in everything we do...

Step 1: Learn About our Team

2013-2014 Power Hawks Robotics FRC Team

Your generous commitment to become a 2014-15 sponsor will make an impact on the lives of high school students who will soon graduate, attend college, and enter the work force. Every year we reach hundreds of students and teach them skills necessary to enter top universities, internship programs, and high-paying careers. We do this by educating them in technology, engineering, science, mathematics, media project management, financials, and numerous other fields.

It costs our team approximately $86,000 a year to design, build, and field multiple competitive robots. Our team has grown substantially over the past few years, and over 70 students are relying on your support to provide work-force training, mentoring, media, project management, and hands-on learning so that they can be successful.

We do more than build competitive robots. The Power Hawks also participates in demonstrations to elementary and middle school students, industry associations, and political organizations. We also host a yearly robotics competition, robotics summer camps, and engage in community service throughout Maryland. Your support helps us to grow our community outreach and ability to affect our community with the importance of science, technology, engineering, mathematics, and business principles.

Step 1: Learn About our Team

We have appeared in the following outlets…

ESPN

CAPITAL GAZETTE

chesapeake Family

Annapolis Patch

SOUTH RIVER SOURCE
Locally Owned. Totally Independent.

U.S. HOUSE OF REPRESENTATIVES

DEMOS AND COMMUNITY EVENTS

- US House of Representatives hearing on STEM Education
- Arundel Mills Mall Family STEM Night
- CRTC Members Thanksgiving
- Kiwanis Club Breakfast
- YMCA Thingamajig
- Centreville Manufacturing Tour
- Aerospace Mechanisms Symposium
- Mayo Beach Car Show
- USA Science and Engineering Expo
- Numerous Elementary School STEM Nights
- University of Maryland Robotics Day
- Demos for NASA in greater Maryland area
- Sponsor demos

ACCOMPLISHMENTS

2014 Awards	
North Carolina Regional	Regional Finalists Entrepreneurship Award
Chesapeake Regional	Imagery Award
2013 Awards	
Finger Lakes Regional	Engineering Inspiration
2012 Awards	
Chesapeake Regional	Judges' Award
2011 Awards	
Chesapeake Regional	Excellence in Design
Virginia Regional	Judges' Award
2010 Awards	
Washington DC Regional	Engineering Inspiration
2009 Awards	
Chesapeake Regional	Creativity Award Team Spirit
2008 Awards	
Chesapeake Regional	Regional Finalists Innovation in Control
2007 Awards	
Chesapeake Regional	Sportsmanship

Step 1: Learn About our Team

What Others Say About our Program…

“FIRST Robotics has changed my life by giving me the skills to lead, and the confidence to try things I never would have done before I joined the Power Hawks, such as apply for a leadership position on the team. I will see the results of my participation in FIRST for the rest of my life, and am grateful to everyone who has helped me in FIRST.”
-Clay N, FRC

“I found out that there were people just like me with the same interests and now I have tons of friends and they help me whenever I need it. I'm so glad I joined our robotics team, the Power Hawks!”
-Brittany P, FRC

“Being a Power Hawk was one the most meaningful experiences of my high school career. It gave me the chance to apply all of the engineering concepts that I was learning in my classes as well as teaching leadership skills.... it has given me an enormous leg up in applying for internships, I was one of very few college freshmen who have been offered an internship through the duration of college. I know that this could not have happened without the Power Hawks.”
-Alyssa R, Alumni

Step 1: Learn About our Team

"Our son has gained so much more than just programming or robotics knowledge from his participation in Power Hawks Robotics. He's learned about teamwork, community service, business planning, strategy, website design, time management and technology careers in a wonderfully supportive and diverse community. Amazing!"

-Ms. Christine Jackson, Parent

"The Power Hawks is largely responsible for my daughter's happiness at South River; this is the place where she feels most at ease and the least stress....She was not only free to pursue her interests; she was encouraged to take on new responsibilities and skills. Every year, the Power Hawks gave her new challenges and opportunities...."

-Ms. Bridgman-Yang, Parent

"As a five year sponsor of The Power Hawks FRC Robotics Team, Government Services IPT has received great benefits and rewards. Through our sponsorship, we were able to contribute to promoting the Nation's future scientists, engineers, and entrepreneurs. The firm gained visibility with some of our clients, such as NOAA, NASA and DOD, through secondary marketing and logo placement on the shirts and robot. The students demonstrated the robot's capabilities during our corporate events for the employees and their families. And of course, the sponsorship is tax deductible! By contributing to the Power Hawks, we were able to see immediate and tangible results not often found with other donations."

-Susan Ballard-Hirsch, Sponsor, GSIPT

Step 2: Choose your Sponsorship Level

PLATINUM ($25,000)

- Titanium level +
- Your company name becomes our official team name
- You get one trophy for every award won at an official competition to display at your company

TITANIUM ($10,000)

- Gold level +
- Robot demo at company function

GOLD ($5,000)

- Silver level +
- Plaque of appreciation
- Your company logo on our trailer
- Large logo on robot and Pit

SILVER ($1,000)

- Bronze level +
- Your company logo on literature
- Framed team photo
- Team DVD
- Small logo on robot
- Team memorabilia (t-shirt)

BRONZE ($500)

- Your company logo in our Pit
- Your company logo on t-shirt
- Letter of appreciation
- “Shout out” on team social media pages
- Logo on our website

Step 2: Choose your Sponsorship Level

	Platinum	Titanium	Gold	Silver	Bronze
Your company logo on website	✓	✓	✓	✓	✓
“Shout out” on team social media	✓	✓	✓	✓	✓
Letter of appreciation	✓	✓	✓	✓	✓
Your company logo on t-shirt	✓	✓	✓	✓	✓
Your company logo in our Pit	✓	✓	✓	✓	✓
Team T-shirt	✓	✓	✓	✓	
Small logo on robot and Pit	✓	✓	✓	✓	
Team DVD	✓	✓	✓	✓	
Framed team photo	✓	✓	✓	✓	
You company logo on literature	✓	✓	✓	✓	
Your company logo on our trailer	✓	✓	✓		
Plaque of appreciation	✓	✓	✓		
Robot demo at company function	✓	✓			
You get one trophy for every award won at an official competition	✓				
Your company name becomes our official team name	✓				

Step 3: Complete the Sponsorship Form

We'd like to thank you for taking the time to read our sponsorship packet, and if you have any further questions or concerns, please feel free to contact our head mentor at zcohen@aacps.org.

If your organization would like to assist our team financially or otherwise, please detach this form the sponsorship packet, fill in your information, and return it to:

Power Hawks Robotics Club, Inc.
1498 Lee Way
Edgewater, MD 21037

Company Name: _____

Company Phone Number: _____

Company Address: _____

State: _____ Zip Code: _____

Contact Name: _____

Contact Phone Number: _____

Contact Email Address: _____

My Organization would like to become a:

- O Platinum Sponsor ($25,000)
- O Titanium Sponsor ($10,000)
- O Gold Sponsor ($5,000)
- O Silver Sponsor ($1,000)
- O Bronze Sponsor ($500)

Enclosed with this form is our check made out to **Power Hawks Robotics Club Inc.** for $_____

Our Company would also like to help by providing:

- O A mentor for the team
- O Parts/Supplies
- O Other Services

If providing parts/supplies or other, please specify:

_____
_____
_____
_____

If you would like us to use your company logo, please email it to us at zcohen@aacps.org. .eps format is preferred for optimum quality.

If you would like to support us by sponsoring materials on our team's Wish List, please visit our team's website, www.powerhawks.org, for the link!

POWER HAWKS ROBOTICS IDENTITY STANDARDS

This document details standardized usage guidelines of logos, colors, and all public information for the Power Hawks Robotics. By following these guidelines, we create a uniform recognition and awareness of our program amongst ourselves, our community, and our greater area.

Table of Contents

Purpose

As one of many co-curricular robotics programs, it is essential that we convey the Power Hawks Robotics name clearly, consistently, and prominently. Keeping our brand name in front of the public in an appealing and consistent manner will help identify who we are as a team and help to build a relationship with Anne Arundel County Public Schools, the community, and other robotics teams.

This guide details standardized usage guidelines for use by all individuals associated with the team. By following these guidelines, we create a uniform recognition and awareness of our program.

Name

The team name is the cornerstone of our identity, both in written and verbal communication. The official team name should be used in any written documents whereas the team nickname may be used in any non-formal situations. The Power Hawks name will always be displayed as two words, and never combined to make one.

Official team name

The Power Hawks Robotics Team

Team Nickname

“Power Hawks” or “1111”

Team Number

FIRST® has assigned the team number of 1111 to our team. This should be incorporated in all formal communication and may be used as a team nickname as well.

Pronunciation

Our team number should be pronounced “eleven eleven”. It should never be pronounced “one one one one”.

Team vs. Club

The Power Hawks Robotics Team and Power Hawks Robotics Club, Inc. are two organizations that work extremely closely with each other. Care should be taken though to differentiate the two in both written and verbal communication.

The Power Hawks Robotics Team is associated with South River High School and represents the students and teacher advisor. FIRST® has associated the team number 1111 with The Power Hawks Robotics Team as well.

The Power Hawks Robotics Club, Inc. is an independent nonprofit organization whose mission is to provide funding for STEM initiatives in Anne Arundel County, principally through The Power Hawks Robotics Team. The two work closely together, but are still separate organizations.

Use of "FIRST®" in name

Whenever possible, we should incorporate FIRST® into our name such as FIRST® Team 1111, FRC Team 1111, or FIRST® Power Hawks Robotics Team. This will help to identify us as a member of the FIRST® Robotics Competition. Further, it is encouraged to include the FIRST® logo on publications to help identity the team as a member of FIRST®. Any use of the FIRST® logo must follow logo usage guidelines set by FIRST®. These may be found on FIRST®'s website pertaining to logo usage.

