

# FRC Team Member Special Projects Proposal

## Outline

"The varsity Sport for the Mind," FRC combines the excitement of sport with the rigors of science and technology. Under strict rules, limited resources, and time limits, teams of 25 students or more are challenged to raise funds, design a team "brand," hone teamwork skills, and build and program robots to perform prescribed tasks against a field of competitors.

The FIRST Robotics Competition involves teams of mentors (corporate employees, teachers, or college students) and high school students who collaborate to design and build a robot in six weeks. This robot is designed to play a game, which is designated by FIRST and changes from year to year.

The FIRST Robotics Competition is an international high school robotics competition organized by FIRST (For Inspiration and Recognition of Science and Technology). Each year, teams of high school students compete to build robots weighing up to 120 pounds (54 kg), not including battery and bumpers, that can complete a task, which changes every year. While teams are given a standard set of parts, they are also allowed a budget and encouraged to buy or make specialized parts as long as they conform to FIRST safety rules. Game details are revealed at the beginning of January and the teams are given six weeks to construct a competitive robot, that can operate autonomously as well as when guided by wireless controls, to accomplish the game's tasks.

Teams can be active for the entire year. Many work in community outreach, business planning and technical challenges.

## Hours expected to complete the project

Because of the essence of the program, hours can differ. For a high majority of teams, every student will contribute over 125 hours each.

Hours can differ from 125 - 350 depending on the student's role, their dedication and the team's schedule.

## Method

FRC teams follow a general procedure every year. Small adjustments are made on every team for varying reasons, but most will follow this method:

### Pre-Build (Off-Season) Activities

Before the official build season, teams will make preparations. Funding, off-season events, community outreach, sub-team training, prototypes and much more is all done before the build season. Some teams spend even more time outside of build season. Many important non-technical skills are learnt during the off-season.

### Build Season

During the build season, the six weeks following the kickoff, the teams begin to design a robot that is able to play the game, essentially from scratch. Team members typically spend the time designing strategies to play the game, drawing up ideas for robot parts, using Computer Aided Design to prototype, working with size and weight constraints, and finally, building and assembling their robot. Other challenges include gaining driver experience, building the electronics for the robot, and software development. After the

build season has ended (usually the 3rd full week of February), teams must stop work on their robot before transporting it to the location of their first competition.

During build season, students organize their time and resources to complete a very complex task in a short amount of time. They learn technical skills like CAD, fabrication, programming, electronics and strategy. Many students go out of their way to complete unrequired challenges just to gain competitive advantages.

### **Competitions**

Most FIRST regional events take place between Thursday and Saturday in a week in March. Thursday is typically a practice day where matches take place but do not count towards final standings. All day Friday and on Saturday morning, teams participate in qualifying matches. On Saturday afternoon, after the qualification matches have ended, the top eight ranked teams will pick partners from any team ranked below them, and the resulting alliances will compete to be regional winner. The top teams pick their partners starting with the top-ranked team, proceeding to the 8th ranked team, then back from the 8th team to the 1st team again. The alliances picked this way then proceed into elimination rounds, set up into quarterfinals, semifinals, and finals. Each quarterfinal, semifinal, and final is determined by a best-of-3 matchup between the two alliances. All three teams in an alliance that wins a regional earns a reserved spot at the championship event, which in 2011 to 2015, is held in St. Louis, Missouri.

During competitions, teams have a “pit” in which they do between-game repairs and enhancements. There is also a subset of teams who will watch other teams and scout their competition. This allows students to learn on-the-fly strategy and design, as well as thinking on their feet in-game. Drivers of the robot deal with a variety of input and have to make complex decisions in 2-3 minutes.

### **Expected Result**

FRC Teams are expected to design and build one robot that can compete in FRC competitions. This robot will undoubtedly complete a complex task using sophisticated equipment and software.

### **Evaluation Procedures**

The student will be evaluated on the proceeding logs of their build season and competition experience.

### **Expected Completion Date**

The official date that teams will be considered complete is May 1st.

### **Supervising teacher**

Teacher's Name: \_\_\_\_\_

**Build Season Log**

*Make a weekly log of what you did during build season*

**Week 1**

Progress:

**Week 2**

Progress:

**Week 3**

Progress:

**Week 4**

Progress:

**Week 5**

Progress:

**Week 6**

Progress:

**Competition Log**

Your performance:

How did pit stops work:

Things you could improve on:

Your role in competitions: