

The Technological Terrors

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Robotics Team

TEAM 5438 **BUSINESS PLAN**

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Executive Summary

Mission Statement

The focus of Team 5438 is to promote and provide education in the fields of robotics, engineering, computer science, math, marketing, and team management, while also inspiring students to pursue careers in these professions. We will maintain a positive, supportive, and inclusive work environment, letting all students express their intellect and curiosity, something that is in accordance with the morals and ethics held by our student body and school. Although we are team 5438, we are the first US FIRST Robotics team from Jersey City, a city with a population of 250,000 people. We will create a passionate spirit to build a strong foundation in our rookie year. We will continue to grow and improve year after year, learning from more experienced teams in our region through alliances. We will also mentor and teach future rookie teams in the Jersey City area in order to share our learning.

Team Inception Date





August 20, 2014

Location




Saint Peter's Preparatory School, Room H305

144 Grand Street, Jersey City, New Jersey, 07302

Team Members

-  35 Students (15 seniors); (20 underclassmen)
-  4 School Mentors
-  3 Professional Mentors
-  2 College Student Mentors

Major Supporters





-  **Eastern Millwork, Inc.** - Our primary corporate sponsor, providing professional mentors, workshops, and funding. Their representative, Mr. Michael Mahal, has been supporting our team and giving advice on fabrication and improving the robot. He has been spending much time helping his team.
-  **Beyer, Blinder, Belle Architects and Planners, LLC.** - Provides strategy workshops and mentorship. Antonia Botero, an MIT educated architect and employee of BBB, has been guiding us on the design process and working with documents. She has been donating much of her time into the team, much of her interest in helping the team coming from her experience with FIRST Robotics when she was in high school.
-  **Saint Peter's Preparatory School** - Provides our team with workspace, funds, and support. Various staff members, mainly Fr. Robert O'Hare, have been majorly assisting us with various tasks from fabrication to programming to business. Fr. O'Hare has been

 **Jersey City-** The Tech Terrors is the first US First Robotic team from Jersey City, NJ. We were referred to by our lead sponsor, Eastern Millwork Inc., by the city's Mayor's office. Jersey City has a population of 250,000 citizens comprise of diverse culture and ethnic groups, so being the first group to bring FIRST robotics here is a great honor and responsibility. Over time, we hope to reach out to other Jersey City high schools, such as Hudson Catholic or High Tech High School.

Objectives

Our objective as a rookie team is to not only compete and succeed, but to also create an enduring team structure, budget, and system of operation to ensure the fruition of future generations of team members, all while inspiring our members to further their STEM education and pursue careers in these disciplines.

Keys to Success

-  Effective Communication
-  Team organization and synergy
-  Maintaining a positive attitude and outlook
-  Enjoying the experience and learning

Description of FIRST, FRC Program, and Brief History

FIRST and *FRC*

FIRST is a not-for-profit organization created in 1989 with the mission of inspiring the nation's youth's interest and participation in science and technology. This is achieved by groundbreaking programs that motivate K-12 students to reach beyond their STEM academic studies in the classroom, giving them opportunities to use hands-on experience in working with a team to overcome engineering and programming problems involved in robotics, fund and promote their own products, and gain experience working with professionals in both companies and universities in addition to their school's teachers.

Saint Peter's Prep Robotics Origin

The official FRC Team 5438 began on August 20; the first team meeting of the 2014-2015 school year. They are located at Saint Peter's Preparatory School 144 Grand Street, Jersey City, in a converted computer science turned math classroom on the third floor.

Before it was FRC Team 5438, the "Technological Terrors," was nothing more than a small robotics club founded and run by Bennett Wong and Kyle Smith from 2011 to 2013. After two years of building small autonomous robots from kits, Eastern Millwork, Inc. contacted the club in January 2014. The company is a local, automated custom millwork-engineering firm, and was surprised to learn that there was no team in Jersey City.

The club leaders founded the team with the help of the club's moderator, Fr. Robert O'Hare, S.J., who in addition to being Harvard graduated calculus and robotics teacher, is a Jesuit priest. Thus began a year's work of careful research, planning, and recruitment, all in preparation of the momentous task of creating Jersey City's first robotics team. With difficulties of not

having dedicated space in which to work, a limited budget, and a strict anti-fundraising policy for school clubs, the process of becoming the Tech Terrors was no easy task. With the help of mentors from Eastern Millwork, Stevens Institute of Technology, and Beyer, Blinder, Belle Architects and Planners, the hard work paid off. What had started as a club of two became a team currently comprised of 30 dedicated students, all interested in STEM careers, and all eager to make history at the century old school.

Relationships

The team has made many efforts in educating and retaining team members. Various presentations, discussions, and meetings were held to educate the team. In the process of gathering new members, mentors and leaders held meetings about commitment to the team and the tasks ahead. The team has gone to workshops to learn about different topics, such as Steven's Institute of Technology to learn about robot basics, Eastern Millworks for information about fabrication and workshop safety, and Beyer Blinder Belle for design and creative thinking.

As a student based organization, the role of mentors is limited, yet still imperative if we wish to remain safe, efficient, and successful. As a mentored team, we maintain healthy relationships with our mentors, asking questions, heeding their advice, and thanking them profusely. We celebrate and honor our mentors with the Woody Flowers award application, thank you letters after workshops, respecting their expertise, and being vigilant not to use the time they dedicate to us unproductively.

Team 5438 recognizes the importance of working with and updating our sponsors on the team's progress and the way in which we are utilizing their donations. The team has created a division of students responsible for regularly informing our sponsors of our activities. We maintain open lines of communication with our school administrators who have supported all the team's work.

Summary of Team Growth & Goals

Team Growth

Back in 2012 to early 2014, Team 5438 had been Saint Peter's Prep Robotics Club, with only a handful of dedicated members. After the club leaders decided to move into competitive robotics, the team numbers during its preparation for the *FIRST* competition soared to 27 committed and excited students, most of which were seniors dedicated to making their final year at Prep an amazing one. With the help of the team's mentor, Fr. O'Hare, and the Eastern Millwork engineer staff, the team's mentors now comprise of 3 physics and calculus teachers, 4 students with *FIRST* experience from Steven's Institute of Technology, and a total of 5 professionals in the field of engineering and architecture.

Team Membership

Our team, Technological Terrors, is a newly developed rookie team that has developed within the Jersey City area. Our biggest goal was to have participation within the club itself. The school has never witnessed anything like US First robotics competitions. Our team has witnessed great interest and strives for more participation each day. We have sub-leaders, beside the president and vice president, who will take on responsibilities and work. Our hope is to have sub-groups dedicated to certain aspects of the FRC experience, aspects that include, but aren't limited to, programming, fabrication, business, and strategy. Meeting attendance isn't optional.

Creation of team leaders means that they are responsible for many tasks. A few include website and public relations, programming language, and game strategy. We desire to get families informed and involved in this journey, that is the FIRST Competition. That entails meeting with parents, updating the website so parents and others can see our progress, and reaching out to various local and school run publications to express who we are and what we do.





Future Team Plans

As a rookie team, there is nowhere to go but up in terms of financial growth, new resources from the school, and engagement with mentors, parents, and students. After our inaugural year, in which we plan to have great success, the current leaders of the team plan to have extensive meetings regarding the future. The first key objective for the team is to be given a dedicated work area in the school. During the build season, it became evident that working in an area that was during the school day was a classroom and some afternoon was used as standardized testing space proved to be a great hindrance on productivity and efficiency. Gaining a room for tools, work, and safety precautions is very reasonable, and is projected to be accomplished within the next year.

Over the course of the next three years, Team 5438 will experience a large shift in funding. Instead of relying on grants for registration fees, the largest expense, the team will focus on gaining corporate sponsorship and raising funds by means of fundraising and donations. This entails a massive emphasis and effort on behalf of the marketing team, which will spend large amounts of time talking to local companies, reaching out to Prep alumnus and benefactors, and organizing new means by which we fund raising.