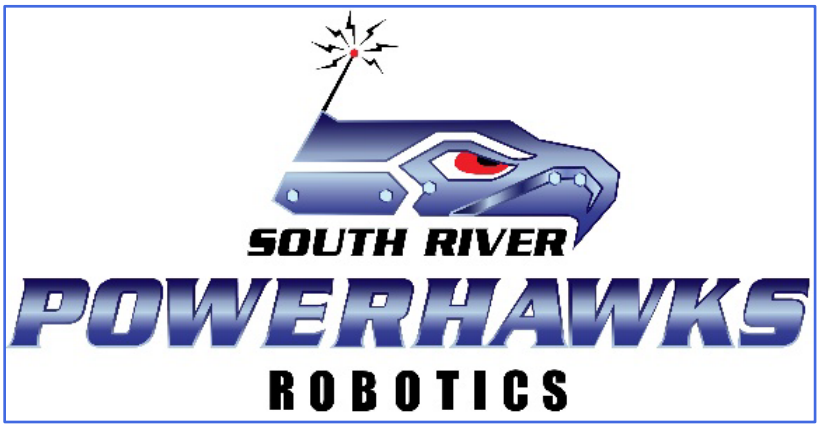
Team Logos

Team Logos

The Power Hawks Robotics Team maintains multiple logos that should be used in all Power Hawks Publications.

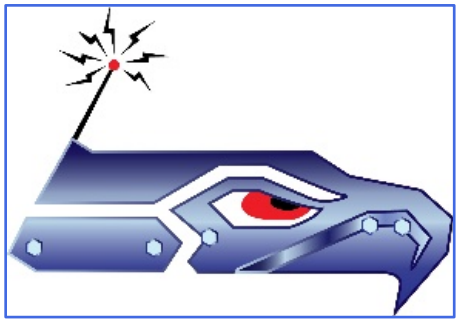
Primary Logo

The Power Hawks Robotics Team's official logo is the "Power Hawk". The formal form of the logo includes the signature "South River Power Hawks Robotics". This should be used in all formal literature and print.



Bird head Logo

For less formal publications, the primary logo may be used while omitting all text. This logo can be used to either compliment the primary logo on formal documentation or may be used to add character to less formal publications while maintaining our identity. If the bird head is used, the document must include the organization name and location somewhere prevalent on the document.



Text Logo

The Power Hawks also maintain a logo that may be used with just the signature to allow for - some variation in different types of publications. This includes the Power Hawks name in a color gradient and may or may not include the hawk head on the side of the text.

Stamp

The Power Hawks maintain an informal “stamp” that may be used in publications to compliment the primary or text logos in an informal setting. The primary or text logo should never be separated to insert the stamp nor should the stamp be displayed in close proximity to the other logos.

Logo Guidelines

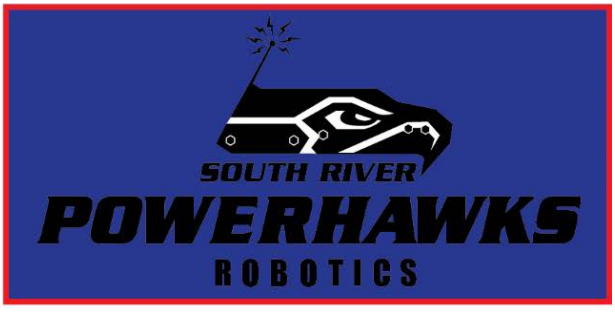
The logo artwork has been created in a precise electronic environment and should never be redrawn or redesigned for any application. The logo is available in multiple formats for ease of use.

Only when necessary should a black and white version be used. The preferred background color is white. Keep the logo area clear of distracting elements such as type, photographs, or textured backgrounds. The Power Hawk should always be seen clearly.

The Power Hawks Robotics Team logo with signature, as shown, is the official identifying mark of the team. This logo should be used on all team marketing and communications materials, including printed pieces, visual presentations, stationery, advertising, and any other materials that represent the team to external audiences. It should appear on the front or back cover of all printed materials unless an exception has been granted by the Chief Executive Officer and Head Mentor.

Logo Background

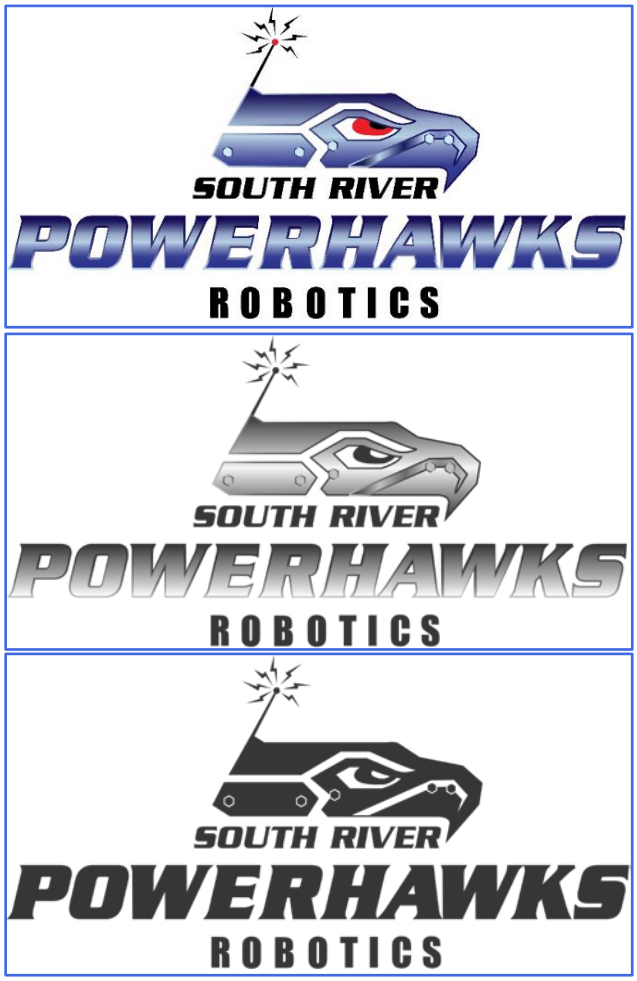
When used on colored backgrounds the black or white version of the Hawk should be used so the colors of the Hawk do not clash or blend with the colors on the background.



Versions of logos

Three versions of the logo exist, the color logo should always be used first, with a preference to each subsequent logo, the last being solid color.

1. Full color
2. Grayscale
3. Solid black



Access to Logo

All logos are available from the Public Relations team or from the team website. Proper care should be taken to use proper file formats and CMYK or RGB values depending on use.

File format

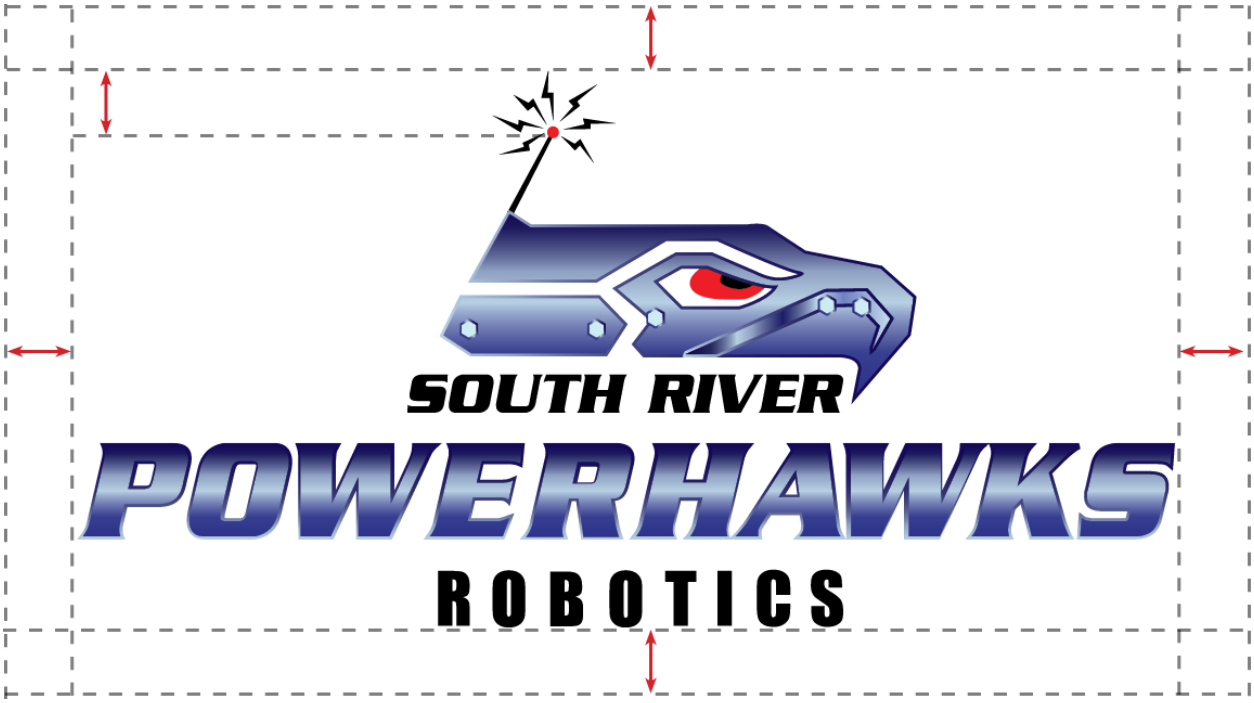
All versions of the Power Hawk logo are available in various file formats:

1. .eps should be used whenever possible.
2. .png should only be used for websites and in screen applications.
3. .emf should be used when working on Microsoft Office documents.
4. .dwf and .dwg should be used when working in 2D and 3D CAD environments.

Correct Logo Usage

Logo Sizing & Spacing

A clear space of not less than the distance from the top of the head to the middle of the antenna should be maintained on all sides of the logo.
The overall height of the logo should not be less than an inch. Proportions should remain constant as the logo size is changed.



