
5-YEAR BUSINESS PLAN
POWER HAWKS
TEAM 1111
ULTIMATE ASCENT
REBOUND Rumble
aerial assist
LOGO MOTION
BREAKAWAY
2014
South River High School
201 Central Ave, East
Edgewater, MD 21037

Cover art by Caitlin Moore, SRHS class of 2014

Table of Contents

Table of Figures

Table of Tables

Executive Summary

Mission

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

Vision

The Power Hawks Robotics Team wants to inspire individuals to express their passions and create a positive impact on the global community.

Team Directive

Power Hawks FIRST Robotics Team 1111 creates an environment in which students can learn about themselves and gives them room to excel within their interests. The Team then uses their interests to spread the idea of FIRST to the community through fundraising, community outreach, and mentoring.

Team Origin

The Power Hawks Robotics Team was founded for the 2003 FRC season at South River High School by Mr. John Jacobson, along with eight students. The team has grown each year since then to its current size of 46 FRC students and 30 FTC students, who compose three FTC teams. The team has accomplished this by branching into both build and business subteams; with 13 business subteams, 12 build subteams, and 3 subteams that are both business and build. This allows students to grow in any area of interest and allows the team to grow to fit our student's needs and interests.

Currently, the Power Hawks Robotics main focus is to inspire our community through multiple outreach efforts in partnership with our funding arm; the Power Hawks Robotics Club, Inc. This helps to educate our community about the ideals of FIRST and STEM, and help to strengthen education in our schools and community programs.

Summary of Team Growth

The Power Hawks has 46 students this year (12 females and 24 males). 28 of these students are new. Of our current students, 31 have had involvement with other FIRST teams before..

Objectives

By the year 2018, we aim to:

- Increase student confidence by teaching technical and entrepreneurial skills through the creation of robots and relations with the community.
- Prepare students for the future through confidence and new skills.
- Create more support for robotics programs in Anne Arundel County.
- Create and support multiple FRC teams throughout Anne Arundel County.
- Become more recognized 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.

- Have a renewable source of professional mentors in technical and entrepreneurial fields including parental mentors.
- Improve financial sustainability.
- Provide a free thinking environment which allows students to express their creativity.

Keys to Success

- Prepare our students by giving them the means to utilize STEM and entrepreneurial skills in a realistic scenario and reinforce the pivotal role played in the community.
- Establish a feeder-system pipeline of students who have been exposed to FIRST robotics by reaching out into the community, promoting science and technology.
- Obtain a Team member-to-mentor ratio of at least 3:1, with mentors of STEM and entrepreneurial experience with a minimum of 10 professional mentors with various skill sets and a program advisor that is a teacher.
- Secure a minimum of two-years operation expenses.

Sponsors

Platinum Level

National Security Agency

Titanium

NASA Goddard

Gold Level

Anne Arundel County Public Schools
Righttime Medical Care

Silver Level

ARINC Technical Excellence Society
Booz | Allen | Hamilton
Daly Computers
Earth Observation Technologies LLC
Family Veterinary Clinic
Government Services Integrated Processing Team LLS
Leidos
Microsoft
Selby Bay Marina
Tri-State Communications, Inc

Bronze Level

CED Investigative Technologies LLC
Chesapeake Bay Sport Fishing LLC
Commodore Mayo Kiwanis Club
Eaton Corporation

Kumon “A Dream Education LLC”
Manufacturing Support Group, Inc
NorthPoint Graphic Studios, Inc.

Other Sponsors

Arundel Self Storage Annapolis, Bay Engineering Inc., Bit Solutions, Carrollton O. Green, CED Investigated Technologies Inc., Google, John Droter DDS, Kwesi O. Rogers, Lawrence Cooper, M-Cubed Information System, Motorola Solutions, Robert and Crystal Dozier, Thomas Wright, Wells Fargo Bank

Partnerships

Andrews Air Force Base, Anne Arundel County Public Schools, ARINC, MD FIRST, Central Middle School, Family Veterinary Clinic, Google, Government Services Integrated Process Team LLS, JCPenney, Kmart, Menchies Frozen Yogurt, Microsoft Cooperation, Motorola Solutions, NASA, Office Depot, Safeway, South River High School, Sweet Frog

