



---

## *FIRST®* Tech Challenge Links & Resources

### GENERAL KNOWLEDGE

---

#### FTC Tutorials

<http://ftctutorials.com/>

Created by the Seshan Brothers of FRC 8027, this is an excellent starting point for information on a wide variety of topics, including robot building, programming and competitions.

#### Game Manual Zero

<https://gm0.copperforge.cc/en/stable/index.html>

This unofficial manual is targeted towards new teams and covers a variety of topics, especially many of the technical topics that intimidate newcomers.

#### GEARSinc (Phil Malone) YouTube Channel

[https://www.youtube.com/channel/UCUNC\\_WYPngnwjLRjmTqYt8Q](https://www.youtube.com/channel/UCUNC_WYPngnwjLRjmTqYt8Q)

There are number of videos here helpful to teams, especially new teams:

- MOTO G4 Play Setup for FIRST Tech Challenge [BEGINNER]
  - <https://www.youtube.com/watch?v=X8BcFhg5R9Q>
- FTC Tutorial - Part 5: First Robot Configuration (Motorola G4) [BEGINNER]
  - <https://www.youtube.com/watch?v=o1weHW2N-58>
- Getting Started with OnBot Java [BEGINNER]
  - <https://www.youtube.com/watch?v=tRDSj2AZJuI>
- FTC Java Tutorial - Part 1: MyFirstOpMode [BEGINNER]
  - <https://www.youtube.com/watch?v=TKPscPqsZ8s>
- FTC Java Tutorial - Part 2: More on OpModes [INTERMEDIATE]
  - <https://www.youtube.com/watch?v=9437L9upnpE>
- FTC Java Tutorial - Part 3: Manual OpMode Registration [INTERMEDIATE]
  - <https://www.youtube.com/watch?v=UaRXfU5xCi0>
- FTC Vuforia Demo Code Walkthrough [ADVANCED]
  - <https://www.youtube.com/watch?v=AxKrJEtfual>

### FTC New Jersey Video Library

Instructional videos on a variety of topics for teams.

<http://newjerseyftc.com/ftcnj-training.html>

### Wizards.exe (FTC 9794) Spellbooks (instructional videos)

<https://wizards-exe.weebly.com/our-spellbooks.html>

The website by FTC 9794 – Wizards.exe has many instructional videos, ranging from CAD to wiring to robot “vision.”

### TNT (Trial N’ Terror – FTC 8372) FTC Getting Started YouTube Playlist

<https://www.youtube.com/watch?v=DYqpaxoabp4&list=PLClS0OdZeKhlB3W9Yv2YFHa5VqzJAalSa&index=2>

This is a series of 17 videos on getting started in FTC. You may want to skip the first video, as it deals with an outdated (Modern Robotics) control system. The link above should start you on the second video (REV Robotics control system).

### REV Robotics — FIRST Tech Challenge Resources

<https://docs.revrobotics.com/docs/first-tech-challenge>

REV provides both general information on FTC topics and specific information on using their hardware and control equipment.

## COLLABORATION

---

### *FIRST*® Tech Challenge Forum (official)

<https://ftcforum.usfirst.org/>

The official FIRST forum for the *FIRST*® Tech Challenge program.

### *FIRST*® Nevada Team Discussion Forum

[http://www.firstnevada.org/discussion\\_forum.aspx](http://www.firstnevada.org/discussion_forum.aspx)

Forum for Nevada teams to collaborate, ask questions and share ideas.

### FTC Share & Learn Facebook Group

<https://www.facebook.com/groups/FTCShareAndLearn/>

Much like its FLL counterpart, this is a fantastic place to post questions and get feedback some of the top teams, coaches mentors and volunteers.

### FTC TEC Network

<http://www.ftctecnetwork.org/>

Long-running private Google+ community.

### *FIRST*® Tech Challenge on Reddit

<https://www.reddit.com/r/FTC/>

FTC board on popular Reddit website.

## ROBOT DESIGN

---

Brainstormers (FTC 8644) — Tips & Tricks Videos

<https://www.youtube.com/channel/UCtm7Wijmxe6n85tDQIQUAawg>

Many video tutorials on collection systems, linear slides, etc.

Wizards.exe (FTC 9794) — The Basics of REV

[https://www.youtube.com/watch?v=7\\_fiFWus0xE](https://www.youtube.com/watch?v=7_fiFWus0xE)

A very simple video introduction to building with the REV system, which is fairly different from other systems (Tetrix, Actobotics, etc.).