Modification of the Power Hawks Robotics Logo

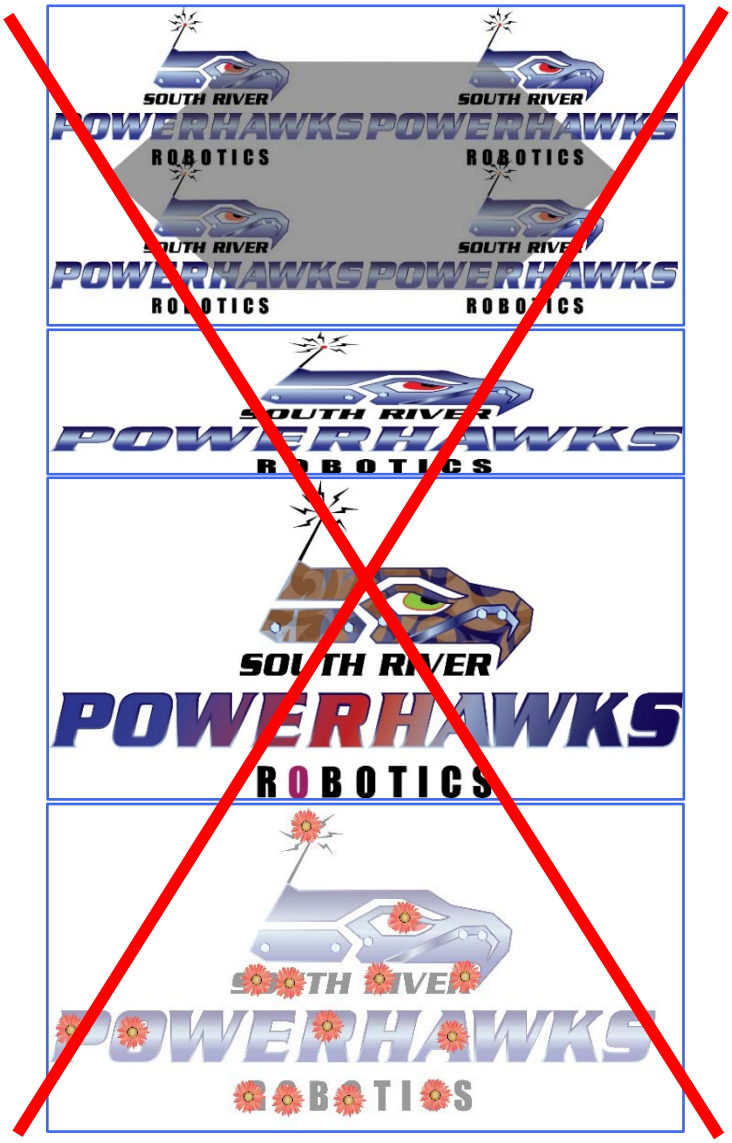
The Public Relations team of Team 1111 reserves the right to add to the logo to add character to the logo displayed on the team shirt and to create slightly different variations from year to year. Any modifications must be approved by Team 1111 leadership.

Unacceptable Logo Treatments

The Power Hawks Robotics Team Logos are stand-alone design elements, not words or parts of a statement and must appear separate from other elements.

It is essential to keep certain standards with the use of the logo. The logo cannot be:

- Stretched out of proportion
- Shaded
- Shadowed
- Used in outline form
- Filled with a texture or photo
- Used with any 3D effect
- Tilted or rotated outside of 90º increments
- Displayed at partial opacity
- Duplicated to create pattern



Color Palettes

The Power Hawks Robotics maintains two color palettes that should be used in all publications. Large bodies of text should always be displayed in primary black on a primary white background or a Power Hawk blue to white gradient. The Power Hawk blue may begin at partial opacity. Accent text and graphics may be displayed in any of the primary team colors.
Due to the nuances of CMYK to RGB conversion, all publications should be printed in RGB when possible. It is understood that most printing is done in CMYK, but individuals should make every attempt to ensure all colors are matched to the values listed in this document.

Primary Color Palette

The predominate color in all communication materials should be selected from the primary team colors. These should make up the majority of the colors, especially when involving our name or logo.

Primary Color 1

- Name: Power Hawk Blue
- Hex: 4169E1
- RGB: R: 65, G: 105, B: 225
- CMYK: C: 71, M: 53, Y: 0, K: 12
- Pantone: #281 C

Primary Color 2

- Name: White
- Hex: FFFFFF
- RGB: R: 255, G: 255, B: 255
- CMYK: C: 0, M: 0, Y: 0, K: 0
- Pantone: #9063 C

Secondary Color Palette

The secondary color palette has been developed to assist with publication design decisions and to give more options to the designer. While the prominent colors in publications should be from the primary color palette, the secondary color palette may be used to add visual interest.

Secondary Color 1

- Name: Dark Blue
- Hex: 2f3f58
- RGB: R: 47, G: 63, B: 88
- CMYK: C: 47, M: 28, Y: 0, K: 65
- Pantone: #534 C

Secondary Color 2

- Name: Slate Blue
- Hex: 9eb0c9
- RGB: R: 158, G: 176, B: 201
- CMYK: C: 21, M: 12, Y: 0, K: 21
- Pantone: #536 C

Secondary Color 3

- Name: Power Hawk Red
- Hex: c74f4f
- RGB: R: 199, G: 79, B: 79
- CMYK: C: 0, M: 60, Y: 60, K: 22
- Pantone: #7418 C

Secondary Color 4

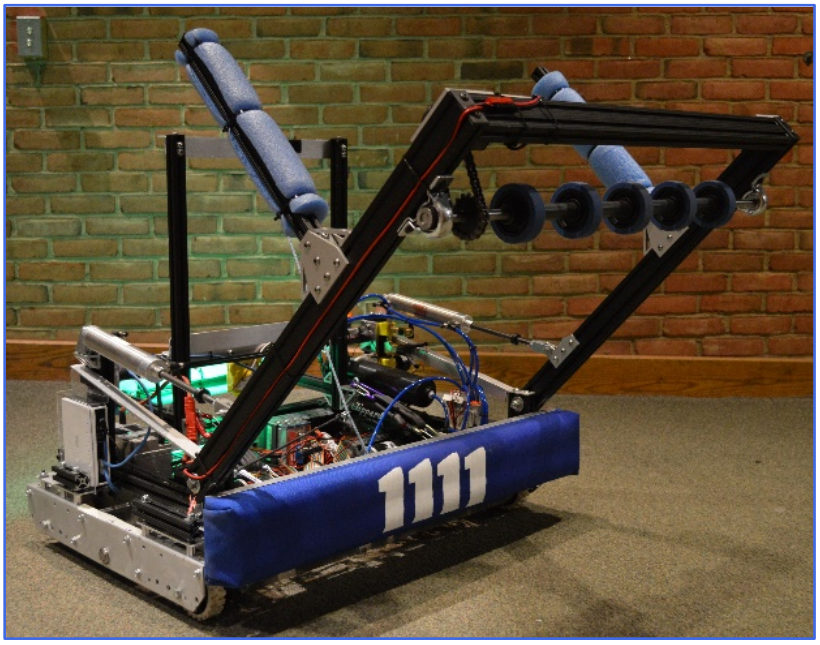
- Name: Cool Gray
- Hex: f0ebe7
- RGB: R: 240, G: 235, B: 231
- CMYK: C: 0, M: 2, Y: 4, K: 6
- Pantone: #1 C

Secondary Color 5

- Name: Black
- Hex: 000000
- RGB: R: 0, G: 0, B: 0
- CMYK: C: 0, M: 0, Y: 0, K: 100
- Pantone: #6 C

Robot Color

While it is important to maintain color consistency and visual interest on the robot, due to the nature of the construction of the competition robot, it may follow a slightly different color scheme. In general, the robot should maintain a Power Hawk Blue, white, black, chrome, or natural metal color scheme. When necessary, other colors outside of the Power Hawks color palettes may be used for safety reasons, such as red or yellow. Additionally any color requirements imposed in the rules for specific items will follow all rules and regulations set by FIRST®.



Typography

The Power Hawks Robotics Team have elected to choose a set of fonts to use in all written communication.

The primary font family should be used as a primary heading in all written communication. The secondary font family should be used as a subheading in all written communication. The paragraph font family should be used in all correspondence in paragraph form when under 14 point font. The display font family should be used with correspondence in paragraph form when over 14 point font.

Primary Title Font Family

Serpentine

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1 234567890 $%&(.,;:#!?) POWER HAWKS ROBOTICS TEAM 1 1 1 1

Secondary Title Font Family

Helvetica LT Std.

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890 $%&(.,;:#!?) POWER HAWKS ROBOTICS TEAM 1111

Helvetica LT Std. Black

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890 $%&(.,;:#!?) POWER HAWKS ROBOTICS TEAM 1111

Paragraph Font Family

Times New Roman

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890 $%&(.,;:#!?) POWER HAWKS ROBOTICS TEAM 1111

Display Font Family

Arial

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890 $%&(.,;:#!?) POWER HAWKS ROBOTICS TEAM 1111

Arial Black

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890 $%&(.,;:#!?) POWER HAWKS ROBOTICS TEAM 1111

Publications

The Power Hawks Robotics Team publication package is a widely used communication tool available to the team and presents an opportunity to convey a positive image. Each component represents the team and works to strengthen the visual identity of the team.

Letterhead

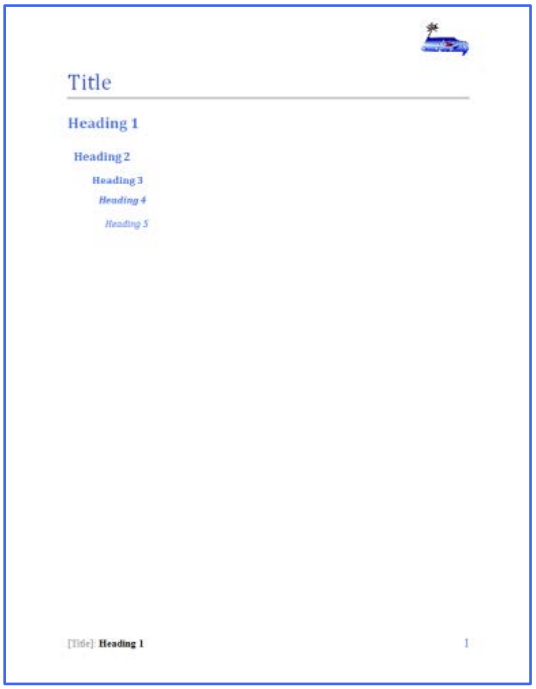
Letters written on Team stationary imply an official message from the writer and The Power Hawks Robotics Team. Since they are official documents, a standard format has been developed for the letterhead. Letterheads have been developed both for the team and for the nonprofit, depending on purpose and use.

Envelopes

All mailed correspondence should use the official team envelope styles. These may be customized to include individual contact information.

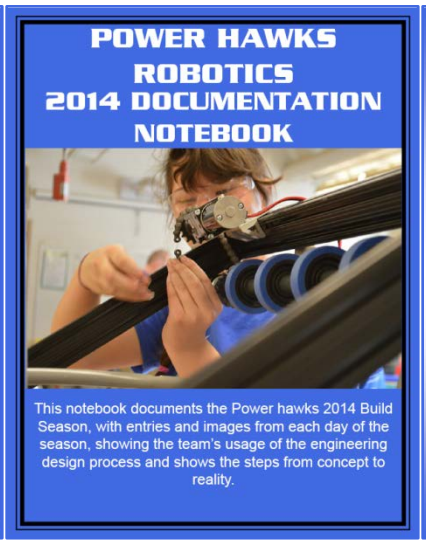
Text Documents

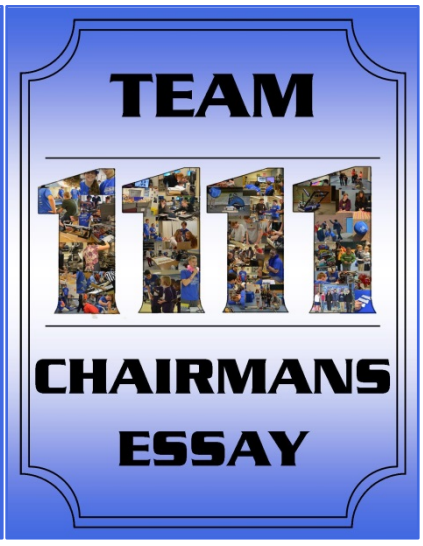
Word documents maintain a standardized format that includes both a header and footer, along with specific styles for headings. Headings should be used whenever possible to aid in the quick and easy finding of information. All documents made in Microsoft Word or other formats should be converted to Adobe PDF before distribution. Title pages and page numbers should then be formatted to properly line up with the document to aid in easy reading.



Cover Page

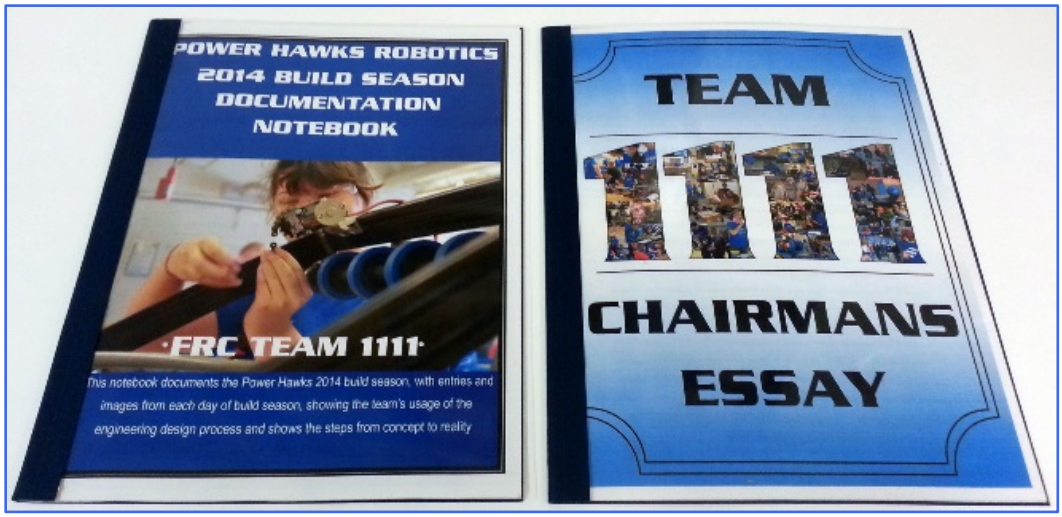
The Power Hawks Robotics Team maintains a standardized cover page that should be used on all multipage documents. The images and description should be changed to represent the document. The only document that may have a separate cover page is the Chairman's Binder which should be representative of the team's theme.





Printed Documents

All documents that have been printed for formal occasions such as awards or formal reports should be bound in house using available technology. The preferred form of binding is using a Perfect Binding machine with a blue binding and clear cover as supplied by the Power Hawks. Documents for presentation purposes should be printed on fine quality, 24 pound or higher paper in laser color. Copies for general team members or to hand out in quantity may be printed using a standard black and white copier on copy paper.



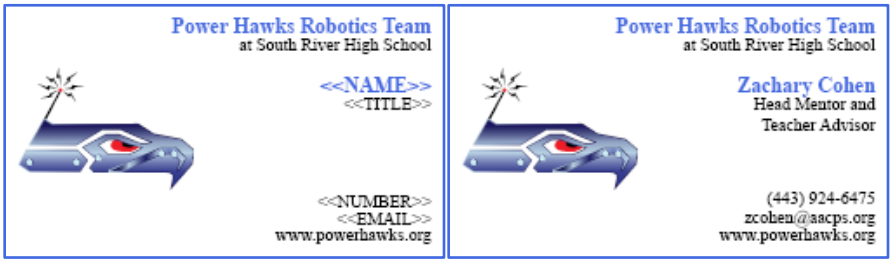
PowerPoints

PowerPoints have a standardized format to ensure consistency in presentations. This includes standardized logo usage, typography, and coloring.

Business cards

Power Hawks Robotics Team business cards have been designed for customized contact information by individuals. A standard horizontal format has been developed including the team logo, and layout should not be modified in any way.

Business cards should be printed on white card stock. The size of business cards is 3.5” x 2”.



Social Media Icons

Social media plays an important role in the Power Hawks effort to include and engage the community at large. All produced publications are encouraged to advertise our social media sources, including Facebook, Twitter, Instagram, YouTube, our blog, and Flickr, in addition to our website. This may be done by listing their links, or if it is an interactive document listing a standardized set of social media icons. QR codes may also be used to advertise our various social media outlets. Social media icons are provided in different sizes, and individuals are encouraged to use the size that best fits without rescaling in any way.

Sponsor Recognition

Since sponsors have generously provided us the means to function and grow, every team member has a duty to recognize sponsors whenever possible. Sponsors should always be recognized at public events through the use of team t-shirts and sponsor banners. Sponsors should also be listed on the robot in a prominent and tasteful way. Whenever the robot is used for promotional applications the sponsor logos must be clean and displayed neatly. The logos may be changed to all black or white if it will help with the unity of the different logos.

Contact Information

The Power Hawks Robotics Team Public Relations Officer is responsible for maintaining and enforcing the identity standards.
The Public Relations team maintains the right to modify these standards at any time if necessary. Any modifications must be approved by student leadership and mentors.

Any questions or concerns may be directed to the Public Relations Officer or the Head Mentor at teampowerhawks@gmail.com

Last modified October 1, 2014. Version 1.00

Power Hawks Robotics Team

Media Standards

2015

SOUTH RIVER
POWERHAWKS
ROBOTICS

Team 1111

Contents

Video Standards

Video Identity Standards:

Intro:

Always use our defined title sequence. The only edits made should be to adapt the title to match the current project. The intro should always be 8 seconds, and approximately 14 frames.

Transitions:

The videos should always have simple fade transitions for consistency, and to not distract the viewer. The transitions should only be 30 frames, and should only be added where they are needed.

Video Quality:

Always begin video projects in HDV 1080p 30fps.

Video Format:

All elements of the video should be in landscape format in order to fully use the screen.

Credits:

Credits should always be simple white text on black background in Arial font; they should fade in and out for 4 seconds per slide. The Credits should always mention (First Names only):
Video Editor
Video Filmer
Jacqui
Subjects of the Video
Depending on the number of people mentioned 2 slides may be necessary.

Music:

Music is not always needed and its need should be addressed at the planning period in order to allow time to find it. The music tone and feel should match that of the video and its volume should not be overpowering. The creator of music should be properly credited.

Video Creation Procedure:

Define Video:

Define the purpose of the video, what parts are necessary, and an idea as you move on to planning the video.
Example:
“We want to showcase our prototypes”

Plan out Video:

Make a storyboard of what the video will be scene by scene including all of the required pieces, and having an estimated time for each of the parts.

Take Footage:

Take footage as needed, or planned depending on your earlier plan. This needs to be done very well we need to have clear stable footage from a good angle that gives a clear view of the subject and if we want to use sound, ensure you are receiving good sound, **always film in landscape.**

Watch and Cut Footage:

Look through the footage and cut it for the best clips while finding sorting them in to each section of the video titles. Also make sure you don't need to retake any footage, if you do find all the footage that needs to be retaken and do it all at once.

Preliminary Viewing:

Look through the video with the PRO (Public Relations Officer) to make sure it all is appropriate, up to standards, and determine where we would like our transitions.

Add Transition:

Add transitions in the locations agreed on by the PRO.

Final Viewing:

Make sure it's all up to standards and that we don't want to make any changes

Export:

Export the file as format "H.264", preset "YouTube HD 1080p 29.97"

Graphics Standards

Graphic Identity Standards:

Borders:

Solid:

Solid borders must be Power Hawk Blue and should have a consistent thickness around the entire document.

Gradient:

Gradient borders, as Shown (image), are to be used without any other border, and are only used at the top and base of the document. Make certain that the gradients are identical, centered, and with equivalent frames. Avoid stroke on borders, as shown in Figure 2.
Preferred gradients colors are Power Hawk Blue and White.