Management and Organization

Team Organization

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

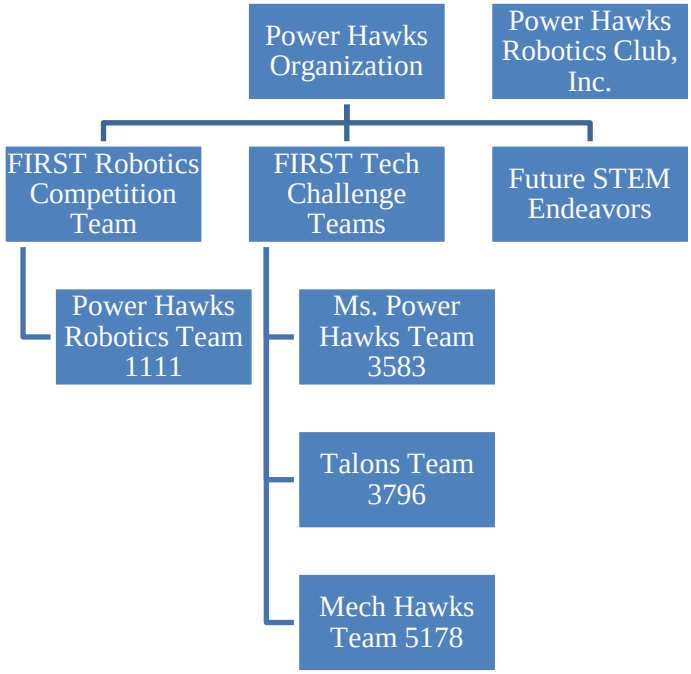

Figure 1: Team Organization

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 ran 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 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 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—Ms. 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)
- Other STEM co-curricular programs

Management Summary

Power Hawks Organization

The Power Hawks Robotics Organization is managed by students, mentors, and a teacher advisor. The leadership roles are based upon succession or election depending on the arm of management.

Students

Student leaders are generally juniors or seniors in high school and are selected to their positions by previous leadership and the mentors. Their responsibilities are to not only be the leaders of their peers, but teachers of basic skills and the liaisons among the mentors.

Board of Directors (BOD)

Members of the community compose the BOD that control the Power Hawks Robotics Club, Inc. BOD positions are elected posts. They also play a general role on the Team as teachers and facilitators for the build and business funding, planning and implementation.

Advisor

In order to keep the team school-based, the Power Hawks robotics is run by a school or district employee. Mr. Zachary Cohen is the teacher advisor for Team 1111. Responsibilities include coordinating with the school, supervision of students and activities, organization of mentors and students for meetings, and

various other small tasks that are vital to the successful operation of Team 1111. He works closely with the Power Hawks Robotics Club, Inc., the Team Executive Officer, and other student officers.

Team Organizational Hierarchy

For 2013-2014, the FRC Team 1111 has evolved a dual organizational hierarchy (business and build) to administer the Team operations.

Leadership

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

Student Executive Leadership Team

The student executive leadership team comprises of four students in positions as shown in the chart in figure 2.

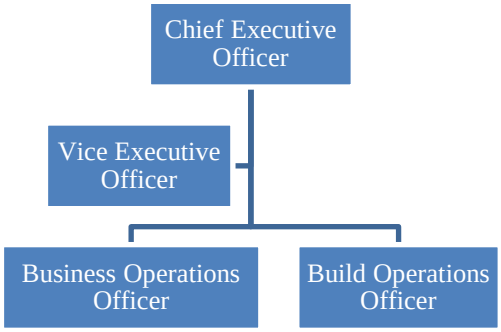

Figure 2: Student Executive Leadership Team

Each position 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 college and career opportunities
- Maintaining and updating the team calendar
- Delegating responsibilities to other team leaders.

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 the roles and tasks that the student may be expected to complete.

Chief Executive Officer

Lead team, liaison with school and sponsors, manage TIMS and STIMS, communicate with team, parents, mentors, approve all calendar events, dates, plan and direct team meetings.

Vice Executive Officer

Assist the CEO with all tasks, fill in for CEO when absent, facilitate inter-communication for the team, create and maintain team organizational data.

Business Operations Officer

Oversee all aspects of business, work with mentors as needed, ensure TIMS is complete, attend PHRC Board meetings, maintain business notebook, and send business emails.

Build Operations Officer

Plan build days, oversee all build support, create a build schedule with a planning tool such as a Gantt chart and monitor progress, ensure safety, be rules expert, work with mentors as needed, design and build robot and demobot, send build emails.

Student Leadership Team

The Power Hawks Student leadership Team is responsible for overseeing the wellbeing and success of each sub team. The hierarchy of these roles is shown in figure 2.