The final area in which major growth is expected is in our outreach to students and their parents. By means of advertising via communication channels within the school, we expect our team membership to increase. With this we will require a larger amount of teachers to help with supervision, technical advice, and presence in administrative capacities. With the numbers of dedicated team members increasing over the next three years, it is understood that the numbers of teachers involved will increase from the current four to about ten. Meetings with potential school staff, constant communication of successes and events created by the team, and conversation between current mentors and teachers will accomplish this.

Long Term Goals

-  To maintain a presence in the community through service
-  To promote STEM interest in the students of Saint Peter's Prep
-  To recruit and train new students of the team
-  To create relationships with engineers, architects, the teachers of Prep, and the parents who are involved

Organizational Structure

Raising Funds

The Technological Terrors plan on fundraising with different approaches. The SPP Robotics Bake Sales in October and November had much success and netted a \$240.00 profit. Tech Terrors had sold hooded sweatshirts, quarter zip sweaters, and key chains were all sold to the team and in the campus store at school. Grants, school provided funds, and alumni donations will also help sustain monetary flow.

Ensuring Proper Usage of Funds

The team has a set allocated budget for the cost of parts, transportation, lodging, meals, etc. Being a rookie team, it is essential that every last cent is spent on necessary items while being cognizant of the fact that money must be set aside for the other various expenses that the team might have. Every team member is aware of the monetary crunch, so improperly handling funds is out of the question. All grants, funds, and donations are used properly along with the team who thoroughly planned out and documents income and expenditures.

Finding and Engaging Sponsors

Although Eastern Millwork and Saint Peter's Prep have been generous in providing monetary sponsorship for the team, additional sponsors are needed. In an effort to gain various organization's support, the management and finance team has created a systematic method in which they research, contact, and provide the teams information, typically in the form of a business plan, to local companies. They then wait for responses, and follow up with contacts in the organization to explore the possibility of relations. Student callers are reminded to speak formally, appropriately, and concisely, in order to paint the team in a positive light while also avoiding wasting the contacts time. If a company is interested, the student will tell the team captains, who will then follow up with the prospective mentors with emails, phone calls, and eventually visits to give an in-person presentation of the team.

Recruiting Team Members/Mentors for Current and Future Seasons

Although they are all rookies, Team 5438 has recruited 27 highly intelligent students and several brilliant mentors. The club received a lot of positive responses and the attraction will be even larger in the team's second year of existence. Eastern Millwork Inc. has been a major support and supplied mentors to improve our progress throughout the year.

Ensuring *FIRST* Principles Remain Core to the Team's Efforts

The Tech Terrors are a united team where we work to find solutions. We seek help from our mentors to discover new possibilities to any predicament. Together, we honor the spirit of friendly competition. The team works together and to supply graciousness and knowledge to everything. We cooperate with each other and help each other. But mainly, we have fun!

SWOT Analysis

S

Strengths

- Dedicated and ambitious students
- Support from school and sponsors
- Dedicated workspace in school
- Location inside Jersey City, and near New York City
- Rookie advantages; FIRST Rookie grant, reputation yet to be established
- Strong relationship with local government

W

Weaknesses

- Lack of experience in FRC
- Sources of finance
- Reliability and trust
- Difficulties in transportation and commute
- School policies restricting fundraising
- Spatial restrictions for workshop due to urban campus

O

Opportunities

- Strategic alliances, partnerships
- Continuous annual flow of new students
- School's desire for STEM education outreach
- Innovation and technology development
- Close proximity to wealthy and charitable organizations

T

Threats

- Loss of alliances with other FRC teams
- Economic instability and price inflation
- Loss of sponsorship
- Not obtaining grant money
- School allocation of funds going elsewhere

Risk Analysis

The risks associated with maintaining a FRC team financially has becoming increasingly evident. As a new team, our sponsors have been very accommodating and generous, but as the years pass, losing sponsorship will become a considerable threat to the team's sustainability. To mitigate the impact an unforeseen drop in funding may have on our operation, plans have already been created in such an event. Keys to mitigation are the risk analysis of each source of income, the creation of back-up funds from the remaining unused income from previous seasons, and a strong base of fund raising resources. Currently, the largest risk the team has is not being awarded the large amount of grants for registration fees we gained this year. With the main writers of the grant application during 2014 graduating, several classes and documents will be created to teach the new rising leaders how to perform these duties to maintain the same level of success.

