

MOE, Miracles of Engineering

FTC Team 365

2018-19 Business Plan



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1.0 Executive Summary

1.1 Team Mission Statement

The mission of Miracles of Engineering (MOE) 365 First Tech Challenge (FTC) is to proudly represent For the Inspiration and Recognition and Science and Technology (FIRST) in the community by:

- Competing with the utmost sportsmanship to our partners, competitors, and all event personnel.
- Exhibiting the core values of FIRST with respect to “Coopertition” and Gracious Professionalism.
- Encouraging children to involve themselves in STEM related activities in order to understand the importance of such skills that will increase their expanse of knowledge as well as develop important characteristics.
- Building a cohesive team based on the respect, communication, creativity, and commitment of individual members.

1.2 FIRST Description

The FIRST program strives to inspire young people so they can become leaders in the scientific and technological industry, immersing them in stimulating programs lead by mentors that build STEM skills, inspire innovation, and grow life capabilities including but not limited to self-confidence, communication, and leadership.

Originally, FIRST was founded in 1989 in Manchester, New Hampshire, so young people could be inspired to participate in science and technology related activities. Classified as a 501 (c) (3), FIRST is a nonprofit public charity that aids in designing accessible and innovative programs motivating young people to seek out opportunities in the STEM field while also building important life skills.

(The original descriptions that these words were based off of can be found on the FIRST Website here: <https://www.firstinspires.org/about/vision-and-mission>)

1.3 Program Summary

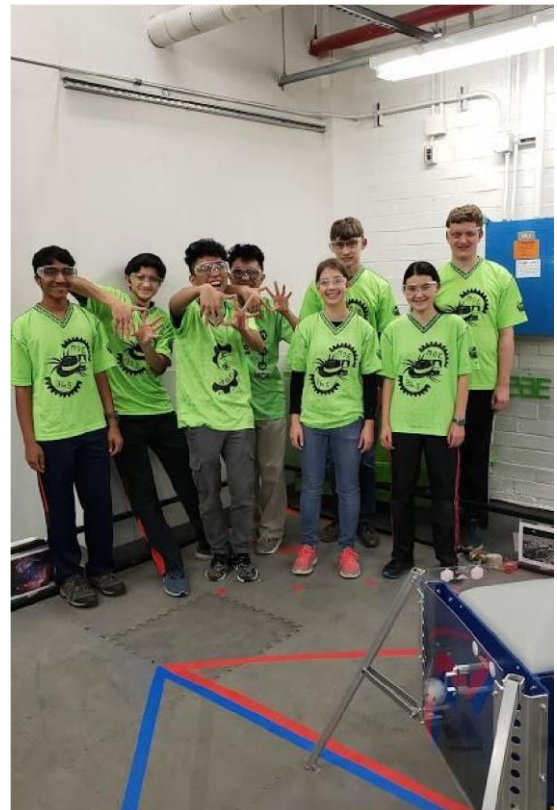
The FIRST Tech Challenge consists of teams of up to 15 team members from grades 7-12 competing in a head-to-head and alliance configuration. These teams are challenged to program, design, build, and operate robots alongside adult coaches and mentors. Not only do students develop STEM skills and practice engineering principles, they are also taught the importance of hard work, innovation, and sharing ideas. The robot kit is reusable every year and can be programmed using many different languages. Teams are also required to raise funds, design and market their team brand, and do community outreach, and exemplars can win awards.

1.4 Team Summary

MOE 365 FTC is a community team based in Wilmington, Delaware. The team designs, builds, and programs robots to participate in competitions released annually by FIRST. MOE 365 has proudly competed at the FTC World Championship four times.

1.5 Team Structure

The team consists of many mentors with engineering and science or technology-related backgrounds who manage the team as well as teach and coach the students on key engineering, designing, programming, and building concepts. Some of the graduated students also come to assist the team and share their knowledge and their past experiences. The members of the team



are responsible for managing the team, determining the roles, and completing various non-technical tasks such as fundraising and planning the season with a project timeline.

Sub-Team Structures

- Designing (Non-Technical)
 - Brainstorms realistic ideas to construct the robot
 - E.g. designing the mechanical parts on the robot to the chassis and placement of the battery, phone, etc.
 - Drawings used during the building process are also in the notebook and the judging presentations to demonstrate the function of mechanical pieces and why it was chosen
- Judging Presentations (Non-Technical)
 - Prepares 5-10 minute presentation given to the judges during competitions
 - Sub-team's job is to ensure all notable events, decisions, and values of MOE FTC 365 are conveyed clearly to the judges at the event
- Drive Team (Technical)
 - Responsible for practicing and understanding functions of robot so during competitions and meets the team can do their best
 - Driving is crucial: it is an opportunity to see all the hard work pay off
- Programming (Technical)
 - Codes for the abilities of the robot while also following the game rules
 - Converts ideas of human rules and strategies into a language the robot can understand
 - MOE FTC 365 uses Java and Android Studio

- Communicate with other technical groups to ensure that the requirements of the robot are implemented

- Building (Technical)

Although building is one major sub team, there are multiple components that need to be constructed for the robot, thus splitting the building team further into smaller groups: ○

The chassis of the robot is built differently every year depending on game requirements; CAD software is used to visualize the build

- As the goals of the game vary from year to year, MOE will have teams building different parts for the robot depending on the tasks to be completed. CAD will be used help design the attachments.
 - e.g. This year MOE FTC 365 has teams developing the hanging/dropping mechanism, the harvesting mechanism, and the dispensing mechanism.