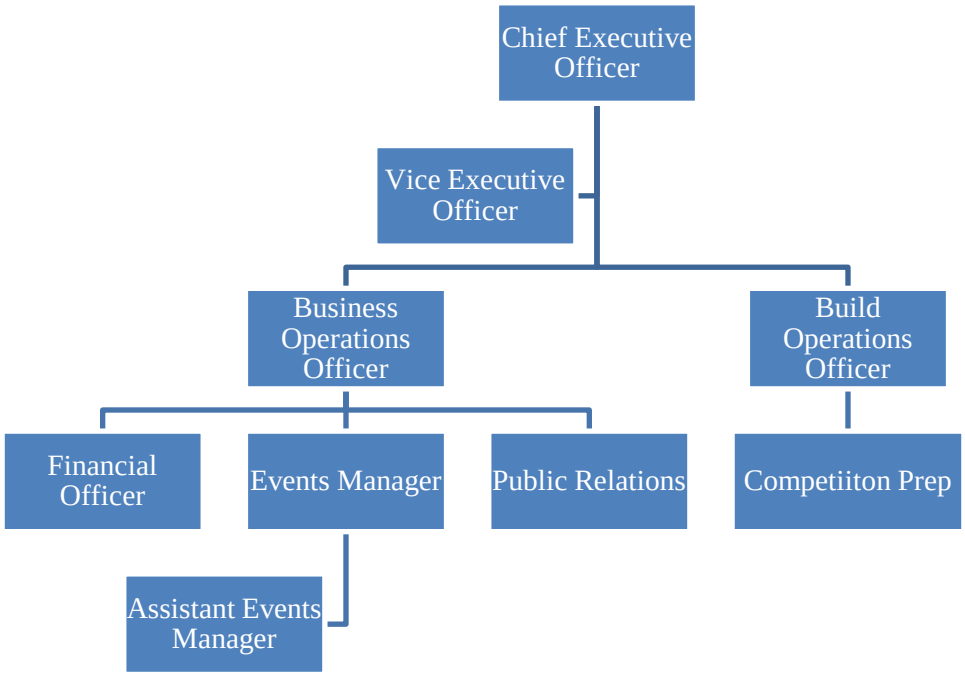

Figure 3: Student Leadership Team

In general each of these roles is fulfilled by students who have risen from specific captain positions, but they may be filled when a new student shows specific qualities during the application process. Each position is filled with one student only. Each leadership position has specific roles as detailed below. Please note, this is by no means a complete list and more may be expected of each position.

Financial Officer

Maintain and communicate team budget, handle team member financial accounts, liaison with PHRC Treasurer, liaison with SRHS Financial Secretary, take attendance, and assist sub teams as needed.

Events Manager

Manage sub teams, scholarship activities/reports, Saturday lunches, plan regionals, trash schedule, snack schedule, forms expert, field trip paperwork and scheduling, and assist sub teams as needed.

Public Relations

Facilitate communication with all PR sub-teams, manage and follow up with all sub team tasks, write press releases, school announcements, grant information, thank you letters, assist sub teams as needed.

Competition Prep

Facilitate communication between all prep-sub teams, ensure safety, reinforce clean-up, and assist sub teams as needed.

Shop Manager

Ensure Safety, organize materials, direct shop clean-up, provide tool instruction, manage all storage organization, keep all sub-committees on task, and assist sub teams as needed.

Sub Teams

The Power Hawks are broken down into 9 leadership positions and 18 sub teams, each with a captain. Each sub team is expected to work with every other sub team as needed to best accomplish the goals of the Power Hawks. Every student will be placed on at least one sub team, and some will be placed on two or more. Students who are on multiple sub teams are expected to divide their work as needed between the different teams to ensure that all tasks for all sub teams are completed within specified due dates set by leadership, captains, and mentors.

Team Organizational Hierarchy

The Power Hawks maintain an organizational chart to serve as a graphic aid in helping to organize student involvement.