Even with talented writers, the team will not be offered the same level of support it received from being a rookie team. As the team matures, it will be expected to be more self-sufficient. Risks arise from this, and include a decrease in school contributions to the team. With increasing corporate sponsorship and different priorities for the school, the team may experience limitations and cut backs in its spending limits. To reduce this risk, updated business plans and financial statements are needed to show the schools finance department and benefactors why the team needs funding and how much is required to be successful.

The Team

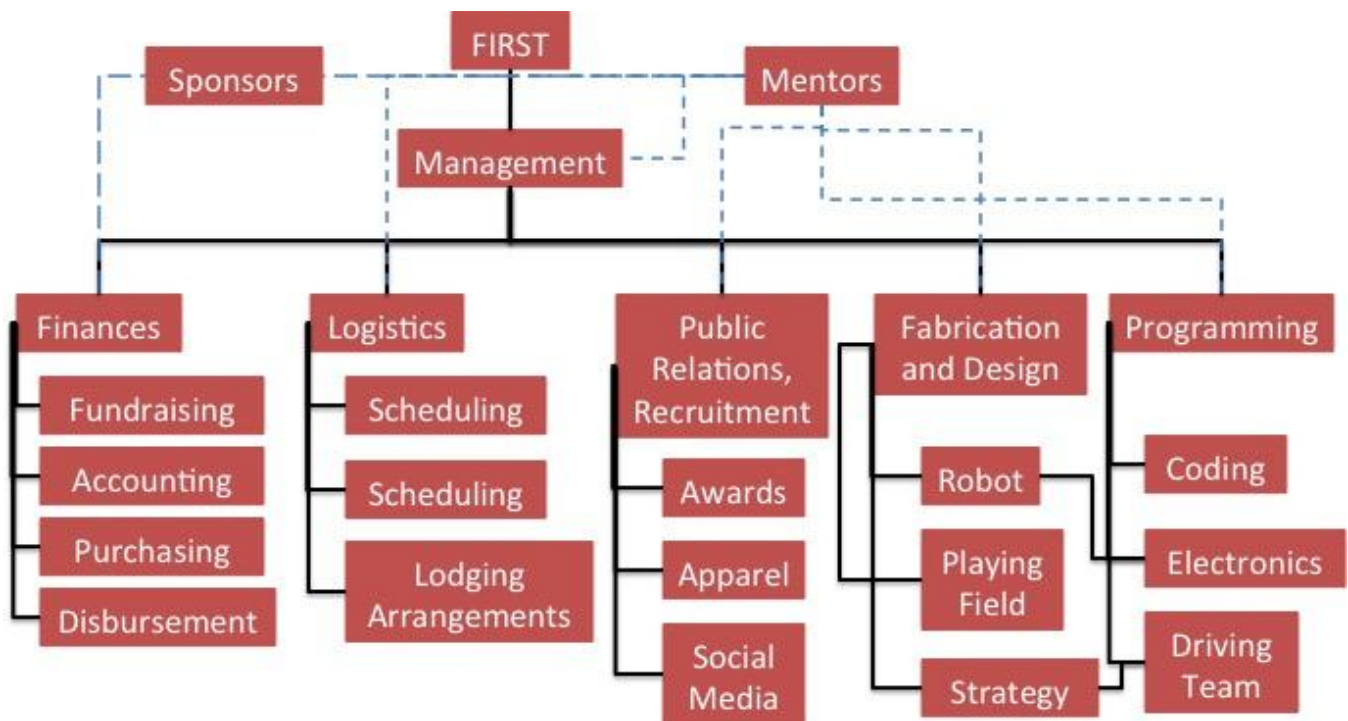
Student Leaders and Roles

Team 5438 is a student-led organization, with adult mentors and school staff assisting and advising team actions and ensuring all members are safe in the workshop. The student leaders and their positions are:

Team Captain: Bennett Wong	Team Captain: Kyle Smith	Secretary: Alex DeMartino
Treasurer: Andrew Febrillet	Technical Division Lead: Shawn Vollaro	Electrical Division Lead: Jonathan Racki
Programming Division Lead: Hunter Novello	CAD Lead: Brian Rojas	Public Relations Director: Christian Herrera

Team Structure

The team is divided into groups and subgroups assigned tasks to ensure efficient coordination of effort. In order to complete the robot within the six-week build period, we have five main groups: finances, logistics, public relations, fabrication and design, and programming. A more detail hierarchical structure of the team is depicted below.



