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FTC Timeline

Timeframe: ~8 Weeks, ~3 meetings/week, ~6 hrs/week
Competition: February
Resources: List of FTC Resources

Week 1

Mechanical Design

Watch the PowerPlay Game Video. This is the game you'll build your robot for.

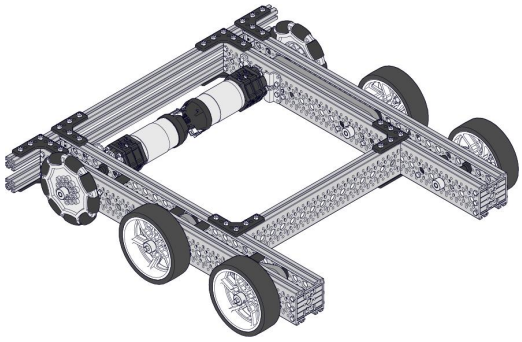
Watch an example PowerPlay match.

Brainstorm ways your team could complete the tasks in the game. Discuss as a team, make drawings, and/or build prototypes.

Start building the robot drivetrain:

→ The drivetrain is the wheels, motors, and structure that enables a robot to drive around the field.

→ Here is the drivetrain you'll make using the REV Kit.



→ Follow the Channel Drivetrain Building Instructions PDF to start building the drivetrain.

For the beginning, we recommend splitting into groups to each work on the following sections:

- 2.1 SINGLE SPROCKET SHAFT ASSEMBLY p.4
- 2.2 DOUBLE SPROCKET SHAFT ASSEMBLY p.7
- 2.3 DRIVE SHAFT ASSEMBLY p.10
- 2.4 ULTRAPLANETARY GEARBOX ASSEMBLY p.15
- 2.5 BREAKING AND REFORMING CHAIN p.19

→ If you need more guidance on the REV drivetrain or aren't sure what a part is, here are more helpful resources:

- FTC Kit Visual Parts List
- REV Channel Drivetrain Guide
- REV Build System Overview

General Tasks

Brainstorm team name ideas!

Document your team's progress. Write a summary of what you accomplished that meeting/week, take photos of your robot and team, compile any sketches or prototypes you made.

→ You can do this in a physical notebook or an online document.

→ Documentation should be done every week. Recording your progress is an important engineering skill and this will help with judging later on.

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Week 2

Mechanical Building

Finish building the drivetrain if you have not already done so.

→ Channel Drivetrain Building Instructions PDF.

Control System/Programming

Setup the Control System:

→ Your team has either received a Driver Hub & Control Hub or an Phone & Phone + Expansion Hub. Follow the instructions under the option your team has.

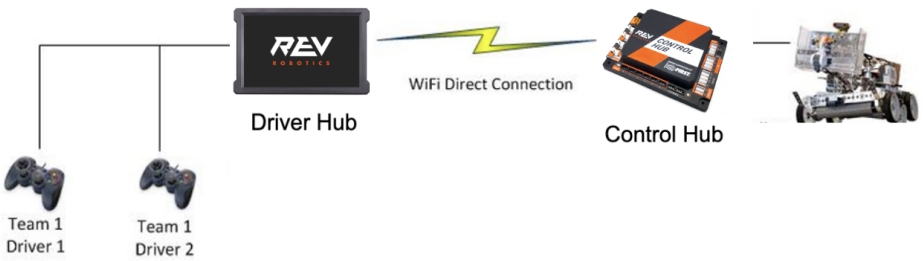
→ The Driver Hub or Phone connects wirelessly to the robot and allows you to select programs and connect the controllers. You will need to charge them periodically.

→ The Control Hub or Phone + Expansion Hub is the “brain” of your robot (equivalent of the FLL Spike brick).

All of these electronics are essential to your robot functioning, and they are very delicate, expensive, and difficult to get, so be very careful with them. Keep them away from liquids or excessive amounts of dust (especially the Control/Expansion Hubs), and take care to not drop them.

` **Option 1:** Driver Hub + Control Hub

→ Follow the Configuring your Android Devices guide.



Option 2: Phone (Driver Station) & Phone (Robot Controller) + Expansion Hub

→ Follow the [Configuring your Android Devices] guide.