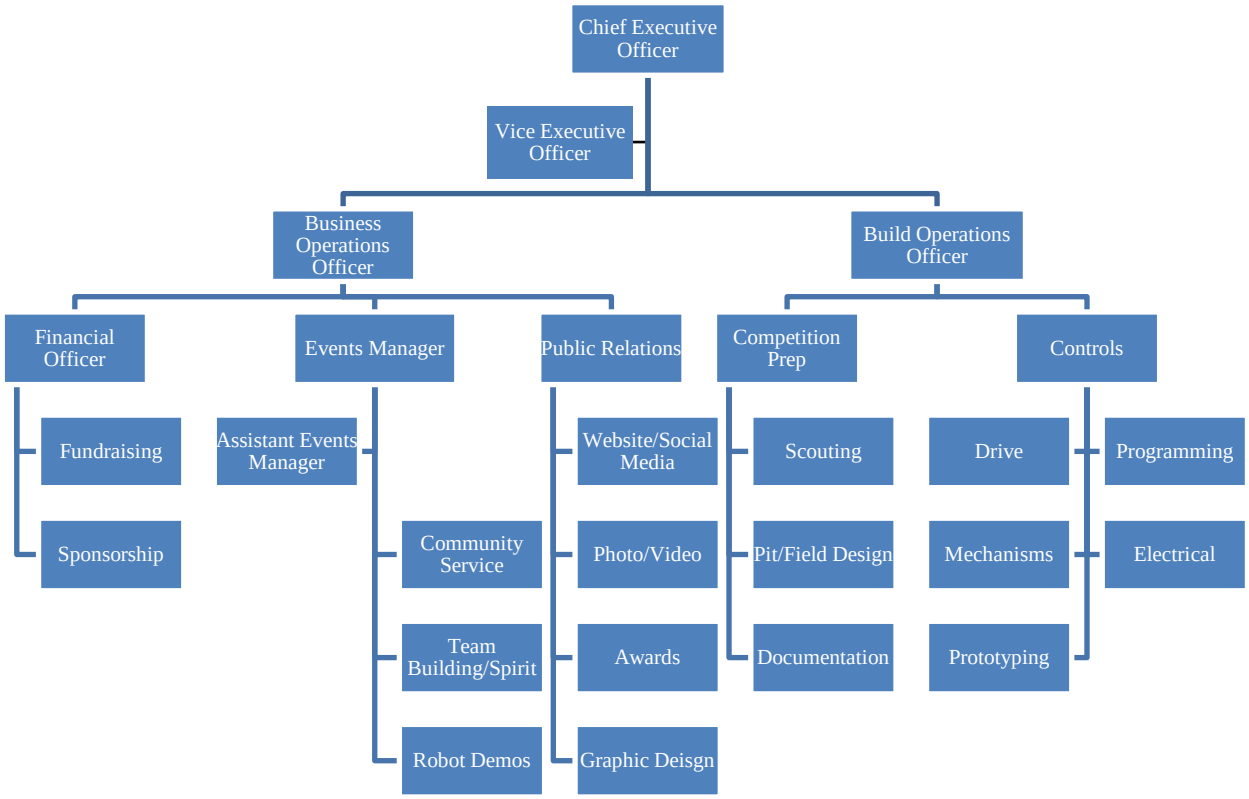

Figure 4: Organizational Chart

Sub Team Descriptions

Following is a short description of each sub team's role on the Power Hawks. Please note though, this is by no means an exclusive list of the roles and responsibilities of each sub team and many other tasks and jobs may be expected from the students of the sub team.

Fundraising

Plan Fundraisers, school fundraisers, select individual fundraisers, coordinate flocking, complete school fundraising paperwork and communicate with team about fundraising events.

Sponsorship

Contact new sponsors and current ones, keep records of sponsorship and financial contributions, and send invitations to events and communications about progress.

Community Service

Manage paperwork and communications for all community service events, Support academic tutoring program, Connect with charities, Plan collections and donations.

Team Building/Spirit

Design all spirit wear and T-shirt design, Giveaways, Yearbook Liaison, Plan Spirit Award, Organize team-building activities, and manage paperwork and communications for team-building/spirit.

Robot Demos

Maintain demo robot, Connect with schools and sponsors, Organize volunteers to do demos, manage paperwork and communications for all Demo team activities.

Website/Social Media

Maintain Website, team emails, and update all social media resources.

Photo/Video

Post to YouTube and website, take video, take photos, and create videos for Chairman's, sponsors, pit, and send-off day.

Awards

Create Chairman's presentation, documentation and support. Write Woodie Flowers Award. Compile Entrepreneurship Award. Assist in all award documentation, creation, and presentations.

Graphic Design

Sponsor logos, invitations and thanks, design team brochures and handouts, design stat card, banners, awards, certificates.

Build Operations Officer

Plan build days, oversee all build support, create Gantt chart and monitor progress, ensure safety, be rules expert, intervene with mentors as needed, design and build robot and demobot, send build emails.

Scouting

Create scouting plan, manage scouts, and collect data for drive team on other teams.

Pit/Field Design

Design/Build Field, Pit, and robot cart. Prepare bag and tag documentation.

Documentation

Document Team history, take team leader meeting minutes, maintain build notebook.

Controls

Design control system, plan for and integrate sensors.

Drive

Create drive train based off of team decisions, maintain drive train during competition.

Programming

Program robot and integrate controls and electrical.

Mechanisms

Design and build robot mechanisms to manipulate field components.

Electrical

Design electrical system, wire robot.

CAD

Digitally design and test robot, assist other sub teams in part design.

Prototyping

Assist build sub-teams in design and fabrication of new systems. Use the engineering design process to come up with solutions to solve problems the team is facing.

Strategy and Implementation

FIRST Robotics Awareness Plan

Student Recruitment

An objective of the Power Hawks is to have a network of students devoted to learning STEM and entrepreneurial skills. Members of the Team come primarily from South River High School with open applications from feeder schools. There are two levels of the FIRST program that are offered -- FRC Team 1111 and three FTC teams 3583, 3796 and 5178.

Pool for Recruits

The student body of South River is composed of two middle schools, (Crofton Middle and Central Middle), and fed by six elementary schools (Central, Davidsonville, Mayo, Edgewater, Crofton Meadows and Crofton Woods). In addition, we periodically reach out to other high schools in the area. Specific team recruitment starts at the sixth through the twelfth grade.

Specific Target Groups:

- Freshman: Flyers and applications are given out to students to learn about the Teams, and offer an opportunity to take the next step and become involved.
- STEM magnet program: These students have already expressed an interest in the STEM fields that Team 1111 provides and are targeted as members for JV and Varsity Teams.
- Project Lead the Way (PLTW): Students have a direct focus on engineering and technology, and are offered information about the Team in those classes.
- The general population of students in the area are also welcome to join the team and thus targeted through announcements and flyers. The Team is not only a STEM and PLTW focused program, as anyone can join the Team for the experience it brings.