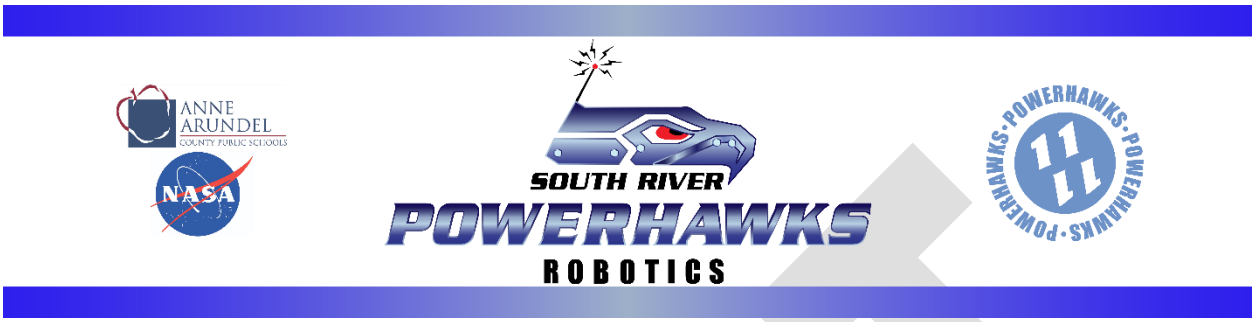
White Space:

White space should be kept to a minimum, and on large banners the white space should be filled with one of our fillers as listed below.

Appropriate Fillers:

Stamp: Our stamp is appropriate filler for large white space. It also includes our team name and number, and may be used in lieu of such.

Sponsors: In certain situations, it may be appropriate to fill white space with the logos of sponsors we would like to promote or advertise. Use NASA and AACPS as the default in such situations.



Logos: Our Logos should be used (primarily) for Identification reasons. If necessary, place logos according to the Identity Standards documentation.

Finished Documents:

Once documents are finished and revised by the MLOTGPRST and/or Executive Leadership, package the document to the current Send to Printer folder on the Graphics hard drive. Upload the packaged folder to the send to printer folder on the team google drive. In some situations, other file types will be required. Export into the proper package folder and then distribute to the necessary recipients.

Placement of Logos:

Refer to the Identity Standards. Maintain a buffer space between our logos and any other objects.

Use of Text:

Text should always follow the Identity Standards; most situations will require the use of the serpentine font family. The text should be large enough to be clear and easy to read.

Power Hawks Robotics Team

Power Hawks Design Standards & Guidelines

2015

SOUTH RIVER
POWERHAWKS
ROBOTICS

Team 1111

Introduction to Design

Design is a methodology of developing requirements to solve a problem. It allows for more effective solutions to a problem in faster and cheaper ways than otherwise. There are always a number of solutions to a problem, and often choosing concepts to explore can be difficult. With proper insight and training in the design process, the team can succeed in identifying what is important and deliver results.

Engineering Design Process

The standard approach the team will use to solve problems is adopted from Project Lead the Way's engineering design process. This process will help students design solutions to problems through an educated method designed to help eliminate problems later on. A flowchart of the engineering design process is shown in Appendix A. The steps of the design process are detailed below:

1. Define the problem
    a. Identify a problem
    b. Validate the problem
    c. Justify the problem
    d. Create design requirements
2. Generate concepts
    a. Research
    b. Brainstorm possible solutions
    c. Consider additional design goals
    d. Select an approach
3. Develop a solution
    a. Create detailed design solution
    b. Justify the solution path
    c. Create technical drawings
4. Construct and test a prototype
    a. Construct a testable prototype
    b. Plan prototype testing
    c. Test prototype
5. Evaluate the solution
    a. Evaluate solution effectiveness
    b. Reflect on design
    c. Optimize/redesign the solution
6. Present the solution
    a. Document the project
    b. Communicate the project

Common Materials Used in *FRC®*

Metals

Aluminum

Generally, aluminum is the desired material to work with as it is lighter and easier to machine and work with than steel. Due to its low density it is ⅓ lighter than steel, allowing for lightweight yet strong construction. We use two primary building platforms made out of aluminum plus a number of custom fabricated parts made with different alloys.

80/20

80/20 is a modular extruded aluminum system that is largely used to complete the mechanisms of general structure of the robot other than the drivetrain. It offers a number of fastener types and accessories that can be used to build extremely complex frames. Its disadvantage is that it is rather expensive and heavy.

VersaFrame

VersaFrame is available through VEX Pro, and is an alternative to 80/20. While not as versatile, it allows for robust and light frames and is thus often used for the drivetrain.

Aluminum Alloys

There are four main types of aluminum that will be used in our projects: 3003-H14, 5052-H32, 6061-T6, 7075-T3

3003-H14: Weaker than other aluminum alloys, but easily formable.

Typical use: Large sheets that dont have much force going through them (side panels).

5052-H32: Soft and easy to work with, easy to bend

Typical use: Most bent pieces and sheet metal.

6061-T6: Harder and stronger than 5052 and 3003, good all-around alloy. Most common.

Typical use: typical aluminum robot parts

7075-T3: Hardest but brittle, worst to bend and shape but extremely strong.

Typical use: gears and shafts. Typically purchased finished or just cut to length.

Steel

Although steel can be stronger than aluminum in certain applications, the weight of steel prevents much of its use. Other than commercial off the shelf (COTS) items, the use of steel is often limited to rotary power transmission shafts and counterweight.

Bronze/Brass

Due to the structural properties of bronze or brass, it is rarely used on the robot. It can be extremely useful though in bearings and bushings, where it is often impregnated with graphite to provide and extremely low coefficient of friction between the bushing and the rotary shaft.

Polymers

A number of polymers are used on the robot in areas where strength isn't as critical or the lightness of a polymer outweighs the loss in strength. Polymers are often classified as plastics and woods.

Plastics

The use of plastics is growing fast on the team. Due to its lightness and strength, plus its non-conductivity.

PVC

PVC is often used in PVC pipe, which allows for relatively light and flexible designs primarily used for prototyping. Its rather weak and brittle though, and so is not often included in the final build of our robots.

Polycarbonate

Polycarbonate is an extremely versatile and commonly used material in sheet form. Its an extremely light but strong material, and is often used for making guards, electrical boards, and as a medium to display the team's sponsors, name, and numbers.

PLA

PLA is used exclusively in 3D printing. The team has increasingly been using three 3D printers that we have available, which prints only in PLA and PLA composites. While not as strong as some plastics, through good design its fairly easy to make fairly strong components.

Wood

While rarely used in the final design of the team robots, wood is an extremely versatile and inexpensive tool used for prototyping and initial design. Basic woodworking is an essential skill due to the ability for the team to create quick and efficient prototypes in the beginning design process phases.

Composites

The use of composite materials is growing rapidly due to their versatility, structural advantages, and recent drops in prices. Composite materials allow the team to get superior strength to weight ratios, and its use is encouraged where possible. Primary areas where its use has proven to be effective are in belly pans, electrical boards, and increasingly in 3D printing, particularly with carbon fiber-PLA composites.

Size and Thickness

Manufacturing limitations create size parameters that should be considered when designing parts. Parts should not exceed 4' x 4' flat in raw sheet or 10' long in bar stock. When machining, sheets should be cut to no more than 2' x 4' to fit within the size constraints of the machines we have access to.

Raw aluminum stock should be kept on hand in the following sizes:
Sheet: .032”, .0625”, .125”
Angle: 1x1x1/16, 1x1x1/8, 2x2x1/8
Flat bar: 1/8x1, 1/8x2, 1/8x3, 1/8x4, 1/4x1, 1/4x2, 1/4x3, 1/4x4, 1/4x6, 3/16x1, 1/2x1, 1/2x3
Square bar: .25”, .375”, .5”, .625”, .75”, 1”, 1.5”
Square tube: 1x1/8 wall
Rectangle: 1x.75, 4x2
Round: .25”, .375”, .5”, .625”, .75”, 1”, 1.25”, 1.5”, 2”, 3”
80/20: 1x1/2, 1x1, 1x2, 2x2
Versaframe: 1x1x.04 wall, 1x1x.1 wall, 1x2

Fasteners

Threaded Fasteners

Thread Type

Following accepted industry standards, the Power Hawks have selected a variety of fasteners used in all fabrication.

Thread	Type	Nominal Major Diameter	External Thread Minor Diameter	Internal Thread Major Diameter	Fastener Use
4-40	UNF	.1120	.0805	.0849	Electrical components
6-32	UNC	.1380	.0989	.1040	Electrical components
8-32	UNC	.1640	.1248	.1300	Low stress components
10-32	UNF	.190	.153	.156	Medium stress components
¼-20	UNC	.2500	.1876	.2070	High stress components

Fastener Heads

The Power Hawks have preferred fastener heads that are used in order to standardize tool usage. For fasteners ¼" in diameter and under, it is preferred to use socket cap screws, preferably with button head tops. Extremely small fasteners can use Philips head, and fasteners over ¼" inch may use hex head. Other fastener heads should be avoided when possible.

Non-Threaded Fasteners

The primary non-threaded fastener used is the pop-rivet, which is a form of the blind rivet. Blind rivets are multi-piece fasteners used when only one side of a structure is available for installation. While not reusable like threaded fasteners, their speed of installation, low cost, and low weight make them a desired fabrication materials when using sheet metal and thin wall metal. Additionally, Cleko temporary rivets are able to be used to ensure fits before installing pop-rivets.

Diameter	Head Diameter	Head Height
3/32	.198"	.032"
1/8	.262"	.040"
5/32	.328"	.050"
3/16	.394"	.063"

Design

Manufacturability

Due to the manufacturing ability that the team has access to, all designs should consider our limitations in fabrication. This includes our limited sheet metal abilities, limited turning and milling abilities, and our average tolerances that students work to with hand tools and power tools.

Maintenance

All designs should allow for easy of maintenance. Be mindful that many parts wear and need to be replaced or repaired during their life. When designing you should be mindful of how parts and assemblies are mounted, attached, routed, and used. Design for quick and efficient maintenance to minimize downtime. This is a paramount concern during competition due to the extreme pressure to service the robot in little time.

Assembly

The overall design of the robot should allow for modular components that can be assembled easily and quickly. Each module should allow ease of assembly, removal, and replacement with little downtime.

