KineticKnights

R 4 R

TEAM 781 PRESENTS:

ROBOTICS 4 ROOKIES

team781.com

You're New! Welcome!

So you're new to *FIRST*®? That is awesome! Trust us: You are making one of the biggest and most important decisions of your life. Joining *FIRST* Robotics Competition (FRC) will be one of those things that you look back on and say: *Remember that? That's what made me who I am today.*

Whether you're a rookie team or a rookie on your team, this handbook will tell you exactly what you need to know before you jump in. This guide will teach you all you need to know about *FIRST*: the competition; the jobs you can do on a team and what they entail; and where this can lead you in the future.

Are you ready? Of course you are! Let's get started, shall we?

What is FIRST*?*

This is a popular question; the one that everybody asks. Most importantly, this is the question that will solidify exactly what you can expect. *FIRST* (**F**or **I**nspiration and **R**ecognition of **S**cience and **T**echnology) is a robotics program for youth of all ages. It was designed by Dean Kamen to inspire young people's interest and participation in STEM (**S**cience, **T**echnology, **E**ngineering and **M**athematics). *FIRST* was formed to teach youth all around the world about the importance of science and technology, as well as to demonstrate the fun you can have with them.

FIRST strives to create a world where young people dream of becoming science and technology leaders. However, *FIRST*'s mission is not just to spark interest in youth, but to do something much greater. By greater, we mean *huge*. And by huge, we mean on a *societal* scale. *FIRST* envisions that in the near future, we will have changed the culture of our society by helping science and technology become celebrated.

Progression of Programs

The *FIRST* Robotics Program is separated into four main categories:

- Junior *FIRST*® LEGO League (Jr. FLL)
- *FIRST*® LEGO® League (FLL)
- *FIRST*® Tech Challenge (FTC)
- *FIRST*® Robotics Competition (FRC)

Junior* FIRST® *LEGO® League – Grades K-3

Junior *FIRST* LEGO League (Jr. FLL) is a program designed for children aged 6-9. Students build a sculpture out of LEGO to represent an idea that solves real-world problems. This program is designed to capture the interests of younger students and direct it toward science and technology.

FIRST® *LEGO® League* – Grades 4-8

FIRST LEGO League (FLL) is an interactive engineering challenge designed for younger students. The competition is open to Gr. 4-8 students and requires teams to design and build a LEGO MindStorms robot to complete the given task.

FIRST® *Tech Challenge* – Grades 9-12

FIRST Tech Challenge (FTC) is for students who want a more competitive feel to robotics tournaments, competing head to head with a sport replicated scenario. In FTC, teams are allowed to reuse the Kit of Parts year after year, which makes FTC more affordable. Unlike FRC, *FIRST* Tech Challenge has a maximum of 10 members per team.

FIRST® *Robotics Competition* – Grades 9-12

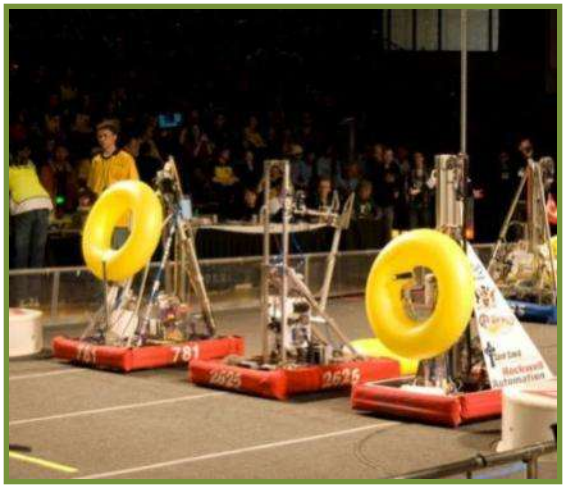
The *FIRST* Robotics Competition (FRC) is a competition that challenges high school students to design and build their own innovative, creative, and fully functional robots. With the help of knowledgeable mentors, students have only six weeks to construct a robot based on the year's game challenge.