Team Mentors

<u>School Mentors</u>	<u>Professional Mentors</u>	<u>College Mentors</u>
Robert O'Hare S.J.	Michael Mahal	Howard Cohen
Jan Butrym	Antonia Botero	Victoria Thomas
Brian Healy	Heiko Seiling	
Lisa Bui		



Team Finances

Financial Management

The St. Peter's Prep Tech Terrors are involved in various fundraising activities to receive enough money to support the team and sustain it for years to come. The team depends on funds and grants received from different companies and sponsors, concomitant with the earnings from different fundraising activities organized by the team members. The team routinely holds meetings to discuss possible events to bring in funds, such as bake sales, 3D printing workshops, selling team created merchandise, etc. The team will also utilize online crowdsourcing websites, namely Kickstarter.com.

Fundraising Efforts

- 🍪 Bake sales
- 🍪 “Dress down day” for robotics (excuses students from wearing school uniform)
- 🍪 Movie night for Jersey City families (Recommend Big Hero 6)
- 🍪 Technological Terrors apparel
 - Clothing (tee shirts, hoodies, and polo's)
 - Pins and buttons
 - Keychains
- 🍪 Video game competition
- 🍪 Weight lifting competition
- 🍪 Trivia game (provide team stickers and key chains as prizes)



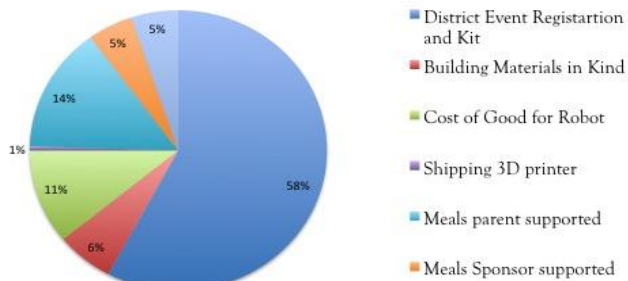
Team Polo shirts, provided by Custom Ink are used for team recognition and fundraising sales

Financial Statements

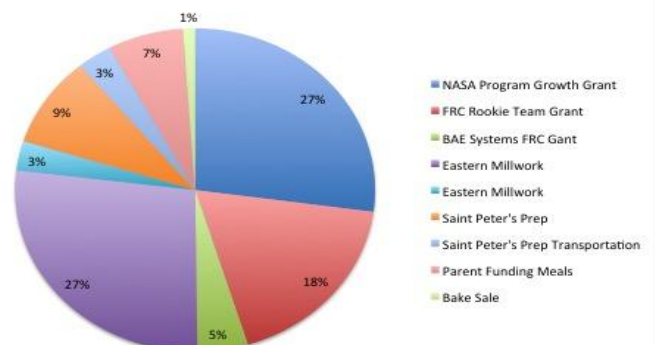
Technological Terrors currently have \$11713 available for the 2015 competition year and have enough available funding to pay for MAR district championships. However, if the team makes the world championships, up to \$22687 of funding will be required. Assuming similar costs in 2015/2016, the Technological Terrors will need to raise \$43850 additional funds next year. It is essential to maintain good relationships with the school, sponsor, and parents