1.6 Team Relationships

MOE FTC has had the valuable opportunity of being supported by several FIRST FTC sponsors this year through grants and fundraising. These sponsors have provided multiple forms of support including:

- MOE FTC uses this financial support for team expenses. Furthermore, the team makes a contribution to the FIRST program, a worthy STEM based organization.
- DuPont provides facilities including a lab, conference and workshop space to our team.

The team gives back to the sponsors by emailing all of them at the end of each season to show our appreciation for their support. Additionally, MOE FTC has held multiple robotics demonstrations and events to support sponsor causes.

MOE FTC sponsors include:



2.0 Team Impact and Goals

2.1 Team Goals

MOE 365 FTC continuously aspires to improve and develop as a team, and setting goals is one of the most important steps to take in order to move forward. The team set goals based on the SMART Goals Method where the goals should be:

- **Specific:** The goal should be descriptive and clear in regard to exactly what is being achieved as well as the reasoning behind creating this goal. Knowing what the goal truly entails will help in increasing the chances of success.
- **Measurable:** This criterion ensures that the completion of the goal will be recognized using elements or resources that can be measured. By setting a time constricted goal and defining the physical manifestations, the achiever can actively see change with concrete evidence.
- **Attainable:** The goal should be proportional to the amount of time and effort the goal setter is willing to commit. If the available time does not account for what the goal is asking for, then it will be impossible to achieve. This step helps in weighing the costs and benefits to setting a realistic goal.
- **Relevant:** The goal must be related to the area that requires improvement. Addressing the relevance behind the goal, or why the goal is being achieved, will help motivate the achiever to complete the goal because they know the reason behind the goal.

- Timely: Instilling deadlines in a realistic and flexible timeline will ease the process in achieving the goal. Planning with time limits can help the goals turn into a reality by inducing action.

The team chose to use this method because SMART goal setting brings structure and the ability to track progress into goals and objectives. SMART goal setting does not allow vague resolutions, and instead creates a process with verifiable paths towards a definitive objective, clear milestones, and an estimation of how attainable the goal is.

Overall, SMART goal setting can help evaluate the objectives, creates transparency, and allows for communication throughout a team. This method clarifies why the goals exist in the first place and the criteria the goals will conform to.

- Two outreaches a Month (Average) from the end of last season to the end of this season
 - Tend to do more outreaches in the summer, so a monthly goal is a bit difficult
 - We have to keep searching for them, but if we're well known, people can come to us
 - We need more people to do outreaches
- To increase relationships within the community and spread the FIRST program
 - Help expose STEM opportunities to underserved communities
- Procure two new sponsors this season
 - Increase relationships with the professional community
 - Gain sponsorship money to support the team
 - Local ties to smaller, Delaware organizations
 - Tiered Reward System
 - i.e. Patreon – the more money given, the higher the benefit for the organization

- Everyone must know their team role at meetings, competitions, and outreaches after the first qualifier and onwards
 - Each team member must contribute to the success of the team – knowing your team role will help maintain a positive and inclusive team environment as well as increasing efficiency
- Nominated for a judged award in 75% of our competitions and win a judged award at 50% of our competition
 - Ensures that we have a focus that is outside just our robot
 - Demonstrates consistent excellence in all fields

2.2 Team Impact and Outreach

MOE 365 FTC prioritizes the spreading the learning and passion for STEM based activities to local schools and youth organizations. Aligning with the goals of FIRST to immerse students and the community in STEM related activities, the team regularly seeks out opportunities and events that can help spread the message. Some of the STEM based demonstrations, seminars and outreach events in the community include but are not limited to:

- Mentored Vex IQ Robotics team at the Brandywine Hundred Library
- Showcased Robot at Dover Public Library for the Dover STEM Maker Fest
- Demonstrated robots to underserved elementary school students to STEM at the Gravity Festival
- Mentored teams at the Delaware Museum of Natural History
- Assisted the DigiGirlz program by creating Minibots for them
- Demonstrated during Chemistry Week at The Independence School in Newark, DE