At the beginning of January, all teams around the world are introduced to that year's game challenge and game field. Teams are issued a standard Kit of Parts (KOP) as well as the rules for the game. In the six weeks that follow, the team must build a robot to complete the challenge.

After the build season, teams may enter to compete in regional competitions with the hope of qualifying for the *FIRST* World Championship. Teams cheer on their robots and compete to win both technical and nontechnical awards.

Red Alliance vs. Blue Alliance

In FRC, it is a competition between two alliances: the Red Alliance and Blue Alliance. Each alliance consists of three randomly selected teams during qualification matches. Elimination matches are different, but we'll get to that next. Each match contains two alliances, as mentioned before, and the colour of the bumper on the robot indicates which alliance the team is on.



Qualification Matches

The first part of every tournament is the qualification matches. They consist of randomly selected teams on temporary alliances to show the other teams what they can do. Teams are ranked based on their performance during the qualification matches. Even though the alliances in the qualification matches are constantly changing, we are able to rank teams based on whether they win or lose, their autonomous score, the amount of points their robot scores, and other factors. You may see a lot of teams with clipboards and laptops. These people will be examining other teams to decide which teams they will pick during alliance selections for the elimination round.

Alliance Selections

After qualification matches are over, alliance selections begin to determine the alliances for the elimination matches. Here's how it works: The team with the highest total of qualification points after the qualification matches becomes the first alliance captain. The highest "seeded" alliance captain gets the first opportunity to request another team to permanently join their alliance for elimination matches. If a team is offered to join an alliance, they have two options: They can either accept the offer or decline it. If the team accepts the offer, they will be on the alliance for the elimination rounds. If, however, they decline the offer, they cannot receive an offer from another team. If this team is its own alliance's captain, it can still request other teams to join its alliance. This process continues from the #1 alliance all the way down to the #8 alliance. Once each alliance has two teams, they can select their third team. This time, the #8 alliance gets to choose first. This process continues until each alliance is complete with three teams, with the #1 alliance choosing last.

Let the Eliminations Begin!

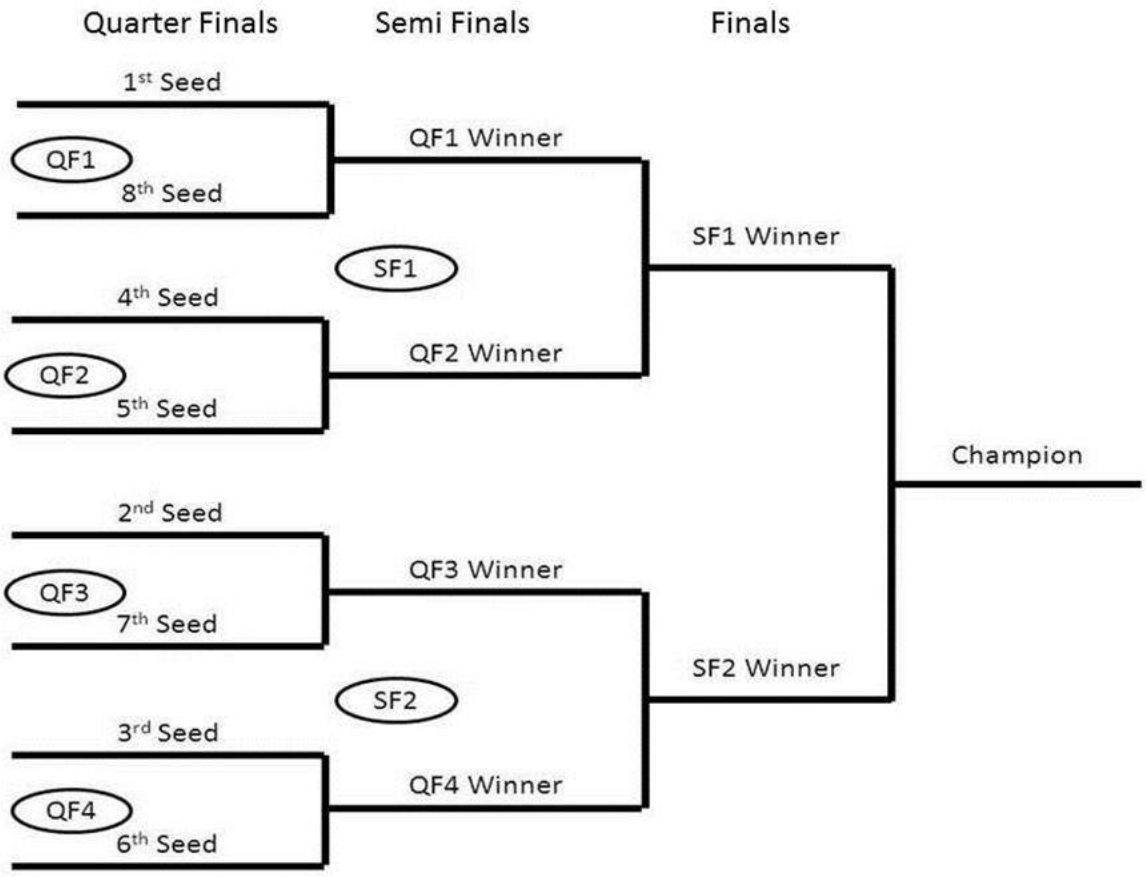
Here's how the elimination matches are set up at Regional Competitions:

- Alliance 1 vs. Alliance 8
- Alliance 2 vs. Alliance 7
- Alliance 3 vs. Alliance 6
- Alliance 4 vs. Alliance 5

The alliance that wins two out of three rounds moves on to the next stage of the competition. The losing alliance will be eliminated. There are three stages of elimination matches:

- Quarterfinals
- Semifinals
- Finals

Each time an alliance eliminates its opposing alliance, it moves on to the next round. If the alliance wins the finals, they win the entire competition. If the particular competition is a regional event, the alliance will earn the right to attend the World Championships.



Eliminations Map derived from US*FIRST*.ORG and the FRC 2013 Game Manual.

Awards

The *FIRST* Robotics Competition has a large variety of ways teams can be recognized for their excellence both on and off the playing field. Here are the awards for the 2013 season:

Technical Awards

Descriptions are derived from the *FIRST* Robotics Competition Manual 2013.

Photo derived from *FIRST* Robotics Canada

Creativity Award: Celebrates creative design, in process, execution, or via a creative or unique strategy of play. It is focused on a feature or features of the machine or development process.

Excellence in Engineering Award: Celebrates an advantageous machine feature(s). This award recognizes any aspect of engineering elegance that reinforces the principles of *FIRST*.

Highest Rookie Seed Award: Celebrates the highest-seeded rookie team of the qualification rounds.

Industrial Design Award: Celebrates form and function in an efficiently designed machine that effectively addresses the game challenge.

Industrial Safety Award: Celebrates the team that progresses beyond safety fundamentals by using innovative ways to eliminate or protect against hazards. The winning team consistently demonstrates excellence in industrial safety performance that shines throughout the competition from unbagging to re-pack.

Innovation in Control Award: Celebrates an innovative control system or application of control components (electrical, mechanical or software) to provide unique machine functions.

Quality Award: Celebrates machine robustness and concept in fabrication.

Finalist Award (Regional/District/Championship): Celebrates the alliance that makes it to the final match of the competition.

Winner Award (Regional/District/Championship): Celebrates the alliance that wins the final match of the competition.

Non-Technical Awards

Entrepreneurship Award: Celebrates the entrepreneurial spirit and recognizes a team which has developed a comprehensive business plan in order to define, manage, and achieve team objectives. The winning team displays entrepreneurial enthusiasm and the vital business skills to ensure a self-sustaining program.

***FIRST* Dean's List Award:** Celebrates outstanding student leader whose passion for and effectiveness at attaining *FIRST* ideals is exemplary.

***FIRST* Future Innovator Award:** Celebrates innovation and intellectual property creation inspired by the *FIRST* season experience.

Founder's Award (Championship only): *FIRST* presents this award to honor an organization or individual that has contributed significantly to the growth of *FIRST*.