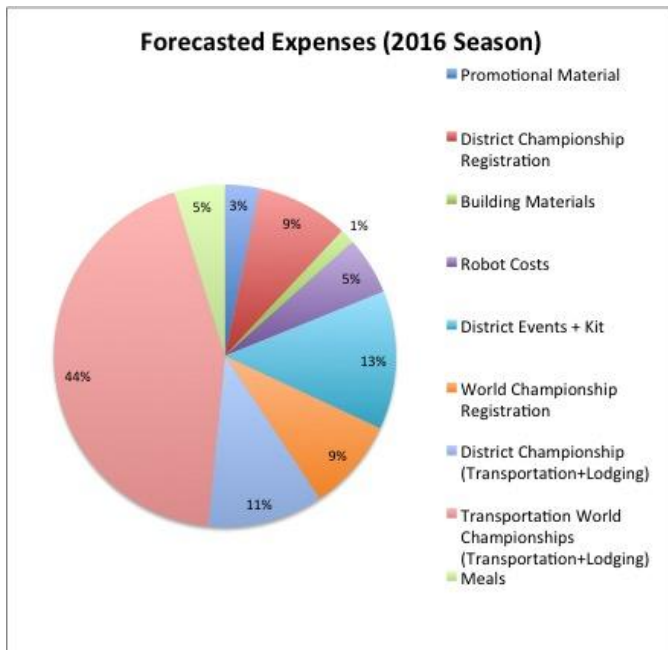
Team 5438 Technological Terrors CASH FLOW STATEMENT FOR 2015 and 2016 COMPETITION YEARS					
ITEM	DESCRIPTION	COMMENTS	2014/ 2015		2015/2016
NASA Program Growth Grant	Covers the Cost of Registration District	Used for 2015 March and April event	6000		
FRC Rookie Team Grant	Covers the Cost of Registration	Used for district championships	4000		2000
EKOCYCLE 3D printer program	Free 3D Printer	Must pay for shipping	0		
BAE Systems FRC Gant	Grant for General Competition Costs	Tools and materials	1000		
Eastern Millwork	Sponsorship	Robot materials	6000		
Eastern Millwork	In Kind support	General building materials	650		
Saint Peter's Prep	Sponsorship	General costs	2000		
Saint Peter's Prep Transportation	Visit to Architectural Firm	Mentor's Company	700		
Parent Funding Meals	Late Night and Weekend Meals	15 meals	1500		
bake Sale	Fund Raiser	Parent supported	240		
TOTAL CASH IN			22090		2000
District Event Registration and Kit			-6000		
Building Materials in Kind			-650		
Cost of Goods Robot			-1132		
Shipping 3D printer			-50		
Meals parent supported			-1500		
Meals Sponsor supported			-514		
Team Shirts			-531		
Total Actual Cash Out			-10377		
Total Current Cash			11713		2000
Promotional Material			-900		-1500
District championship registration			-4000		-4000
Building Materials					-650
Robot Costs			-500		-2500
District Events + Kit					-6000
World Championship Registration			-4000		-4000
Transportation District Championships			-5000		-5000
Transportation World Championships			-20000		-20000
Meals					-2200
Total forecasted expenses			-34400		-45850
Total Forecasted Cash Position			-22687		-43850