Clearance Holes

When placing holes, a hole should always be drilled or reamed so that the item being inserted into the hole is smaller than the actual hole. The general exception to this rule is a rivet. For example, a ¼-20 screw should technically not use a ¼" hole, but a .2570" or .2660" depending on the tolerance of the item.

Tolerances

When fabricating, certain steps should be taken to make it as exact as possible. While design should allow for some error, or tolerance, in the manufacture of the part tolerances should be used and upheld to ensure everything manufactured works properly. While it varies, a general tolerance of 0.0250" inches should be practiced in all milling, turning, and hole making applications. A general tolerance of 0.0500" should be practiced for all cutting operations.

Physics of Design

Weight

Weight is a concern in almost an design process. In robotics especially, we have very strict weight limits that must be upheld to ensure success. When designing, it is important to understand weight and its effect on stability, speed, and maneuverability. Small and light may not maneuver as well as large and heavy. Using proper engineering methodology and trade studies, you can determine how to develop a system that meets its requirements.

Center of Gravity

The center of gravity is the average location of weight in an object. Simply put, the center of gravity is the point at which will freely rotate about. Using the center of gravity effectively will allow for enhanced maneuverability, speed, and efficiency in the drivetrain.

Stability

Understanding the center of gravity is important in determining the stability of the robot. When the gravity vector from the center of gravity crosses the outside support of the robot structure, it will tip. Recognizing the center of gravity when designing will allow for stability inherent to the design.

There are two kinds of stability: static and dynamic. Static stability occurs when the object is at a constant velocity. For the purposes of an FRC robot, static stability will be used primarily to analyze a design concept such as a game piece manipulator. Dynamic stability occurs when an object is undergoing acceleration. Dynamic stability is most important in the design of an FRC robot due to the inherent nonlinear nature of the game. Typically, the center of gravity should be kept low and in the center of the robot for stability.

Traction

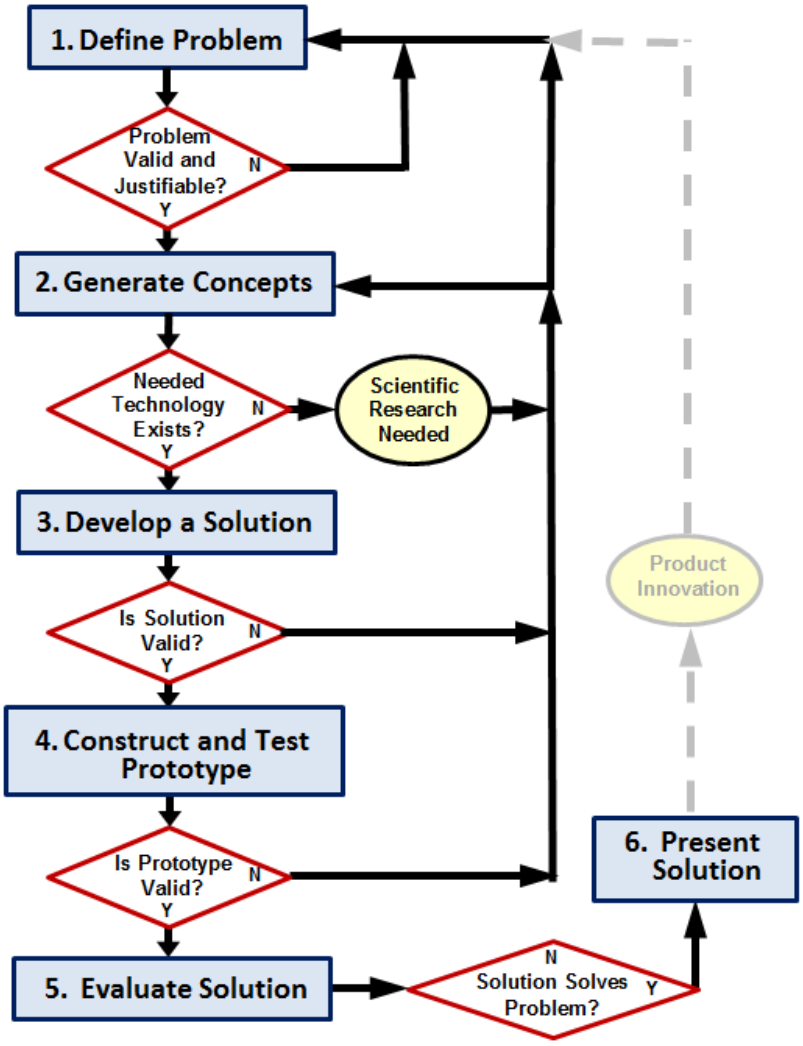
Traction is important in most competitions. The requirement for grip and maneuverability will determine material selection for wheels. In general, tread that conforms to the surface will provide more grip due to the higher coefficient of friction. Traction is also important when encountering a pushing match with another robot. At a minimum, the robot will need to stand its ground in a pushing match. In terms of forces, the robot must exert an equal and opposite force to the opposing robot. Ideally, the robot should be designed to push an opposing robot.

Acknowledgements

Document written by Zachary Cohen, head mentor for the Power Hawks Robotics Team 1111.
Edited by Clayton Cobb, 2015 Build Operations Officer.
Version 1.00
Thank you to team 836, the RoboBees for the idea and information for the document.

Appendix

Appendix A: Engineering Design Process



Appendix B: Drill Index

Drill Size	Decimal (in.)	Decimal (mm)	Drill Size	Decimal (in.)	Decimal (mm)	Drill Size	Decimal (in.)	Decimal (mm)	Drill Size	Decimal (in.)	Decimal (mm)
80	0.0135	0.3429	47	0.0785	1.9939	11	0.1910	4.8514	X	0.3970	10.0838
79	0.0145	0.3683	46	0.0810	2.0574	10	0.1935	4.9149	Y	0.4040	10.2616
1/64	0.0156	0.3962	45	0.0820	2.0828	13/64	0.2031	5.1587	13/32	0.4062	10.3175
78	0.0160	0.4064	44	0.0860	2.1844	2	0.2210	5.6134	Z	0.4130	10.4902
77	0.0180	0.4572	43	0.0890	2.2606	1	0.2280	5.7912	27/64	0.4219	10.7163
76	0.0200	0.5080	42	0.0935	2.3749	A	0.2340	5.9436	7/16	0.4375	11.1125
75	0.0210	0.5334	3/32	0.0938	2.3825	15/64	0.2344	5.9538	29/64	0.4531	11.5087
74	0.0225	0.5715	41	0.0960	2.4384	B	0.2380	6.0452	15/32	0.4688	11.9075
73	0.0240	0.6096	40	0.0980	2.4892	C	0.2420	6.1468	31/64	0.4844	12.3038
72	0.0250	0.6350	39	0.0995	2.5273	D	0.2460	6.2484	1/2	0.5000	12.7000
71	0.0260	0.6604	38	0.1015	2.5781	1/4 (E)	0.2500	6.3500	33/64	0.5156	13.0962
70	0.0280	0.7112	37	0.1040	2.6416	F	0.2570	6.5278	17/32	0.5312	13.4925
69	0.0292	0.7417	36	0.1065	2.7051	G	0.2610	6.6294	35/64	0.5469	13.8913
68	0.0310	0.7874	7/64	0.1094	2.7788	17/64	0.2656	6.7462	9/16	0.5625	14.2875
1/32	0.0312	0.7925	35	0.1100	2.7940	H	0.2660	6.7564	37/64	0.5781	14.6837
67	0.0320	0.8128	34	0.1110	2.8194	I	0.2720	6.9088	5/8	0.6250	15.8750
66	0.0330	0.8382	33	0.1130	2.8702	J	0.2770	7.0358	41/64	0.6406	16.2712
65	0.0350	0.8890	32	0.1160	2.9464	K	0.2810	7.1374	21/32	0.6562	16.6675
64	0.0360	0.9144	31	0.1200	3.0480	9/32	0.2812	7.1425	43/64	0.6719	17.0663
63	0.0370	0.9398	1/8	0.1250	3.1750	L	0.2900	7.3660	11/16	0.6875	17.4625
62	0.0380	0.9652	30	0.1285	3.2639	M	0.2950	7.4930	45/64	0.7031	17.8587
61	0.0390	0.9906	29	0.1360	3.4544	19/64	0.2969	7.5413	23/32	0.7188	18.2575
60	0.0400	1.0160	28	0.1405	3.5687	N	0.3020	7.6708	47/64	0.7344	18.6538
59	0.0410	1.0414	9/64	0.1406	3.5712	5/16	0.3125	7.9375	3/4	0.7500	19.0500
58	0.0420	1.0668	27	0.1440	3.6576	O	0.3160	8.0264	49/64	0.7656	19.4462
57	0.0430	1.0922	26	0.1470	3.7338	P	0.3230	8.2042	25/32	0.7812	19.8425
56	0.0465	1.1811	25	0.1495	3.7973	21/64	0.3281	8.3337	51/64	0.7969	20.2413
3/64	0.0469	1.1913	24	0.1520	3.8608	Q	0.3320	8.4328	13/16	0.8125	20.6375
55	0.0520	1.3208	23	0.1540	3.9116	R	0.3390	8.6106	53/64	0.8281	21.0337
54	0.0550	1.3970	22	0.1570	3.9878	11/32	0.3438	8.7325	27/32	0.8438	21.4325
53	0.0595	1.5113	21	0.1590	4.0386	S	0.3480	8.8392	55/64	0.8594	21.8288
1/16	0.0625	1.5875	19	0.1660	4.2164	T	0.3580	9.0932	7/8	0.8750	22.2250
52	0.0635	1.6129	18	0.1695	4.3053	23/64	0.3594	9.1288	57/64	0.8906	22.6212
51	0.0670	1.7018	17	0.1730	4.3942	U	0.3680	9.3472	29/32	0.9062	23.0175
50	0.0700	1.7780	16	0.1770	4.4958	3/8	0.3750	9.5250	15/16	0.9375	23.8125
49	0.0730	1.8542	15	0.1800	4.5720	V	0.3770	9.5758	61/64	0.9531	24.2087
48	0.0760	1.9304	14	0.1820	4.6228	W	0.3860	9.8044	31/32	0.9688	24.6075
5/64	0.0781	1.9837	3/16	0.1875	4.7625	25/64	0.3906	9.9212	63/64	0.9844	25.0038
									1	1.0000	25.4000