Gracious Professionalism Award: Celebrates outstanding sportsmanship and continuous Gracious Professionalism in the heat of competition, both on and off the playing field.

Imagery Award: Celebrates attractiveness in engineering and outstanding visual aesthetic integration from the machine to the team appearance.

Judges Award: During the course of the competition, the judging panel may encounter a team whose unique efforts, performance or dynamics merit recognition.

Rookie All Star Award: Celebrates the rookie team exemplifying a young but strong partnership effort as well as implementing the mission of *FIRST*: To inspire students to learn more about science and technology.

Rookie Inspiration Award: Celebrates a rookie team's outstanding success in advancing respect and appreciation for engineering and engineers both within their school and in their community.

Team Spirit Award: Celebrates extraordinary enthusiasm and spirit through exceptional partnership and teamwork to further the objectives of *FIRST*.

Media and Technology Innovation Award: Celebrates a team that looks beyond the team website, taking into account the numerous ways people search for and consume content on the web.

Woodie Flowers Award: Celebrates effective communication in the art and science of engineering/design. Dr. William Murphy founded this prestigious award in 1996 to recognize mentors who lead, inspire and empower those around them by using excellent communication skills.

Engineering Inspiration Award: Celebrates a team's outstanding efforts in advancing respect/appreciation for engineering and engineers both within their school and their community.

Chairman's Award

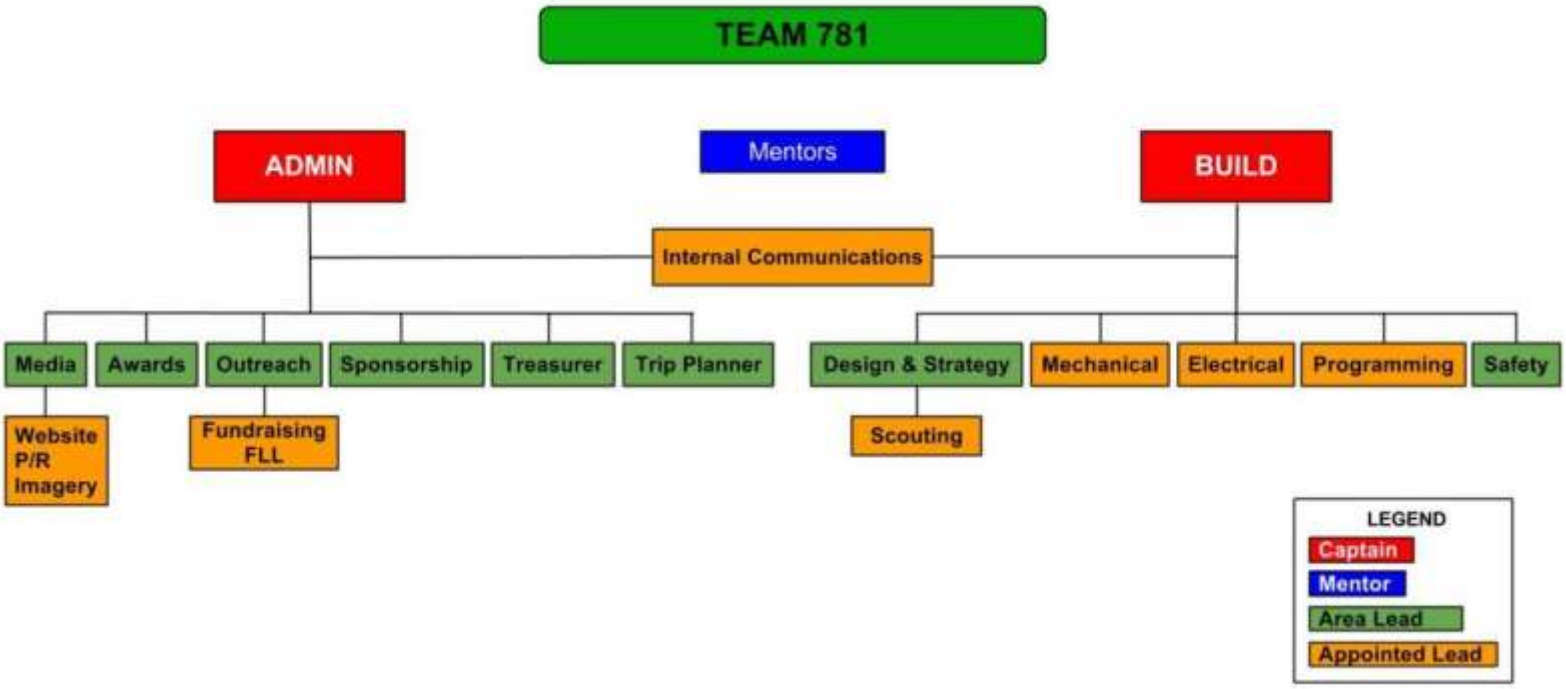
The Chairman's Award is the most prestigious award as it represents the spirit of *FIRST*. It honours the team that, in the judges' estimation, best represents a model for other teams to emulate. It embodies the goals and mission of *FIRST*. Winning the Chairman's Award is the most significant recognition a team can earn from *FIRST*. Only one team wins this award at each regional competition, and this team moves on to compete against the winners from all other regional competitions at the *FIRST* World Championship Event. The team who wins the Chairman's Award at the Championship is inducted into the *FIRST* Hall of Fame and is invited to the world championship each year, regardless of whether or not the team qualifies at the regional level.