Total Actual Expenditures



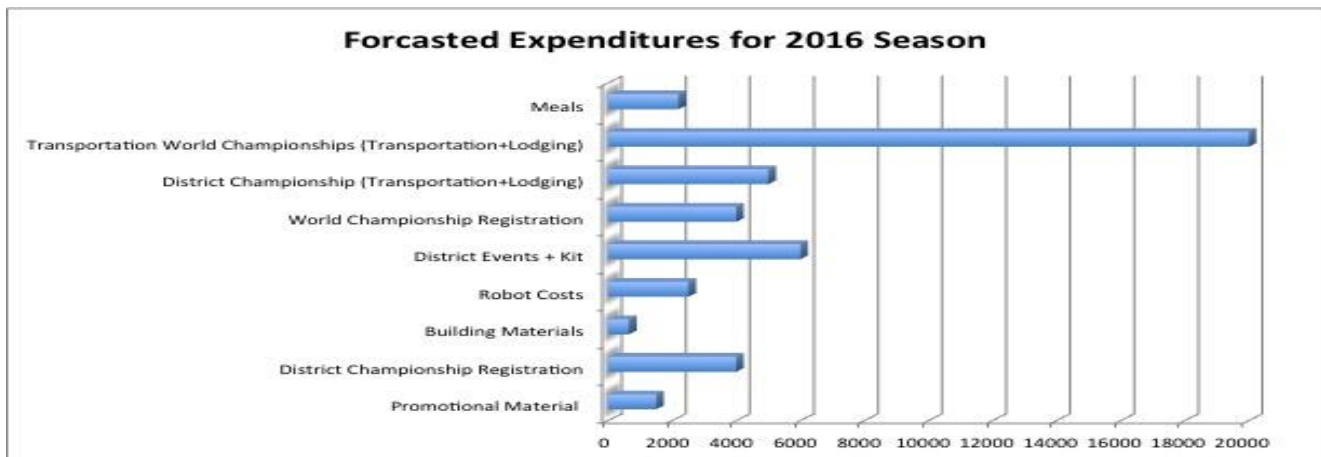
Percent Income by Source





For our 2016 season, the expenses in relation to 2015 will be significantly greater. This is attributed to the greater likelihood of the team going to Saint Louis for World Championships, and the additional events in which Team 5438 plans to compete, such as regional or off-season events. This is illustrated in the chart to the left and graph below, which illustrate the financial statement data from the page above.

To meet these surmountable financial demands, the Tech Terrors will grow their financial division of operation, a project that will be lead by mentor Brian Healy of the Saint Peter's Prep mathematics department, and 2016 CFO Chirayu Shah.



Marketing

General Marketing

The Tech Terrors has been marketing through events, school media, and through discussions with friends and classmates. The Business branch of the team is primarily responsible for this job. The team has been and plans to be featured in school emails, which all students and faculty receive, the school's online newspaper, *The Petroc*, and in local newspaper articles. One of the ways we are obtaining notoriety is through social media such as Instagram, Facebook, Twitter, LinkedIn, Skype, Whatsapp, and more. In addition to this, the team will distribute pamphlets and brochures. The team has also created a division of students responsible for updating our website.

Deployment of Resources

Team 5438 will introduce itself to the community in many ways. Team members will go to various schools and groups to present the robot and showcase its abilities. We are encouraging STEM values to be embodied by future team members. Students will discuss different aspects of the process involved in designing and building robots. The Technological Terrors will use the robot's impressive capabilities to promote recycling. Our audience will witness the team's display of Gracious Professionalism in all of our community events, and will remember and retell this core value of the competition to other interested parties. We also promote our team through various online social media outlets and team merchandise sold at our campus store. Promoting the team and robot inspires the people we encounter to support us and become involved in our multifaceted exploits. FIRST provides the members of our team with hands on experience of working with peers to meet a deadline. Throughout this process, all students have developed new skill in problem solving, critical thinking, and time management. The competition also provides an opportunity for students to not only develop fabrication and programming skills, but also marketing and raise funds.

Community Participation and outreach

The Tech Terrors will work with the community to give back and spread the message of FIRST. We will help the local schools and science programs to assist in educating children in science, technology, engineering, and math. The events in which we plan to participate are included in the below table.

St. Peter's Prep Fashion Show	School-wide assemblies	Science Fairs
Biannual pep rallies	Educational programs and workshops with local schools	Liberty Science Center

Competitions

Competition	Date	Location	Description
MAR FIRST Mt. Olive District Competition	March 6-8, 2015	Mt. Olive High School	1 st qualifying competition for championships
MAR FIRST New Brunswick District Competition	April 4-6 2015	Bridgewater-Raritan High School	2 nd qualifying competition for championships
MAR Robotics Championship	April 8-11, 2015	Stabler Arena, Lehigh University	Must qualify for this event in the districts. If successful here, we move to national championships
FRC World Championship	April 22-25, 2015	Union Station, St. Louis, MO	The highest level of competition offered by FIRST for FRC teams at which they compete. This is the ultimate goal for our team.

Levels of Sponsorship and Benefits

For Information regarding monetary contribution, we have constructed a table of the levels of sponsorship at which organizations or individuals can donate, in addition to the benefits associated with that level.