Outreach for Recruits

The target students are reached through a variety of special events and general appeals. Outreach programs to the Elementary and Middle school level gain recruits to the Jr FLL and FLL teams that The Power Hawks sponsor.

Current Efforts

- PLTW Days are events that target eighth graders that show an interest in the program, and showcase engineering abilities and applications for the future. It is indirect recruitment for robotics for in-coming South River High School (SRHS) students.
- The STEM gala is an event that targets prospective STEM students and allows for the robotics team to start taking polls for early interest about robotics.
- Freshman Day is the first day of school for only freshman students. During lunch they can peruse a club expo in which the Power Hawks participate. They are given some basic information about the Team and have the opportunity to talk to current members.

Announcements and flyers are posted after Freshman Day as well as when the rest of the school is in attendance. An Application Night is held for prospective robotics members and their parents to explain in

more detail the commitment and expectations of the students as members of the Team; this is when applications are turned in. This is also an opportunity to recruit parental mentors for either FRC or FTC Teams.

- Demos at elementary schools in Anne Arundel County to create interest in FIRST and the Team at the elementary level.
- Outreach events such as STEM nights at Elementary schools and Middle schools as well as after school robotics classes and camps.
- One day robotics outreach events will be done throughout Anne Arundel County elementary schools. These events allow students to get hands on experiences with robotics, encouraging students who may have not been as interested in robotics to look into Jr.FLL and FLL.

Plans for Growth

- Target the middle school further. Use assemblies, newsletters, and other forms of communication to start a growing awareness and interest in robotics. Help to market the current FLL teams at that level to increase recruitment.
- Target the students at the middle school that are in a tutoring program to reach a group of students who would not normally be involved in Robotics.
- Target Elementary schools by creating interest through interactive workshops and creating Jr. FLL teams in the local schools supported and mentored by the Team.

Application Process

After initial interest is shown in the Team, there is an opportunity for the students to apply.

FIRST Robotics Exposure (K-12)

Recruitment for Team 1111 is open to the feeder system of South River High School and surrounding communities, but exposure to FIRST robotics is extended to broader Anne Arundel County, as well as across the state. Through various outreach and school events, students in grades kindergarten through twelfth are exposed to a robotics education within their school experience.

Jr. FLL

Jr. FLL in elementary schools are funded or mentored by Power Hawks members. These teams are located in the area surrounding to South River. Team 1111 also provides a Jr. FLL Expo opportunity through our FLL Qualifier, which has reached 18 teams across the state. The age levels that fit into this robotics program are introduced at community outreach events such as the Homestead Gardens Fall Festival and other fundraisers.

FLL (4-5)

The Power Hawks mentors and sponsors 4-5 FLL teams every year. FLL is offered to elementary and middle school age students who. As such, there is an issue of finding teacher-mentor support in the elementary schools for a secondary upper-level FLL team with the pre-existence of Jr. FLL in the lower grade levels. There is also a limited source of student mentors from Team 1111. A solution that was developed by Team 1111 to provide guidance to middle school teams that facilitate the mentoring at the

elementary schools. The students in this grade level, in general, are exposed to robotics through elementary school demonstrations.

FLL (6-8)

FLL at the middle school levels are supported financially and are mentored by Team 1111. Students at this age level are given the opportunity to learn about the robotics program through middle school demonstrations, PLTW Days, and the STEM Gala. The FLL Qualifier is also an outreach opportunity that has historically attracted 500+ people, to promote robotics in the community.

FTC

FTC levels at the high school are supported financially and with mentors from Team 1111. The high school level exposure for FTC the Team is identical to that of the FRC levels.

FRC

The FRC level at the high school is supported financially by the Board of Directors of the Power Hawks Robotics Club Incorporated financially. High school level exposure to the student populations is through yearbook inclusion, school announcements, Back-to-School nights through South River High, STEM Gala, a display case in the media center, and show-bots used in outreach events.

Lifetime Exposure

After high school, robotics exposure is in the form of Anne Arundel County TV, radio, Google links, newspaper, and similar media (Patch.com, Facebook, twitter, and blogs), and through community fundraisers. Team 1111 presentations to businesses in the area and mentor recruitment will also spread the word of FIRST throughout the community.

Professional Growth and Development

The team fosters not only the technical skills by building a robot, but also develops professional skills that are applicable in higher education and careers. The technical and entrepreneurial mentors work to guide the students and introduce new tools of organization. Life skills are also a major aspect of what the team offers to the students.

Mentors

Mentor Recruitment

There are two types of mentors that are recruited for Team 1111: parental and professional mentors. Parent nights are a major outreach event to recruit parental mentors. Forms and flyers are supplemental materials that are sent home through the team members. The key to recruit parent mentors is student involvement and student appeal.

Professional mentors can be reached through the various community events such as fundraisers or through sponsoring companies. The Team provides contact information and basic information about the role of mentors on the team.

Mentor Retention

Mentor retention is crucial to having a successful team long after the students have graduated. Parental mentors are generally only on the team for a maximum of four years, though there are exceptions. They invest into the team personally, so they generally stay longer than four years as a mentor.

Student Skills

Through mentorship and team values, team members take away certain skills that fall within technical, entrepreneurial and life classifications.

Technical Skills –The Build Operation

Inherent to creating a robot during the six week build season are the use of tools and the practice of shop safety. Even team members that have been assigned to the business committees are given an overview and basic training with the power tools annually.

It is during the build season that students also learn analytical thinking and design skills. The first week of build is devoted to strategy and design. These preliminary designs are then taken and refined through hand sketches, paper models, and CAD models. Final designs are voted on by the entire team.

Troubleshooting and problem solving go hand in hand throughout the final building process. Students use the mentors' knowledge as well as their own innovation to find solutions to various problems that occur during the transition from concept to reality.

To run the build operations and season as a professional firm and the use of various organizational tools facilitates the tasks that need to be completed. Each subteam is responsible for compiling a set of requirements which is a detailed listing of a task's objective and constraints. These teach the students project management and planning skills.

Entrepreneurial Skills – the Business Operations

The objective of the business operations is to maintain the administrative operations of the team. Every team member, even those that are primarily build, comes away from Team 1111 with public speaking skills.

In terms of organizational skills, students are required to keep meeting notes and important documents. Both the business and the build teams are required to document daily activities and keep a log of events. Captains of subteams create documents that are stored physically and virtually for future use.

Operational skills include the specific subteam job assignments. These job assignments cover a variety of talents that a business would find desirable in prospective employees. Each student will become involved in some way in the process of completing administrative tasks that fall into one of the subcommittees since they are designed to integrate and collaborate to complete tasks.

All students learn the importance of money management through the development of committee budgets. The importance of following a financial constraint is a real world issue that is being taught to these students early on. The budgets are either approved or adjusted and the committees must plan and work

within their means. Event planning is related to the financial needs of the team in regards to fundraisers and outreach support.

Life Skills

Overall, the skills taught to every team member are the important life skills that some students or teens do not develop until much later. Motivation, focus, determination, and persistence become natural characteristics of the students involved. Communication, responsibility, and leadership are vital in either build or business. Each member of the team invests time and energy into their work, and the team invests in them by teaching them the skills that are applicable in higher education and careers.

FIRST FRC Team 1111 Expectations

Student Expectations

Students are expected to be engaged in the team affairs and have a positive attitude. New members do not need to have previous experience in robotics or business affairs as the true value of the team is the willingness for students and mentors to teach each other. Students are expected to attend meetings regularly and to be an active member of the team. However, students must also keep a 2.5 GPA in order to keep participating during the build season. If any student's grades begin to fall, they are placed into mandatory tutoring with another member of the team during the meeting. Additionally, in all events - outreach, team-building or competitions, students are expected to uphold the values of the Team and their school. They must behave as representatives of FIRST in Maryland and of themselves.

Mentor Expectations

Mentors are expected to serve as teachers and guides. Students are expected to give them respect and mentors in turn are expected to reciprocate. Mentors are not to make decisions for students, but rather guide them. They are expected to impart not only their knowledge, but their experiences to the students and influence them to pursue STEM or business fields after high school.

Products and Services

Products

Robots

The Power Hawks designs and builds a 120-pound FRC robot following the current year game objective.

FRC Team Robot

2014 Game 'Arial Assist'

Teams of three robots pass exercise ball to each robot on the alliance. There is also a truss hanging over the middle of the field that the robots can throw the exercise ball over to gain more points. Once the ball has made it from one field to the other, the robot in possession of the ball can score the ball in a low goal or a high goal. Each alliance can have only one ball on the field at one time.

2013 Game 'Ultimate Ascent'

Teams of three robots try to shoot Frisbees into high, medium, and low goals. One such goal is on top of the two metal pyramids on either side of the playing field. There is an autonomous, teleported, and an end

game period. During the end game period, robots can climb the pyramid. The higher the robot goes, the more points the team gets.

2012 Game 'Rebound Rumble'

A robotics style basketball game. Teams of three try to shoot in three different levels of hoops. In the center of the court, there is a steel barrier and three bridges. The bridges can be balanced on during the end game to gain points. If opposite teams balance together, coopertition points will be gained. During the autonomous mode, a Kinect may be used.

2011 Game 'Logo-Motion'

Teams of three robots try to score points by hanging inflatable inner tubes in the shapes and colors of the FIRST logo onto a scoring grid of pegs. There are an additional 4 towers on the field that a 'minibot' must climb during the end game. There is an autonomous period, a teleported period, and an end game period.

Award Entries

- *Chairman's Award* – The entire Power Hawks Team works together to complete the Chairman's video and a specific sub team works on creating the essay.
- *Woodie Flowers Award* – The team choses one of the most dedicated mentors to the team.
- *Dean's List Award* – The mentor's collectively chose students on the team that they believe are exceptional.
- *Entrepreneurship Award* – The Business Operations Officer updates the business plan with current information.