Appendix C: Tap Chart and Hole Fits

Machine Screw Size		Number of Threads Per Inch	Minor Dia.	Tap Drills				Clearance Hole Drills			
				Aluminum, Brass & Plastics 75% Thread		Stainless Steel, Steels & Iron 50% Thread		All Materials			
								Close Fit		Free Fit	
No. or Dia.	Major Dia.			Drill Size	Decimal Equiv.	Drill Size	Decimal Equiv.	Drill Size	Decimal Equiv.	Drill Size	Decimal Equiv.
0	0.06	80	0.0447	3/64	0.0469	55	0.052	52	0.0635	50	0.07
1	0.073	64	0.0538	53	0.0595	1/16	0.0625	48	0.076	46	0.081
		72	0.056	53	0.0595	52	0.0635				
2	0.086	56	0.0641	50	0.07	49	0.073	43	0.089	41	0.096
		64	0.0668	50	0.07	48	0.076				
3	0.099	48	0.0734	47	0.0785	44	0.086	37	0.104	35	0.11
		56	0.0771	45	0.082	43	0.089				
4	0.112	40	0.0813	43	0.089	41	0.096	32	0.116	30	0.1285
		48	0.0864	42	0.0935	40	0.098				
5	0.125	40	0.0943	38	0.1015	7/64	0.1094	30	0.1285	29	0.136
		44	0.0971	37	0.104	35	0.11				
6	0.138	32	0.0997	36	0.1065	32	0.116	27	0.144	25	0.1495
		40	0.1073	33	0.113	31	0.12				
8	0.164	32	0.1257	29	0.136	27	0.144	18	0.1695	16	0.177
		36	0.1299	29	0.136	26	0.147				
10	0.19	24	0.1389	25	0.1495	20	0.161	9	0.196	7	0.201
		32	0.1517	21	0.159	18	0.1695				
12	0.216	24	0.1649	16	0.177	12	0.189	2	0.221	1	0.228
		28	0.1722	14	0.182	10	0.1935				
		32	0.1777	13	0.185	9	0.196				
1/4	0.25	20	0.1887	7	0.201	7/32	0.2188	F	0.257	H	0.266
		28	0.2062	3	0.213	1	0.228				
		32	0.2117	7/32	0.2188	1	0.228				
5/16	0.313	18	0.2443	F	0.257	J	0.277	P	0.323	Q	0.332
		24	0.2614	I	0.272	9/32	0.2812				
		32	0.2742	9/32	0.2812	L	0.29				
3/8	0.375	16	0.2983	5/16	0.3125	Q	0.332	W	0.386	X	0.397
		24	0.3239	Q	0.332	S	0.348				
		32	0.3367	11/32	0.3438	T	0.358				
7/16	0.438	14	0.3499	U	0.368	25/64	0.3906	29/64	0.4531	15/32	0.4687
		20	0.3762	25/64	0.3906	13/32	0.4062				
		28	0.3937	Y	0.404	Z	0.413				
1/2	0.5	13	0.4056	27/64	0.4219	29/64	0.4531	33/64	0.5156	17/32	0.5312
		20	0.4387	29/64	0.4531	15/32	0.4688				
		28	0.4562	15/32	0.4688	15/32	0.4688				
9/16	0.563	12	0.4603	31/64	0.4844	33/64	0.5156	37/64	0.5781	19/32	0.5938
		18	0.4943	33/64	0.5156	17/32	0.5312				
		24	0.5114	33/64	0.5156	17/32	0.5312				

5/8	0.625	11	0.5135	17/32	0.5312	9/16	0.5625	41/64	0.6406	21/32	0.6562
		18	0.5568	37/64	0.5781	19/32	0.5938				
		24	0.5739	37/64	0.5781	19/32	0.5938				
11/16	0.688	24	0.6364	41/64	0.6406	21/32	0.6562	45/64	0.7031	23/32	0.6562
3/4	0.75	10	0.6273	21/32	0.6562	11/16	0.6875	49/64	0.7656	25/32	0.7812
		16	0.6733	11/16	0.6875	45/64	0.7031				
		20	0.6887	45/64	0.7031	23/32	0.7188				
13/16	0.813	20	0.7512	49/64	0.7656	25/32	0.7812	53/64	0.8281	27/32	0.8438
7/8	0.875	9	0.7387	49/64	0.7656	51/64	0.7969	57/64	0.8906	29/32	0.9062
		14	0.7874	13/16	0.8125	53/64	0.8281				
		20	0.8137	53/64	0.8281	27/32	0.8438				
15/16	0.938	20	0.8762	57/64	0.8906	29/32	0.9062	61/64	0.9531	31/32	0.9688
1	1	8	0.8466	7/8	0.875	59/64	0.9219	23377	1.0156	11689	1.0313
		12	0.8978	15/16	0.9375	61/64	0.9531				
		20	0.9387	61/64	0.9531	31/32	0.9688				

Power Hawks Robotics Team

Power Hawks Team Organization

2015

SOUTH RIVER
POWERHAWKS
ROBOTICS

Team 1111

Power Hawks Team Organization

The Power Hawks Organization is broken into a number of different programs as shown in the figure below.

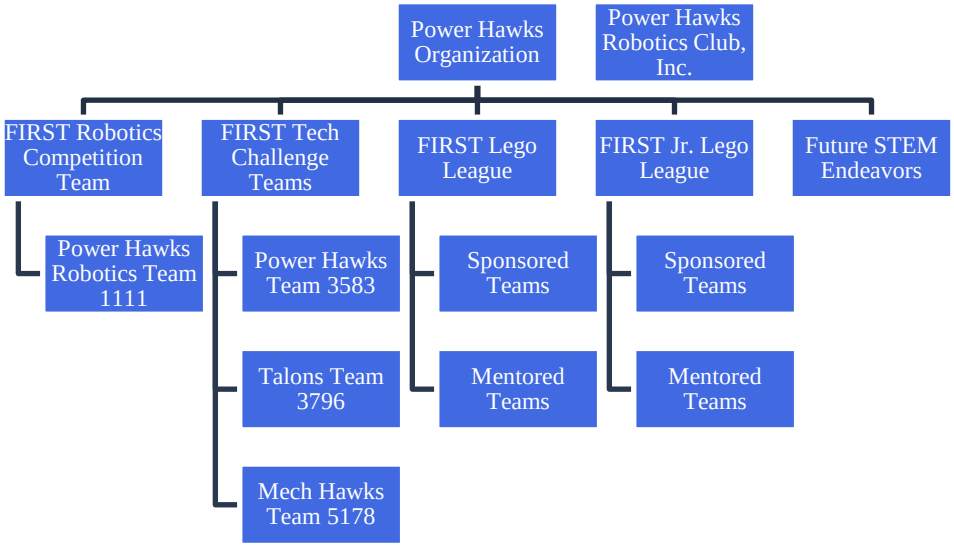


Figure 1 Team Organization

Power Hawks Organization

The Power Hawks Organization is the school program that makes up all school activities in the organization. While most of the teams under the Power Hawks Organization largely operate on their own, The Power Hawks Organization runs large events that span all programs such as our annual *FIRST* Lego League Qualifier, fundraisers in the school, and community service projects. It is run by the leaders or captains of each program under its control.

The Power Hawks Organization's purpose is to create unity in the organization when completing large projects.

Power Hawks Robotics Club, Inc.

The Power Hawks Robotics Club, Inc. is a 501(c)(3) nonprofit run by parents and community members. It is not associated in any way with Anne Arundel County Public Schools or South River High School. The goal of the nonprofit organization is to provide funding opportunities to help STEM and Robotics programs throughout Anne Arundel County. It is the primary monetary mechanism for the Power Hawks Organization, providing the majority of the organization's funding and materials. While separate from the Power Hawks Organization, The Power Hawks Robotics Club, Inc. works closely with the programs under the Organization to ensure both missions are being met. Further, The Power Hawks Organization often volunteers for the nonprofit's fundraisers and community service projects, providing volunteers and services to help the club in its endeavors.

FIRST Robotics Competition Team

Our *FIRST* Robotics Competition (*FRC*) Team is considered the pinnacle of the Power Hawks Organization. The Power Hawks Organization fields one team—Team 1111, the Power Hawks, which competes yearly in the *FIRST* Robotics Competition.

FIRST Tech Challenge Teams

Our *FIRST* Tech Challenge (FTC) Teams are considered our starter teams. They help students get acclimated with robotics and allow students who have other major time commitments still participate. The Power Hawks Organization fields three *FIRST* Tech Challenge teams;

- Team 3583—Power Hawks
- Team 3796—The Talons
- Team 5178—Mech Hawks

FIRST Lego League Teams

The Power Hawks support multiple Lego League teams in the Anne Arundel County area. This support is provided through team sponsorships and through student mentoring. While the teams ebb and flow, typically the Power Hawks will support between 15 and 30 teams a year.

FIRST Jr. Lego League Teams

The Power Hawks support multiple Jr. Lego League teams in the Anne Arundel County area. This support is provided through team sponsorships and through student mentoring. While the teams ebb and flow, typically the Power Hawks will support between 5 and 20 teams a year.

Future STEM Endeavors

The Power Hawks Organization is continuing to look for other ways to further inspire more students. Currently though we do not have the adult mentors to run the teams. If you are interested or may be interested in starting another program under the Power Hawks Organization, Please contact the Head Mentor. Programs may include;

- Vex Robotics Competition (VRC)
- Technology Student Association (TSA)

FIRST Robotics Competition Team Student Organization

The Power Hawks *FIRST* Robotics Competition Team is broken down into a leadership structure in order to provide the best opportunities available to the students at large. Leaders are picked yearly by mentors and previous leadership, with an emphasis on maturity, communication skills, and enthusiasm.

FRC Student Executive Leadership Team

Student Executive Leadership comprises of four students in different roles as the chart in figure 2 specifies.