John V Neun's Mechanical Design Calculator — JVN DesignCalc

<https://johnvneun.com/calc>

This is a spreadsheet that can be used to calculate things like the stall load on a motor. (You also can find an online forum about this spreadsheet on the Chief Delphi website:

<https://www.chiefdelphi.com/t/paper-jvns-mechanical-design-calculator-2016/146281>.)

## PROGRAMMING

---

Programming Language Options (REV Robotics)

<https://docs.revrobotics.com/rev-control-system/programming/programming-language-options>

This is a good overview the three programming options available to FTC teams.

FIRST Tech Challenge Programming Resources

<https://www.firstinspires.org/resource-library/ftc/technology-information-and-resources>

This is official programming resources page from FIRST, including guides for each of the three programming options available: Blocks, OnBot Java and Android Studio Java.

- Blocks Programming Manual  
[https://www.firstinspires.org/sites/default/files/uploads/resource\\_library/ftc/blocks-programming-manual.pdf](https://www.firstinspires.org/sites/default/files/uploads/resource_library/ftc/blocks-programming-manual.pdf)
- OnBot Java Guide  
[https://www.firstinspires.org/sites/default/files/uploads/resource\\_library/ftc/onbot-java-guide.pdf](https://www.firstinspires.org/sites/default/files/uploads/resource_library/ftc/onbot-java-guide.pdf)
- Android Studio Guide  
[https://www.firstinspires.org/sites/default/files/uploads/resource\\_library/ftc/android-studio-guide.pdf](https://www.firstinspires.org/sites/default/files/uploads/resource_library/ftc/android-studio-guide.pdf)

The above manuals/guides/tutorials are updated regularly, but not necessarily immediately. If you want to see the current version of any of the tutorials above, you can find them on the Wiki page of the FTC App GitHub account: <https://github.com/FIRST-Tech-Challenge/FtcRobotController/wiki>.

### FIRST Tech Challenge Blocks Tutorials (YouTube Playlist)

<https://www.youtube.com/watch?v=AKoqwqPo-Vc&list=PLEuGrYl8iBm4A4yrRcatGcK7q0od0LYov>

FIRST has produced a series of video tutorials to get you started with Blocks programming.

### FIRST Tech Challenge Java Tutorials (YouTube Playlist)

<https://www.youtube.com/watch?v=exE0jph1HwA&list=PLEuGrYl8iBm7wW9gyxpLDhBJAOWDZid1P>

FIRST has produced a series of video tutorials to get you started with Java programming.

### FIRST Tech Challenge Blocks Programming (YouTube Playlist) by Bruce Schafer

<https://www.youtube.com/watch?v=yGOIJG6d3g0&list=PLq-SuSZcm5veW1kiK8JenKZoQgrHiln>

This series of videos by Bruce Schafer of ORTOP (Oregon Robotics Tournament & Outreach Program) is one of the most comprehensive tutorials on Blocks programming around. You may want to subscribe to Bruce Schafer's YouTube channel:

<https://www.youtube.com/c/BruceSchaferORTOP/>.

### STEM Robotics 201 - Java for Robots

<http://stemrobotics.cs.pdx.edu/node/4196>

A great tutorial for FIRST Tech Challenge teams as it focuses on Java being used for robotics.

### FIRST Canada FTC SIM [CanCode]

<https://www.firstroboticscanada.org/ftc/sim/>

This is an only simulation using FTC Blocks to program virtual robots. The tool was created by CanCode and currently is available for free.

### Learn Java

<https://www.learnjavaonline.org/>

Basic introduction to Java concepts, including a “live” interactive output screen for testing code techniques.

### Java Tutorial for Complete Beginners (Udemy)

<https://www.udemy.com/java-tutorial/>

This is a free tutorial with the basics; Udemy offers additional paid tutorials.

### Learn Java (Codecademy)

<https://www.codecademy.com/learn/learn-java>

This is a free tutorial; there is additional content as part of Codecademy's paid service (Codecademy Pro).

### Java Tutorial (TutorialsPoint)

<https://www.tutorialspoint.com/java/>

Text-based, but easy to follow.

### Java Tutorial for Beginners: Learn in 7 Days

<https://www.guru99.com/java-tutorial.html>

Some of the topics are a bit programmer-oriented (i.e., beyond the scope of programming for FIRST Tech Challenge), but the explanations are good.

### Java Tutorial (SoloLearn)

<https://www.sololearn.com/Course/Java/>

A free tutorial (required account / sign in, though); not interactive, but it includes quizzes.

### Essentials of the Java Programming Language (Oracle)

Part 1: <https://www.oracle.com/technical-resources/articles/java/basicjava-programming1.html>

Part 2: <https://www.oracle.com/technical-resources/articles/java/basicjava-programming2.html>

Guides from the official source for Java; however, they are focused more on app development than general and/or robotics usage.