Service

FRC Team 1111

The original Power Hawk Team, FRC Team 1111, continues to thrive with roughly 46 members. This Team focuses on the production of the FRC robot designed to complete the challenge presented by FIRST on the day of FRC kick-off through February. The structure of the FRC team is intended to give students a taste of the professional engineering world, with sub teams oriented for both the building of the robot and for business administration.

FTC Teams 3583, 3976, and 5178

The Power Hawks Robotics Club has also grown to include three FIRST FTC teams (3583, 3796 and 5178) who are mentored by members of FRC. Each team consists of ten members that design and create a robot that is intended to play the specific game that FIRST outlines at the beginning of the FTC season. These teams work through September to January competing in up to two competitions, not including states. The smaller team structure of the FTC program helps to train rookie members in shop and programming tools, the ideals of FIRST, the engineering spirit, and gracious professionalism.

Community Efforts

Robotics Oriented Outreach

The main outreach focus for the Power Hawks is to the elementary and middle school levels. The Team has mentored several local middle school teams in the FIRST FLL program, as well as several Jr. FLL

teams located in local elementary schools. With a grant provided by the NSA, the Team supports several more FLL and Jr. FLL teams. The Team has sponsored a FLL Regional Qualifiers in the past four years hosting 16-24 teams.

The Team has also mentored a local FRC team, The Cavaliers FIRST Team 4541. The Power Hawks sent students and mentors to help the Cavaliers get their start. Build members would go to their school and help them to remain organized and problem solve.

Community Service

In addition to the robotics oriented outreach into the community, the Power Hawks have adopted an academic tutoring program for the local middle school. The PHAT (Power Hawks Academic Tutoring) Program is devoted to mentoring and tutoring at risk students. Growth of the program is projected to spread to the other middle schools in the high school feeder system and through to the high school.

The Power Hawks have also participated in multiple charity drives such as ‘Soles for Souls’ where the teams collected over 100 pairs of shoes for people in other countries. Other involvement was with collecting Legos for Legos for Literacy and collecting food for Back Pack Buddies. Currently the team is creating to donate to Ronald McDonald house and the Sarah’s House, as well as donating supplies that the shelters may need.

Alumni

Power Hawks alumni are the most valuable products that are produced by the Team. Years on the Team teaches leadership, cooperation through teamwork, humility, overcoming diversity, and other life lessons with the addition of engineering and science principles. With the mentor base coupled with a strong community relationship, the Power Hawks alumni are supported and are ready to enter the real world at the end of their high school career. These individuals are well-rounded and motivated to succeed. Almost 100% of our graduated members attended a four-year college study program. 65% of those pursued a STEM field, 15% of those pursued a dual field, and 20% are professional. The Team is proud to be a part of their educational and social development.

Financials

Financial Overview

The Power Hawks Organization Board of Directors funds Team 1111 and other FIRST teams under the jurisdiction of the Club. The treasurer of the Club and Team Financial Officer approve small expenses, track budgets, and record the funding that comes into or out of the Team.

Funding

Sponsorship Process

Planning

The Team develops a list of potential sponsors, of big and small corporations located around Anne Arundel County.

Create Information Packets

A team of students and mentors draft and create the 'sponsorship packages' that are sent to promising potential sponsors from the list of proposed businesses. These packages are purely informational and provide information on sponsorship levels, benefits, the team and contact information.

Send Information Packets

Packages and envelopes are provided to team members. A group of three team members are given three businesses to be the point of contact (POC). Members are responsible for sending the letters to the appropriate business.

Follow Up

Follow-up consists of sending a follow up letter and a phone call to the business professionals two weeks after the packages were initially sent. This follow-up is to determine their interest in supporting the team, and provide further information to inquiries they may have on the team.

Offer Demonstrations

For all of the businesses the Power Hawks contact, demos are offered for any events that business may hold or a private demo for management and employees. The purpose of the demo is to build a stronger partnership with the businesses that support the Team and persuade those professionals to take a greater role in the FIRST program as potential mentors or "veteran sponsors."

Thank You Letters

Since the Power Hawks operate under the non-profit 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 and updates, sponsors are invited to attend the various events held by the team which include community demos, Kick-off, Robot Send-off, and competitions.

Fundraisers

Members are encouraged to participate in at least one fundraiser. Funds that are raised with these events are channeled into the Team's school account. These events include, but are not limited to: Valentine Flower Sales, Flocking, Car Washes, and Raffles.

Results

NASA House Team

With the aid of one of the Team's mentors who is connected with the NASA Robotics Alliance at the NASA Goddard Space Flight Center in Greenbelt Maryland, the Team became a NASA House Team. So, in return for gaining sponsorship money of $10,000, access to the NASA machine shop and other materials, the Team gives NASA all video recordings from two GoPro cameras. The cameras are located around the Team's work shop and placed onto the robot for a NASA promo video that is made at the end of the year. The Team is one of the three NASA House Teams in the region.