Team 781 was fortunate enough to receive its first ever Regional Chairman's Award at the Greater Toronto East Regional in 2013.

Team 341 Miss Daisy, Hall of Fame 2010 with President Obama after winning the Chairman's Award at the Championship.

Things to do on Your FRC Team!

In any FRC team, there is always an organizational structure. Almost every successful team consists of an Administration side and a Build side to make sure all tasks are accomplished. Here is Team 781's organizational structure for the 2013/2014 season:



Administration

The Administrative side of a team deals mainly with the team's business aspects. For a business to run smoothly, organization and role distribution is required. Here is Team 781's Administrative Structure:

Administrative Captain

The Admin Captain will be responsible for managing the team organization, logistics, and all projects under the Administrative Section by overseeing and supporting the lead members. In partnership with the Build Captain, the Admin Captain will lead Team 781 as a whole, by making decisions when appropriate alongside team votes and mentor advice. **In charge of ensuring lead position for Internal Communications is appointed.**

- Lead Team Meetings
- Obtain approval for all international trips by the deadline for school board
- Ensure all trip forms and related info (i.e. packing list) are distributed and documents are collected by an appropriate date
- All information is submitted to *FIRST* by deadline (non-awards)
- Business Plan

Internal Communications

- Oversee communication between members & make information accessible to all in a timely manner
- Create agendas & email minutes to members
- Manage team information (emails, phone numbers) and documents
- Document past events/tasks and lessons learned
- Use past documentation & debriefs and consult them with the team when organizing upcoming events

Media

The Media Lead is responsible for communicating upcoming events, information, and the team brand to the public. **In charge of ensuring lead positions for Public Relations, Website, and Imagery are appointed.**

- Take photos and video at every event & make them accessible
- Social Networking (Twitter, Facebook, YouTube, Pinterest)
- Organize interviews with local media

Public Relations

- Press Releases (newspapers, radio, TV etc.)

Website

- Create new content for website
- Put new info, photos and video online

Imagery

- Branding
- T-shirts & sweaters
- Banners
- Buttons
- Robot Imagery (sponsor stickers, etc.; team colours if applicable)
- Content for promotional material at community events (brochures, placemats, etc.)

Awards

The Awards Lead is in charge of making any preparations for *FIRST* awards submissions/presentations.