### Wireless Programming for FTC Robots (Jeremy Cole)

<https://blog.jcole.us/2017/04/13/wireless-programming-for-ftc-robots/>

Nevada's own Jeremy Cole created this guide on how to load your programs from Android Studio to your robot's Robot Controller phone (or the REV Control Hub).

---

## CAD SOFTWARE

---

### SOLIDWORKS by Dassault Systèmes

[https://files.solidworks.com/pdf/EDU\\_FIRST\\_Flyer.pdf](https://files.solidworks.com/pdf/EDU_FIRST_Flyer.pdf)

SOLIDWORKS is a 3D CAD program used by many FTC and FRC teams, as well as many companies. It is a great skill to learn, and SOLIDWORKS is willing to sponsor your team members with their own copy of the program! Additionally, DriveWorks has a program to obtain certification of your CAD skills: <https://www.driveworks.co.uk/education/first/>.

### OnShape by PTC

<https://www.onshape.com/cad-blog/how-to-set-up-your-first-robotics-team-in-onshape>

This is another opportunity to gain access to a commercial 3D CAD program for free.

### Autodesk

<https://www.autodesk.com/education/home>

Autodesk also provides free access to its products through the Autodesk Education Plan.

---

## ROBOTICS PARTS SUPPLIERS

---

Note: Most of the sites below sell parts for many different robotics competitions and hobbyist pursuits. You need to make sure a part is legal before purchasing it.

### Actobotics (ServoCity)

<https://www.servocity.com/actobotics>

In addition to the Actobotics line of robotics parts, ServoCity has many parts that may prove useful in building a robot.

### AndyMark

<https://www.andymark.com/pages/first-tech-challenge>

Beyond robotics parts, AndyMark also is the official vendor for purchasing the season field kit.

### goBILDA

<https://www.gobilda.com/>

A relative newcomer, their linear slide kit and FTC legal linear actuators already have proven competition-ready.

### PITSCO

<https://www.pitsco.com/Competitions-Clubs-and-Programs/FIRST-Tech-Challenge>

Primarily known for their TETRIX building system and TorqueNADO motors, as well as the entity you pay your FIRST season fee to.

### REV Robotics

<https://www.revrobotics.com/ftc/>

They are the supplier of the only legal control system for FTC (Expansion Hub, and now the newly FTC-legal Control Hub).

## GENERAL HARDWARE SUPPLIERS

---

### SDP/SI

<https://sdp-si.com/>

When you are ready to expand beyond the stock parts that come in the kits, this site provides lots of useful and interesting parts that can be used on the robot.

### Grainger

<https://www.grainger.com/>

This site has lots of basic building blocks, including things like sheet metal. Also, you can buy nuts and bolts (screws) compatible with the various kit system in bulk.

## RECOMMENDED PARTS

---

### ServoCity — Servo Staff Picks

<https://www.servocity.com/servo-staff-picks/>

This is a good introduction to some common servos recommended for various use scenarios.

### ServoBlocks™

<https://www.servocity.com/servos/servoblocks>

Helps secure servos and makes them much more stable.

### Aluminum Motor Mount B

<https://www.servocity.com/aluminum-motor-mount-b>

Helps secure motors.

### Side Tapped Pattern Mount C

<https://www.servocity.com/90-quad-hub-mount-c>

Referred to as the “Magic Bracket” by teams, this is an excellent part to assist in mounting motors in a stable and secure fashion.

## RECOMMENDED TOOLS

---

### Roboplex — Hardware, Tools and Tips

<http://roboplex.org/ftc/ftc-tools-tips-2/>

This site has many resources, including this comprehensive list of recommended tools.

## MISCELLANEOUS

---

### FIRST® Fundraising Toolkit

<https://www.firstinspires.org/resource-library/fundraising-toolkit>

This site curates information, presentations and examples from various FIRST teams on how to raise money.

### Discord

<https://discord.com/>

Discord can be a useful (and free!) team collaboration tool, with the ability to create separate “rooms” (think of team functions/tasks, such as robot, programming, outreach, etc). For school-based teams, you may need to confirm that your district and/or school allow use of Discord. If set up properly, however, it can be made very private with the ability for adults (coaches) to moderate activity and assign roles to participants.

### Codenames

<https://codenames.cards/>

Codenames is a board game that was converted into an open-source online game. It can be a fun team-building activity for team members, and it can be done in-person or remotely.

### Scribbl.io

<https://skribbl.io/>

Like Codenames above, this is a game similar to Pictionary that can be used for team building and/or fun.