NSA Grant

This is a renewable application of $20,000 that provide funding for community outreach projects and sponsorship of other FIRST teams at differing levels.

JC Penney Team

A $1,000 sponsorship is granted to the team every year, thanks to the head of Maryland FIRST.

Prosperity Fund

All of the funding that is not spent in a team year is put into the continuation fund of the Power Hawks Club. The goal within the five years is to have two years of operation expenses, saved for the future team to use without having the pressure of dependence on sponsors.

Spending

Budget Development

As part of expanding business affairs to the students, subteams submit individual budgets to the BOD for approval. Below is a summary of those budgets and the total.

2013 – 2014 FRC Budgets

Build Committees		
	Programming	$763
	Drive	$2,291
	Mechanisms	$2,567
	Electrical	$487
	CAD	$54
	Controls	$743
	Competition	$1,907
	Subtotal	$8,812
Business Committees		
	Spirit	$80
	Photography	$1,569
	Documentation	$8
	Graphics	$3,335

	Community Service	$715
	Subtotal	$5,707
Budget Totals		$14,519

Table 1: List of 2014 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**	**What is already being done**	**Person Responsible**
Significant loss of sponsors	Inability to continue functioning as a FIRST team	M	H	We send sponsor request letters to previous and possible future sponsors	Sponsorship captain, Board of Directors
Complete loss of money coming into the team	Inability to continue functioning as a FIRST team	L	H	Every year we ensure that the team has enough money to operate for two years. without additional trips and sponsoring other teams	The Board of Directors
Inaccurate Bill of Materials as specified in the FIRST rule book	Disqualified from competition	M	M	The Bill of Materials is compiled by the build operations officer and is reviewed by the Team Executive Officer and the Head Mentor	Build operations officer, Team Executive Officer, and the Head Mentor
Loss of use of school facility	The team loses a meeting location	L	H	Continued relationship with admin and school to ensure that there is support for team activities	Head Mentor, team members, Board of Directors

Loss of a teacher head mentor	Lose of connection with school	H	H	The team tries to keep good connections with all of the teachers that are at the school.	Team members, Board of Directors
Loss of board members	Creates a vacancy or vacancies on the Board of Directors	H	H	Active recruitment with parents and community members	Board of Directors
Student injuries	Serious injuries could lead to loss of school facilities	M	H	Proper safety measures are taught and enforced at all times	Entire team, all mentors, Board of Directors
Students accidentally damage school equipment	The school decides that the team can no longer use the equipment that they provide because a student has accidentally damaged the equipment	M	H	Strong relationship with school is built and proper safety procedures are being followed	Entire team, all mentors, Board of Directors
Loss of a teacher sponsor	The team has lost the ability to enter into the school	H	H	Recruitment of multiple teacher sponsors and close relationship being built with school faculty and staff	Head Mentor, Board of Directors, current Teacher Sponsor

Table 2: Financial risk management plan

Terms of Reference

Board of Directors (BOD) – Arm of management in the Power Hawks Robotics, Inc.
Chief Delphi – FIRST resource for FTC and FRC, created by FRC Wings of Fire Team 51.
Edmodo – A school resource in which teachers can talk to students.
FIRST – For Inspiration and Recognition of Science and Technology, the organization that coordinates robotics teams around the world, providing challenges, opportunities, and finances to students.
FLL – FIRST Lego League, the third highest team formation in the FIRST program hierarchy, offered to elementary and middle school age students.
FRC – FIRST Robotics Challenge, the highest team formation in the FIRST program hierarchy, offered to high school age students.
FTC – FIRST Tech Challenge, the second highest team formation in the FIRST program hierarchy, offered to high school age students.
Jr. FLL – Junior FIRST Lego League, the last team formation in the FIRST program hierarchy, offered to elementary school age students.
Junior Varsity (JV) – Refers to the three FTC teams as part of the school club.
Power Hawks Robotics Club, Inc. – Nonprofit group that supports STEM endeavors in Anne Arundel County, Maryland.
Power Hawks Robotics Team – Cocurricular program at South River High School, encompassing the students and FRC Team 1111
Power Hawks Academic Tutoring (PHAT) – Program initiated by the Power Hawks as an academic mentoring and tutoring program at the nearest middle school.
Project Lead the Way (PLTW) – A national program that partners with STEM to teach the ideals of engineering and science to students who may wish to pursue careers in those 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 a cumulative program.
South River High School (SRHS) – Refers to the school the Power Hawks are located.
The Club – Refers to the Power Hawks Robotics Club Incorporated.
The Team - Refers to FIRST FRC Team 1111, a cocurricular program at South River High School.
Varsity – Refers to Team 1111 as the school organization.
Work Breakdown Structure (WBS) – System of organizing tasks into a timeline as to track progress.
Work Task Description (WTD) – Descriptions of tasks that are compiled into the WBS.