- Chairman's Award: executive summary, essay, video, presentation, creation of presentation team
- Woodie Flowers essay
- Other leads help document tasks.
- Make preparations for in-pit awards tasks
- Aids in the decision process in regards to submission of awards for tournaments.
- Communicate awards-related information to team ("What Every Member Should Know")
- Scout other teams' awards-related information/resources to allow for stronger submissions

Outreach

The Outreach Lead is responsible for spreading the message of our team and *FIRST*, and giving back to the community. **In charge of ensuring lead positions for Fundraising and FLL are appointed.**

- Recruit students and build interest in the school and community
- Reach out to other teams (i.e. symposium, invites to practice field, Robotics 4 Rookies, etc.)
- Kickoff
- Team Events (i.e. Open House)
- Community Events and Volunteering (i.e. tree-planting, Bruce Power Beach Party, etc.)
- New and existing connections with individuals/groups (i.e. politicians)
- Create other FRC teams (if possible)

Fundraising

- Organize students to attend and help out with fundraisers
- Work with other leads/positions to successfully execute fundraising events
- Collaborate with organizations around town to create new partnerships through fundraising

FLL

- Create new initiatives and teams (FLL and FTC)
- Maintain interest and support for parents, mentors and students involved in FLL
- Create bond between Kinetic Knights and FLL to help prepare younger students for FRC
- Summer Day Camp
- Recruit and organize students to attend and help organize FLL initiatives

Sponsorship

The Sponsorship Lead is responsible for facilitating all sponsorship initiatives and maintaining all existing and newly created sponsor relationships.

- Organize and lead students in corporate sponsor fundraising process
- Maintain up-to-date information of all sponsors
- Organize sponsor recognition
- Make sure all sponsors receive benefits per their degree of sponsorship (i.e. name on T-shirt, banner)
- Be aware of all opportunities to support sponsors (volunteering, events, publicity)
- Notify sponsors of opportunities (invite to events, competitions)
- Create up-to-date sponsor lists
- Create new relationships with local and out-of-town sponsors

Treasurer

The Treasurer is responsible for monitoring all projected expenses in relationship to actual spending, by organizing all deposits and withdrawals from the team account, with the assistance of mentors.

- Lead creation of season budget
- Track all income/expenses for the season
- Understand the system of deposits, tax receipts, reimbursements and assist anyone therein
- Communicate status of finances with the team through periodic budget reports
- Lead review of budget at end of year
- Create accurate graphs of past financial history when necessary

Trip Planner

The Trip Planner is responsible for making all necessary plans, bookings and reservations for all team-sanctioned competitions in a timely manner with help from a mentor and working with the Administration Captain to create trip forms and related documents.

- Hotel Bookings (Before Kickoff)
- Transportation (i.e. Bus)
- Research trip options to reduce cost
- Travel Insurance bookings
- Prepare meal plans and, if necessary, make restaurant reservations (food options)
- Make sure all team resources (not robot or scouting) are brought to competitions (i.e. spirit boxes, T-shirts)
- Ensure border crossing preparations are made
- Options for meals at competitions (i.e. reserving team dinners, ordering boxed lunches)

Build

The Build side of a robotics team deals with building the robot for competitions. For a robot to be built well and with cohesive components from everyone involved, the Build team must be well organized and focused. Here is Team 781's Build Structure:

Build Captain

The Build Captain will manage the creation and use of all robots (current and past) by overseeing and supporting the lead members within the build section of the team. In partnership with the Administrative Captain, the Build Captain will lead Team 781 as a whole, by making decisions when appropriate alongside team votes and mentor advice. **In charge of ensuring lead positions for Mechanical, Electrical, and Programming are appointed.**

- Create current season robot and drive team
- Practice field
- Inform mentors of any items to be purchased (working with other leads to do the same)
- Transport robot to all competitions
- Lead team in deciding competitions to attend

Mechanical

The Mechanical Lead is responsible for helping the build team determine a vision for the chassis (supporting frame) and attachment and actively participating in execution.

Electrical

The Electrical Lead is responsible for installing, wiring, and troubleshooting electrical and pneumatic systems for the robot, in collaboration with the build team.

- CAD the layout of the electrical components if resources allow
- Maintain competition-capable batteries

Programming

The Programming Lead is responsible for creating and troubleshooting autonomous, drive, and attachment functions for the robot. They must figure out what each component needs to do, and ensure it is coded.