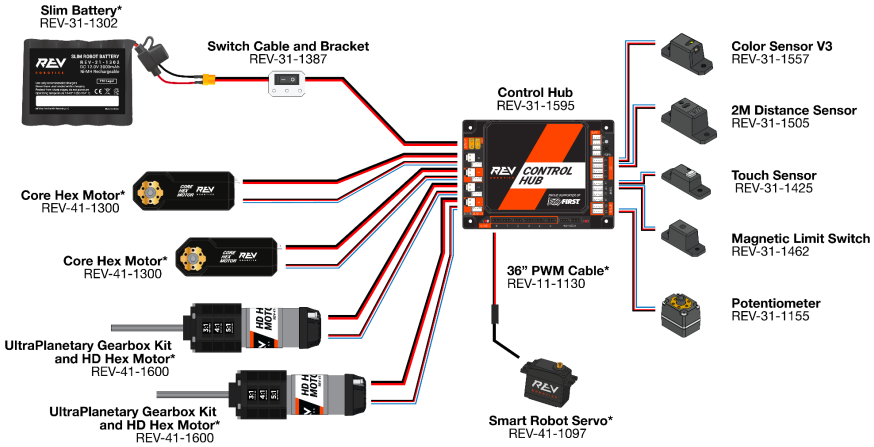
Attach the Control Hub or Phone + Expansion Hub onto your drivetrain.

→ Wherever you attach them should be secure and easily accessible. You don't want them to get bumped by another robot during a match.

→ If you have the Phone + Expansion Hub configuration, you will need to be able to remove the phone easily to charge it.

Wire the drivetrain and mount the battery.

→ Use wires to connect the motors to the motor ports on the left of the control hub and attach the switch cable and bracket for the battery.



→ Make sure the battery is somewhere secure and protected where it won't get damaged, but accessible so that you can take it out to charge it.

Configure the robot.

→ Configuration tells the robot which motors/sensor is plugged into each port. Follow these guides to complete the configuration:

- Configuration Guide
- Configuring your Robot REV Video

Mechanical Design

Look at example PowerPlay robots:

→ Starter Bot - FTC POWERPLAY 2022-2023
→ goBILDA Robot-in-3-Days FTC POWERPLAY Bot Breakdown
→ 6272 Iron Eagles Prime Robot Reveal Worlds FTC Powerplay 2023

Brainstorm ideas for the robot to pick up a cone and place it on a pole. Make sketches, research design ideas online, and discuss as a group. If you do not have a cone, you could find or make something of a similar shape (eg. a water bottle).

Start building prototypes using any materials you like (eg. REV parts, paper, cardboard...).

General Tasks

Decide on a team name!

Document your team's progress. Take photos of the team or any designs/ideas. Write a short summary of what you accomplished this week.

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Week 3

Mechanical Design

Build/prototype mechanism to pick up a cone and score it on a pole. Break into groups and each come up with a unique design.

→ Using linear motion is very common in FTC. If you are interested in building linear motion, the guides below will help you get started:

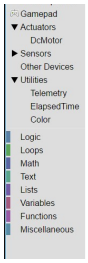
- Introduction to Linear Motion
- Three-stage Lift Guide

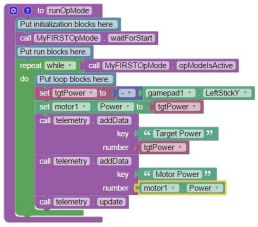
Programming

Start learning how to program your robot. Remember, you need to make two programs: An Autonomous, which needs to be completely pre-programmed, and a TeleOp, which should respond to inputs from the drivers on the controllers.

→ There are two programming languages you can use in FTC:

- **Blocks** is a visual programming language that is very similar to Scratch and SPIKE. You drag and connect code blocks to make your programs. This language is much easier to learn. **We recommend this language if the team does not have experience with Java.**
  - Blocks Programming Tutorial
  - Creating an OpMode
  - Web address for programming page: **192.168.43.1:8080**
  - Password for GBR-RC Wifi: **beefeaterz**





- **OnBot Java** is a text-based programming language that uses Java. To create your program you have to write out lines of code that describe to the robot what it should do. **This language is much more difficult, so we only recommend considering it if several members of your team already have experience with Java.**
  - OnBot Java Programming Tutorial

- Creating an OpMode

General Tasks

Document your team's progress. Take photos of the team and any drawings or designs that you come up with and why you choose them, and write a few sentences about what your major accomplishments were for the week.