- Represented our team at the JP Morgan Generation Tech Event
- Demonstrated our robot at the First Responders event
- Showcased our current and past competition robots as well as outreach robots in an underserved Wilmington area at Kingswood Community Center
- Presented at the Hagley Makers' Fest
- Demonstrated our competition robot at FLL qualifiers to show FLL students next step in FIRST progression to FTC
- Supported Juliette's Revenge 14851 at the Girl Scout Outreach event through showing our competition robot and widely popular Batter Bot
- Demonstrated STEM qualities through our robots at Philly Maker Faire along with fellow Delaware FTC team Razor Steel 12880

MOE 365 FTC is also dedicated to bringing the FIRST FTC Robotics community together by doing the following:

- Organized and hosted 6th annual Delaware brainstorming session to discuss key game strategies and build/design processes.
- Arranging organized scrimmage/workshops to assist other Delaware based FTC teams.
- Welcoming other newer teams to join meetings in order to learn about important processes and experiences from FTC.
- Encouraging students and groups to become involved in the FIRST FTC program and providing them the necessary resources, both information and tools, to start a team.
- Conducted remote programming/Android set up workshops across the country.
- Building a viewership and following of over 1600 Twitter users in order to promote FIRST and STEM based activities across the community.

2.3 Team Growth

MOE FTC 365 is constantly growing every year, proving the team to be sustainable and impactful. Current members of the team spread the word of the FTC program to their and peers, allowing interested students to have the opportunity of attending a few meetings and deciding whether they are interested in the program. Not only is the team physically growing in numbers, MOE's consistent participation in the community has formed annually occurring outreach programs as well as gaining additional outreach opportunities from new organizations. Additionally, MOE FTC 365 has developed a more thorough and efficient system of communication between the members and mentors. Using a week to week agenda with the current and completed tasks of different sub teams ensures that everyone on the team has an understanding of where others stand in their separate processes, thus preventing any confusion and reducing the possibility of mistakes due to miscommunication. These changes resulted in many positives; the team has a significantly improved structure which has aided in elevating the team's productivity and success. The team's increase in efficiency has also resulted in more concise and simpler solutions to completing difficult tasks.

3.0 Sustainability

3.1 Future Plans

MOE FTC 365 takes pride in its actions, and in order to ensure a continuous incline of progress the team plans to expand further in its work both in the FIRST program and out in the community.

- MOE FTC 365 is dedicated to building long term relationships with the sponsors by actively engaging them through the season. The team will continue to represent the sponsors and participate in events related to the sponsor in order to give thanks for all they have done for MOE.
- The team recruits new members from various schools and homeschool organizations, constantly looking to expand the team to interested students. Not only does this benefit

the team itself in gaining more members to help, it spreads the knowledge and importance of STEM to new people.

- Along with the team's priority of communicating the importance of STEM, MOE 365 FTC is a team that is helpful and resourceful to the FIRST community. This ranges from providing information for newer teams so they can take their first step or sharing ideas for the season with other teams, and it is an important characteristic for the team to develop and expand upon.
- It is important for MOE FTC 365 to give back to the local community, participating in outreaches that can inspire other students to be involved in STEM related activities. The team hopes to educate younger children on the importance of STEM and possibly help them to become leaders in the industry, but first and foremost to help them find passion and interest in the subject itself.

4.0 Finances

4.1 Financial Statement

MOE FTC's budget is managed through First State Robotics, covering various expenses such as parts, team shirts, and event registrations. The approximate budget is in the proximity of \$10,000, excluding travel and contingent expenses from additional registration which occur if the team qualifies for World Championships. The parents of the members pay the vast majority of team travel expenses. The team's working facilities are provided by DuPont, and MOE FTC is infinitely grateful that the company provides full access to a workshop and tools as well as conference rooms for non-technical discussions.

MOE's strategy of fundraising is to maintain strong relationships with our current sponsors, while forging new connections to local businesses in area.

Our forecasted budget for 2018-2019 is summarized below:

INCOME	AMOUNT (\$)
Contributors	
Boeing Co Contributions	
Corteva	5000
Labware	5000
Volunteer Grants - Boeing	2000
Fundraising Income	
Horse Tickets and Student Fees	1900
Total Forecasted Income	13900

EXPENSES	AMOUNT (\$)
Facilities and Equipment	
Equip Rental and Maintenance	2260
Student jersey	600
Program Expenses	
Competition Expense	350
Electrical	2000
Event Registration Fees	550
Food Budget	130
Mechanical	3500
Programming & Software	100
Robot Competition Expenses	400
Spirit	130
Team Activities	350
Team Outreach	150
Total Forecasted Expenses	10,520

5.0 Resources

5.1 FIRST Links

- FIRST Website: <http://www.usfirst.org>
- FIRST Tech Challenge Website: <http://www.usfirst.org/roboticsprograms/ftc>
- FTC in Delaware: <http://www.delawareftc.org>

5.2 Team Links

- YouTube Channel: <https://www.youtube.com/user/moe365ftc>
- Facebook: <https://www.facebook.com/MOEFTC?fref=ts>
- Twitter: <https://twitter.com/MOE365FTC>