PUBLIC RELEASE

« Season and Competitions | Table of Contents | Meetings & Attendence »

Team Structure

For many years, The RoboBees operated under a traditional (for FRC teams) subteam model. This meant that subteams were built around the skillset that they were focused on teaching. For example, mechanical, command and control (C&C), Community Outreach and Public Relations (COPR), or media.

While this structure produced functional robots and led to success for a small handful of highly driven students each season, it has also come with significant limitations, especially around communication, cross-functional learning, and broad engagement, as it led to siloing of information. Students tended to work in isolation from each other, which often meant design decisions were made without full understanding of code constraints, and programmers were handed hardware without context. Year after year, only a few students would emerge as truly successful. These were those who could self-manage, fill in the gaps, and connect the dots across the divide.

Starting in the 2024-2025 season, the mechanical subteam piloted an integrated product team (IPT) based approach, focused on the work products developed by the students. This was highly successful and, for the 2025-2026 season, led to an expansion of the program across the entire team. The team currently operates under the IPT model, which closely aligns with how government and industry operates.

Students are still aligned with their areas of interest. Those who want to program still end up writing code. Machinists still spend most of their time in the shop. However, in addition to their technical community, each student is now aligned to at least one IPT and has a clear goal for what to be developing and “owning” throughout the season.

We’ve found that this structure puts students in closer contact with each other, fosters better communication, and gives them ownership over a complete subsystem. In addition, there are substantially more leadership positions available for those who are interested. Each IPT lead role is an opportunity for a student to practice decision-making, collaboration, and technical coordination.

This organizational structure is not perfect. We still work through issues of varying levels of participation and commitment, which can negatively impact the schedule and performance of each IPT. However, we’ve found that this realignment has been a net positive for the team.

Integrated Product Teams

Frame and Drive IPT

The team exists to design, develop, and integrate the drivetrain and electronics placement of the robot. This includes creating the drivetrain system, determining optimal locations for electronics (e.g., motor controllers, RoboRIO, power distribution, sensors), and ensuring reliable integration with programming and other robot systems. This team’s goal is to complete a robust drivetrain and electronics layout early in the build process so that other subteams (e.g., manipulators, wiring, software) can proceed in parallel with a stable foundation.

Game Piece Acquisition IPT

This team's purpose is to pick up any game piece on the field that the team deems necessary to pick up. This includes prototyping, designing, manufacturing, assembling, and programming. The intake must be lightweight while also strong and easy to use from the driver's side.

Game Piece Handling IPT

The team exists to design, develop, and integrate game piece mechanisms on the robot. This includes rapid prototyping of potential solutions, modeling components in SOLIDWORKS, fabricating components, and ensuring reliable integration with programming and other robot systems. The objective is to create mechanisms that work in tandem with others that optimizes game piece movement after acquisition, while also ensuring reliability. Mechanisms can include elevators as an example.

Game Piece Scoring IPT

The team exists to design, develop, and integrate game pieces mechanisms on the robot. This includes rapid prototyping of potential solutions, modeling components in SOLIDWORKS, fabricating components, and ensuring reliable integration with programming and other robot systems. The objective is to deliver a reliable game piece scoring mechanism that optimizes scoring potential, while ensuring reliability.

Human Interface IPT

The team exists to design, develop, and integrate human interfaces for this competition season. These systems, which could include things such as controllers and drive station layouts, require a unique mix of programming, electrical, and mechanical skills that cannot be handled effectively within single capability-aligned groups. The IPT structure ensures collaboration across disciplines and efficient delivery of an integrated solution.

Sensing and Vision IPT

This team exists to design, place, develop, and integrate all vision and sensors.

Technical Communities

Command and Control (C&C)

This team is responsible for developing the robot's electrical platform and programming the control systems. This includes all wiring of system components and determining power distribution

throughout the robot. Various software programs are used to develop our control systems. Java is our primary control system programming language. Other tasks that may be required by this team include, but are not limited to:

- Develop the electronics platform for all prototype robots and the final robot entry
- Implement and authorize electrical allocations for all sub-team components
- Maintain all prototype and final robot entry electrical operations
- Maintain and inventory a neat and organized electrical toolbox and components box
- Develop operational and control programming for the robot
- Test sensors, cameras, actuators, etc. to ensure functionality
- Maintain full documentation of C&C processes, work efforts, and diagrams as needed
- Assist with the VEX IQ programming efforts

Mechanical Design & Manufacturing

This team is responsible for developing all of the designs for the mechanical structures of the robot. This includes the drive system platform and arm and end effectors. Some tasks required are as follows:

- Develop all preliminary sketches and ideas from sub-teams
- Develop all draft and final drawings
- Develop a final bill of materials for competition entry
- Develop a 3D model of the final robot design
- Coordinate with the electrical team on the wiring diagram
- Maintain a weight budget for the robot
- Help develop a fabrication schedule for the robot