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Week 4

Mechanical Design

Continue building a cone scoring mechanism. Try out different variations on your design to see what is faster and most reliable.

Programming

Program your drivetrain, so that you can drive it around using a controller.

→ Creating an OpMode

If you finish with this early, work on creating the rest of your TeleOp.

General Tasks

Document your team's progress. Take photos of the team and any drawings or designs that you come up with and make sure to record any changes you make to any designs and why. Write a few sentences about what your major accomplishments were for the week.

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Week 5

Judging/Presentation

Start working on a portfolio.

→ Your portfolio can be up to 15 pages, and should showcase your team and your robot to judges. It can either be handwritten with drawings, or typed on a computer and printed out.

→ Here are some examples of portfolios:

- Excalibur Engineering Portfolio
- Kuriosity Engineering Portfolio

→ More information about judging can be found in Game Manual 1.

Mechanical Design

Begin to finalize your design, and test it so that it is reliable. Try to make sure you can consistently pick up a cone and score it.

Programming

Create your TeleOp Program. When run, this program should allow the drivers to control the robot and its mechanisms with their controllers.

If you finish with this early, start planning out how you will code your Autonomous.

General Tasks

Document your team's progress. Take photos of the team and any drawings or designs that you come up with and make sure to record any changes you make to any designs and why. Write a few sentences about what your major accomplishments were for the week.

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Week 6

General Tasks

Decide who will be on the "Drive Team", this consists of 2 robot Drivers who each have a controller, a Human-Player who will place cones on the field, and a "Drive Coach" (the "drive coach" does not have to be the official team coach, it can be a student).

Judging/Presentation

Start working on a 5-minute presentation you will give to judges. This presentation should highlight the most important and interesting parts of your robot, code, and team.

Work on your portfolio.

Programming

Start your Autonomous program. This program will be run during the first 30 seconds of the match, and cannot use any input from the drivers. For a breakdown of the Autonomous scoring opportunities, look in Game Manual 2

→ One very high-scoring mission is to detect the color of the signal cone, and park in the corresponding square. A color sensor could be a great way to do this.

Mechanical Design

Build two Beacons, one for the Red Alliance and one for the Blue Alliance. You can find the rules about beacon construction in Game Manual 2.

General Tasks

Document your team's progress. Take photos of the team and any drawings or designs that you come up with and make sure to record any changes you make to any designs and why. Write a few sentences about what your major accomplishments were for the week.

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Week 7

Judging/Presentation

Practice your judging presentation so it is exactly 5 minutes long.

→ Make sure everyone gets a chance to speak.

→ Consider if you want to make any additional presentation material like a slideshow or poster.

Work on your portfolio.

Programming

Keep working on programming the robot.

Mechanical Design

Finalize your robot design.

→ Make sure everything works together and the robot is wired properly. Make sure you don't have any loose wires or things that can get caught in moving parts.

→If everything is working well, try to think about anything that could go wrong, and then make changes so that can't happen. For example, if you have a string that could easily get snagged on another robot, put a piece of plastic around it so that it is more protected.

General Tasks

Document your team's progress. Take photos of the team and any drawings or designs that you come up with and make sure to record any changes you make to any designs and why. Write a few sentences about what your major accomplishments were for the week.

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Week 8

Mechanical Design

Test your robot to make sure everything is working properly.

Practice driving the robot. Simulate a game match and try out different scenarios.

Judging/Presentation

Practice your presentation.

→ Run through your presentation multiple times.
→ Practice judging questions. There will be 5 minutes of Q&A after your presentation.

Finalize your portfolio.

→ Check for any spelling or grammar mistakes.
→ Make sure you can physically hand your portfolio to judges. If you made it digitally you should print it out.

General Tasks

Set aside your parts for the competition. Make sure you have:

- ☐ Charged robot batteries
- ☐ Robot battery charger
- ☐ Charged Driver Hub or phone (driver station) + Driver Hub or phone charger
- ☐ Controllers
- ☐ Spare parts as things often break
- ☐ Portfolio
- ☐ Any other judging materials like posters
- ☐ If you're using a phone on your robot make sure it's charged

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