Design & Strategy

The Design & Strategy lead is responsible for leading the design process and strategic analysis, helping the team stay focused on priorities. **In charge of ensuring lead position for Scouting is appointed.**

- Utilize historical game design data (things we already know from previous designs of our own and others' robots). "Steal from the Best and Invent the Rest."
- In-depth game analysis to determine robot build requirements.
- Create and utilize a predetermined design process.
- CAD the robot if resources allow

Scouting

- Scout other teams before & during competitions
- Create system for scouting and train/lead competition scouts
- Communicate scouting knowledge with drive team during matches
- Lead the pick-list meeting with any necessary assistance from other leads or mentors
- Get pictures and information about other teams' robots (i.e. pit scouting)

Safety

The Safety Captain is responsible for ensuring the team understands the importance of safety and gains the skills/knowledge to act safely, by being familiar with the *FIRST* Safety Manual and other resources (i.e. Bruce Power procedures, existing Team 781 protocols).

- Arrange *First* Aid Training, shop safety training, and any other training for the team
- Constantly monitor actions/resources in pits & build site for possible risks & improvements
- Provide effective safety outreach to other teams
- Connect with Safety Advisors at competitions
- Update Team 781 Safety Manual

NOTE:

This is the detailed structure of Team 781. Of course, not all teams follow the same, or even a similar structure as us. Different teams have different organizational structures, and your organization will probably be different as well. It all depends on your team size and mentor support. Team 781 has worked to create a larger team over the past few years, and this has allowed us to have around 50 students and 20 mentors on the team. Since we have a larger team, we have more room to spread our work out. This is why our organizational structure is also quite immense. If your team is a much smaller size, try to simplify all of the responsibilities above, and you will have a team – no matter how small – that gets the job done.

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Get The Experience You Need!

By getting involved in the *FIRST* Robotics Competition, you are not just building a robot for the sake of winning a competition. In *FIRST*, everybody's a winner, even if you don't win an award. The experience is one that is both unique and spectacular. It allows students that are approaching their entrance into post-secondary education to get a head start in what they will encounter once they begin. There is always something to do, so take a chance and dive in!

Meet New People!

Through *FIRST* you can meet people throughout the world who share your interests. Whether it is Germany, Mexico, or even Israel, you will meet people who share your passions!

Advantages!

Robotics looks incredibly good on resumes and post-secondary applications because it shows schools and employers that you are reliable, responsible, and hardworking. Robotics teaches you lifelong skills that are transferrable to so many different careers. The more time and effort you put into robotics, the more you will be able to take out of it!

STEM Opportunities!

STEM (**S**cience, **T**echnology, **E**ngineering and **M**ath) is the basis of the *FIRST* Robotics Competition. With exposure to this environment, doors to future job opportunities will rapidly open for you!

What Are You Waiting For?

With all these advantages, we ask you: why not? Get a head start on your *FIRST* career! Work on projects that will make you and your team stand out. Expand your technical knowledge so you and your team can build the best robots out there. Most of all, though, get involved. You're bound to find something that you're passionate about. All you have to do is try new things until you find it. So, what are you waiting for? Go!

About FIRST *Team 781*

The Kinetic Knights, Team 781, is an FRC team run by youth aged 13 to 19 with the assistance of adult mentors from Kincardine, Ontario, Canada. There are currently around 50 students and 20 mentors on the team. The Kinetic Knights were formed during the 2001-2002 season with generous help from Bruce Power with regards to sponsorship, tools and mentorship.

The Kinetic Knights created the *Robotics 4 Rookies* handbook to help other FRC teams run successfully. In recent years, we have witnessed substantial growth in the size of our team, but we found it a challenge to keep so many new members involved. This is when *Robotics 4 Rookies* was initiated. We created a presentation for the new members to share what *FIRST* and Team 781 were all about, including things they could do on the team. After this presentation, we saw a more comprehensive level of enthusiasm in the rookie members. We felt this was a great project to continue, and to spread to other FRC teams. The presentation transformed into a handbook.

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