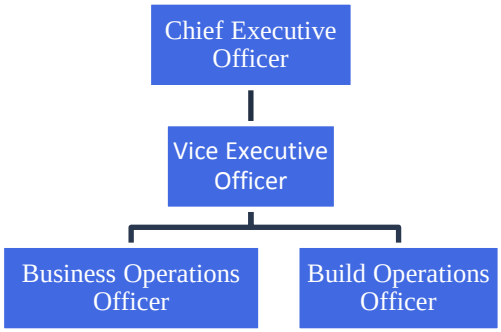


Figure 2: Executive Leadership

Each role is filled through the annual application process and is determined by the application process, mentor input, and the previous year's Executive Leadership. While significant consideration will be given to the Vice Executive Officer to become the Chief Executive Officer each year, the position of Vice Executive Officer does not necessarily guarantee the position and others are welcome to apply for the position of Chief Executive Officer each year.

The Executive Leadership Team is expected to complete the following tasks, amongst others;

- Running team meetings
- Making decisions for and about the overall team
- Creating and distributing team emails and newsletters
- Developing a foundation for the college and career opportunities
- Maintaining and updating the team calendar
- Delegating appropriately to other portions of the team leadership.

Overall, the primary role of the Executive Leadership is to sustain the Power Hawks and keep the team in good standing. The Executive Leadership Team is expected to complete this role *FIRST* and foremost, as it pertains to the continued success of the Power Hawks Robotics. Further, each position has its own set of responsibilities which include, but do not encompass, all roles and tasks that the student may be expected to complete. These tasks are discussed below;

FRC Chief Executive Officer (CEO)

The *FRC* CEO is the leader of the entire Power Hawks organization. This person is responsible for maintaining a positive working environment for the total program and being a liaison to the school system. They should work to ensure the team is always moving in a forward direction and that the student leaders and adult mentors are helping to ensure every student is growing to their full potential. Further responsibilities include, but are not limited to:

- Overseeing all operations of the organization
- Overseeing all internal & public relations
- Reporting to school administration, parents, sponsors and business partners, and team members
- Maintaining a safe and productive learning environment for all participants
- Helping to recruit and train new teachers, mentors, and students
- Setting and maintaining the calendar and schedule
- Ensuring all subteams are completing objectives in a timely manner

FRC Vice Executive Officer (VEO)

The *FRC* VEO assists the CEO with all tasks, filling in for the CEO when absent, and helping to maintain a healthy workload for both of them. They are to be the one to carry out the CEO's plans, working side by side with students and mentors to help the team in their growth. Further responsibilities include, but are not limited to:

- Creating and maintaining all team organization data
- Creating and maintaining data on student progress
- Creating and maintaining data on team progress
- Tracking attendance at meetings
- Filling in for the CEO when necessary
- Filling in for team captains when necessary
- Assisting subteams when deadlines approach

FRC Business Operations Officer (BOO)

The BOO oversees all aspects which involve the business side of the Power Hawks Robotics Team. Responsibilities include, but are not limited to:

- Develop and maintain an annual and five year business plan
- Assist in developing a business budget
- Assist in developing approved fundraising campaigns
- Maintaining all identity and media standards
- Enforcing identity standards with all media that the public will see
- Ensuring all social media and internet presences are maintained and appropriate

FRC Build Operations Officer (BUOO)

The BUOO oversees all aspects which involve the build side of the Power Hawks Robotics Team. Responsibilities include, but are not limited to:

- Plan build schedules
- Assist in developing a build budget
- Create and maintain robot bill of materials
- Create and maintain the team Gantt chart
- Ensure all safety rules are followed in team areas
- Be an expert in all rules
- Maintain a demo robot
- Ensure students maintain and properly use all tooling

FRC Student Leadership Team

Below the Student Executive Leadership Team is the Power Hawks Student Leadership Team. These are generally single person leadership positions that are responsible for overseeing the wellbeing and success of each subteam. The hierarchy of these roles is shown in figure 3.

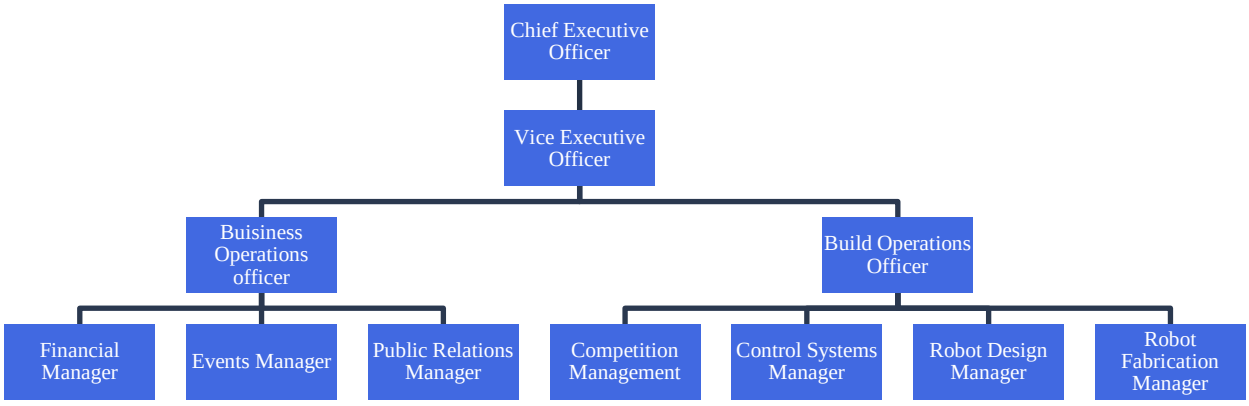


Figure 3: Leadership Team

In general, each of these roles is fulfilled by students who have shown particular potential in the previous season, but they may be filled when a new student shows specific qualities during the application process. Each position is filled with one student only, with an assistant assigned at the request of the student in the position and with the agreement of the Executive Leadership Team. Each student in the Student Leadership Team is expected to aid the Executive Leadership Team's primary role of continuing the success of the Power Hawks Robotics. While this is their primary role, each position also has more specific roles as detailed. Please note, this is by no means an exhaustive list and more may be expected of each position.

FRC Financial Manager

The financial manager is responsible for all financial procurement to support the Power Hawks and tracking spending for the program. Responsibilities include, but are not limited to:

- Maintaining and communicating the team budget
- Liaison with PHRC treasurer
- Liaison with SRHS financial secretary
- Maintain contact with new and existing sponsors
- Coordinate the procurement of new sponsors
- Invite sponsors to team events
- Plan and coordinate fundraising events

FRC Events Manager

The events manager is responsible for planning and coordinating all events that the Power Hawks participate in. Responsibilities include, but are not limited to:

- Planning and coordinating community service events
- Connecting with sponsors for demonstrations
- Organize volunteers and paperwork for specific events
- Coordinate design and ordering of spirit wear
- Liaison with yearbook
- Organize team-building activities
- Coordinate all travel arrangements for field trips

FRC Public Relations Manager

The public relations manager is responsible for all media that represents the team to the public. This includes printed and web materials, plus photo, video, and social media. Responsibilities include, but are not limited to:

- Organizing and completing all award submissions
- Create videos for team events
- Document all team activates through photography
- Release appropriate photos to the public
- Document all team activities through videography
- Release appropriate videos to the public
- Ensure identity standards are held by all persons
- Maintain existing graphics
- Create new graphics as necessary

FRC Competition Management

The competition manager is responsible for all of the tasks that happen during a competition. Responsibilities include, but are not limited to:

- Coordinating drive team
- Completing all prerequisites for scouting
- Organizing scouting at events
- Managing back of house pit
- Managing front of house pit
- Coordinating judging speakers
- Coordinating award presentations
- Organizing photography during events
- Organizing videography during events
- Manage stands and spirit
- Collect data for drive team
- Coordinate battery charging
- Ensure pit and drive team are hydrated and fed

FRC Control Systems Manager

The controls system manager is responsible for the design and implementation of all programing and electrical components on the robot. Responsibilities include, but are not limited to:

- Coordinate design of control system
- Plan and integrate sensor systems
- Coordinate programming of robot
- Coordinate and manage wiring and integration of electrical systems
- Coordinate user input systems
- Coordinate management of battery systems

FRC Robot Design Manager

The robot design manager is responsible for the design and testing of the robot. Responsibilities include, but are not limited to:

- Coordinate robot design with team
- Implement design of robot
- Manage 3D printing systems
- Manage CAD of robot
- Digitally design and test robot
- Design robot components and upgrades
- Render robot and release to public with public relations subteam
- Maintain Power Hawks design standards

FRC Robot Fabrication Manager

The robot fabrication manager is responsible for the manufacturing and implantation of the robot subsystems. Responsibilities include, but are not limited to:

- Coordinating creation of drivetrain
- Coordinating building of bumpers
- Coordinating the building of robot mechanisms
- Coordinate building of mock field components
- Maintain and upgrade demo robot
- Maintain and upgrade practice robot
- Keep all storage rooms clean and organized
- Keep inventory of all parts and tools

FTC Team Organization

The FIRST Tech Challenge team maintains leaders to ensure the team succeeds to the fullest. Other members may have more unofficial roles on the team.

FTC Team Captain

Leads team meetings, organizes events, liaisons with other Power Hawks teams, PHRC, and teams, ensures the wellbeing of team students and ensures deadlines are met.

FTC Team Assistant Captain

Assists Team Captain in all tasks, works closely with students to ensure tasks are being completed. Fills in for Team Captain when they are absent.

FTC Build Captain

Runs the design and creation of the competition robot. Ensures it constraints to all rules and will work most effectively. Keeps students on task and ensure goals are met in a timely fashion.

FTC Programming Captain

Runs the programming of the competition robot. Ensures it constraints to all rules and will work most effectively. Keeps students on task and ensure goals are met in a timely fashion.

Role of Student Leaders

Each student in the student leadership team is tasked with running their group of students as they see fit while still maintaining the team's goals and outcomes. Student leaders are to organize their team with input from the Executive Leadership Team and mentors so that they may do the best they can for the students and the team.