This team is also responsible for the fabrication and assembly of all mechanical subsystems of the competition robot, as well as any prototype systems. Other tasks required may be as follows, but not limited to:

- Develop and maintain the robot frames for all robots
- Develop all playing field mock-ups for robot testing
- Develop the robot shipping crate
- Maintain and inventory a neat and organized mechanics toolbox and components box

Media

This team is responsible for developing, collecting, and archiving all multimedia items for the team. This includes but is not limited to:

- Take/collect pictures/videos for the website
- Responsible for leading team award documentation efforts.
- Creation of a Robot Reveal video, dependent on robot availability
- Capture match video while at competitions
- Handles any other team videography and photography needs
- Responsible for the creation of team graphics (including t-shirts and robots)
- Responsible for team animation award submissions
- Develops and maintains the team branding guide

Leadership Roles

We have official leadership positions on the team, which are determined by the mentors in coordination with the students. It is important, however, to mention that despite these fancy titles these positions rarely come with extra power, only more responsibilities.

For example, a student serving as an IPT lead does magically gain the ability to force decisions "because they say so," nor can they veto a decision that they don't like that is made by the rest of their IPT.

The team is about modeling a healthy working environment that is consistent with industry. Very rarely will a successful STEM professional or leader lead through dictation. Well respected leaders remain positive when working with their teammates, take initiative, lead by example, follow policies, help to educate their teammates, keep our workspace tidy and respectable, etc. Leaders do not talk down to nor about their teammates and do not push others aside.

It is also important to note that everyone on the team can be a leader, with or without a title. This can range from leadership on an IPT to simply setting an example of attitude. Leadership is about building up yourself and others. You don't need a fancy title to do that!

Organization Chart

The organization chart (org chart) for the 2026 FRC season can be found below. The names will change from season to season. Additionally, IPTs may be added, removed, or changed as needed.

Student vs Mentor Led

At the 1998 FIRST Competition Kickoff Workshop on January 10, 1998, the founder of FIRST, Dean Kamen, provided this valuable insight into the philosophy behind the organization.

> I don't know how many ways to try and continue to say it. What this organization is about is not education per se. I heard a lot of people, even last night, and I think they mean well, and I understand what you're saying, there needs to be a balance, but I heard people saying "Well sure that other team did great, but that's because the engineers did all the work. The kids didn't build the robot." I have to tell you, FIRST is not an educational institution. It's okay if the kids build the whole robot, it's okay if they don't touch it. FIRST ought to be to education what the NFL or the World Series is to little league."

In a January 19, 2024 blog post on the FIRST website Collin Fultz, the FRC Senior Director, made the following comments regarding the role of mentors in FRC.

> Every year, the same question is raised: "How much involvement in building the robot should the mentors have?"

> Every year, the answer is the same: “However much is needed to inspire the youth on the team.”
>
> Our mission is to create programs that give young people skills, confidence, and resilience to build a better world, and mentors are a key component to that in FIRST® Robotics Competition. Adult mentorship is part of what makes FIRST® so effective, and it’s been core to our programs from the very beginning. This is also true for the support given to teams by non-technical mentors in areas like logistics, business planning, fundraising, and outreach.
>
> … Remember that FIRST is about Inspiration. It’s about being to STEAM what the NFL is to sports or Taylor Swift is to music. Team mentors have been a key part of that mission from the beginning, and we don’t see that changing.

The reason that this is brought up is because it is a source of continuing confusion about the program. FRC is not a program focused on finding the high school students who can build the best robot without adult help. It’s a program that is focused on partnering students with adults, especially those in industry, and building excitement and enthusiasm for STEM careers the same way that professional athletes build excitement and enthusiasm for sports careers.

The RoboBees operate on the model of building a partnership between students and mentors. We believe that our students are smart enough to struggle through the development of a robot on their own, if necessary. However, why would we want to watch students fail when we have the opportunity to help them succeed? We believe strongly in the concept of instructional scaffolding and raising the students up to reach their potential. As a result, the students don’t build the robot and neither do the mentors. The team builds the robot.

This is not a universal philosophy. If you are in FRC long enough, you will hear robots (perhaps even ours) described as “mentor built.” This phrase is not meant charitably and is generally used to devalue the extraordinary effort that each team makes into developing a robot that can successfully compete at the highest levels of FRC. It fails to recognize and appreciate the service that mentors provide as they work in partnership with the students and fails to recognize the exemplary work that high school students are capable of. It is not appropriate or professional to judge other teams on how they choose to run their team.

Similarly, you may also hear robots described as “toaster bots” or “BLTS” (brave little toasters). This is likewise not appropriate or professional. FRC is a competition and each team puts in an extraordinary level of effort to ensure that their robot represents the best work that they can do. Some robots are, admittedly, less competitive than others. However, it is wildly inappropriate to devalue the work of others. We do not do that on The RoboBees.

« Season and Competitions	Table of Contents	Meetings & Attendence »