Level	Contribution
Wireless Sponsor	\$5,000 +
Gamma Sponsor	\$ 2,500 - \$4,999
Infrared Sponsor	\$1,000 - \$2,499
Radio Sponsor	\$500 - \$999
Tech-Lover Sponsor	\$250-\$499
Connected Sponsor	\$50-\$249
Friend of the Team	Below \$50

* Unless contribution is of a value greater than \$500, in which case level of sponsorship will match contributions monetary value.

Sponsorship Benefits

Sponsorship Level	Robot Demonstration at Company	Present a Video (30-60 sec) at Competition	Logo On Robot	Plaque of Recognition	Name Announced at Competition	Receive a Team T-shirt	Recognition on Website	Thank You Letter
Connected	✓	✓	✓	✓	✓	✓	✓	✓
Gamma		✓	✓	✓	✓	✓	✓	✓
Infrared			✓	✓	✓	✓	✓	✓
Radio					✓	✓	✓	✓
Tech-Lover					✓	✓	✓	✓
Connected						✓	✓	✓
Friend							✓	✓

Material Donations

If you would prefer to donate material items, the list on the next page has been compiled of parts and tools that would greatly augment our ability to build a superior robot, and allow use freedom to express our creativity and workmanship in a better capacity. If you have anything you would like to donate to the Tech Terrors, please consult the contact page at the end of this document. Level of sponsorship for donation is decided by the market value of what is donated, and the price range in which said item belongs in accordance with our levels of contribution (please refer to the next page).

<u>Tool Category</u>					
Saws:	Circular Saw (1)	Hack Saw (3)	Bandsaw (1)	Reciprocating saw (1)	CNC Machine
Drills:	Drill Press (1)	Power Drill corded (2)	Power Drill cordless (1)	Impact Drivers (1)	Drill Bits
Wires:	Soldering Irons and Solder (5)	Multi Gauge Wires	Spade and or Ring Wire Connectors	Heat Shrink Wire Wrap	Assorted Types of Connectors
Raw Materials:	Aluminum	Steel	Plywood	Plastics (PVC, Acrylic, Polycarbonate)	Plexiglass
Miscellaneous:	Educational Books/ Work Kits	Belt Sander (1)	Cabinets/ Work Benches	Goggles/Work Gloves (PPE)	Paint and Brushes

Conclusion

As a rookie team, we undoubtedly will face adversity and learning curves that challenge our ability to overcome problems, work in teams, and who we are as individuals. There has never been any team in our school's century old history of the likes of FRC, and it will certainly be a unique and momentous undertaking to reach the FIRST world championship level. In the presence of this challenge, we are confident that the intellect, dedication, and passion embodied by each of our students will pull through, not only putting St. Peter's Prep, but also Jersey City on the map as a city recognized nationally as a center of technical innovation and interest. This can only be accomplished, however, with the support of our community, including the school, local businesses, and the City's government, and given the historical and present hard work and innovation for which this City is known, it's not a matter of whether we will win nationally; it's when.



The Tech Terrors at City Hall in their hometown, Jersey City, photographed here with Mayor Steven Fulop (center)

Team Contact Information

Website: www.robotics.spprep.org

Team Email: team5438@spprep.org

Facebook: Technological Terrors

Instagram: @team5438

Main Contacts:



Fr. Robert O'Hare, Team mentor

- Email: Oharer@spprep.org
- Phone: 201-547-2342



Mr. Jan Butrym, Team mentor

- Email: Butrym@spprep.org
- Phone: 201-547-2353



Kyle Smith, Team Captain

- Email: Smithk@students.spprep.org



Bennett Wong, Team Captain

- Email: Wongb@students.spprep.org

Team Meeting Information

Location: Saint Peter's Prep High School

Dates & Times: Please contact us at for more information between 3:00pm-5:00pm on weekdays

Donation or Sponsorship Information

Please make checks made payable to: Saint Peter's Preparatory School Robotics

Donations made payable to the Tech Terrors are tax deductible; please contact the team for more information

Mailing Address:

Saint Peter's Prep

144 Grand Street

Jersey City, NJ 07302

Phone: 201-547-6400 Fax: 201-547-2341

Federal Tax ID Number: 22-1527060