Track Descriptions

August Workshops - 2016

TRACK #1 - - Team Topics

Purpose: This track provides a comprehensive overview of the many topics related to the basic operation of a FIRST Tech Challenge Team. Time permitting, increasingly advanced topics, described below, will be covered.

Who Should Attend: This track is designed for the new coach or team captain. It is also intended for those seeking a refresher. If you are veteran team and not sure if you have all of the bases fully covered, it is smart to invest a member's time to attend this track. The topics covered in this track are also very suitable for prospective coaches/volunteers, team members, parents, and sponsors.

Topics: Organizing Your Team, Time Management, Team Support and Sustainment, Marketing and Fundraising, Tournament Day Expectations and Judged Awards Overview.

More Topics: Best Practices and Sample Judged Interviews, Engineering Notebooks, Video Awards, Helping FTC Growth through Volunteers, Outreach, Mentoring and Event Hosting.

Requirements: None. This is meant to be entry level track. However, if you have anything that you would like to share with the group, bring it. This track flows best with interaction.

Supplemental: If you have last year's Engineering Notebook and would like some critique of it, please bring it along. Otherwise, our veteran teams are asked to bring their great experiences to share, along with any marketing materials that they would like to display. We'd like our new folks to see some of the banners, team shirts, and other neat branding developed by our teams.

TRACK #2 - - Robotics Hardware - Mechanical & Electrical

Purpose: This track introduces the assortment of parts in the Mindstorms, Matrix and Tetrix kits. Best Practices are reviewed so that members learn the nuances of the parts and how to use them correctly. Basic concepts of the design process and mechanical systems are covered. It also introduces the various electrical components, including the new Modules.

Who Should Attend: This track is intended for new team members involved with the design / build of the robot. It is also helpful to veteran team members who need a better understanding of the new modules that were introduced by FIRST in 2015/2016.

Mechanical Topics: The Design Process, Kit of Parts, Brainstorming, Tying the Challenge to Robot Design, Mechanical Systems, Build-a-Bot Lab

Electrical Topics: Basic Electrical Devices, Wiring your Robot, Power Distribution, Motors, Servos and Sensors are covered in overview fashion.

Build a Bot: In the afternoon, participants will team up to build a basic robot from loaned material (or receive assistance in building the Tetrix "Harvester" robot from their kit). This track includes the Build-A-Bot Lab. Kits for 4-5 "Jersey Bots" will be available for assembly. This year, we are also including End Effector kits. Groups of 4-5 will work together on this. If you have you own Tetrix kit and you wish to build a Bot to take home, bring your kit and we will set you in separate area of the lab.

Requirements: None. This is meant to be entry level track. However, if you have anything that you would like to share with the group, bring it. This track flows best with interaction.

Goal: Attendees who complete this track will understand the basic use of the parts and how they are properly assembled and wired into a basic, functioning, robot. The focus of this track is developing a basic familiarity with the components and their safe/appropriate use.

Supplemental: Time permitting, other topics involving alternative sensors, interface boards and electrical assembly best practices will be covered.

TRACK #3 - - Robotics Design – Beyond Basics

Purpose: This track is intended to take your team to the next level. Use of parts and materials not in the standard kit (such as sheet materials, approved alternate parts, and 3-D printing) is covered. The track examines complex design practices and iterative design, including a review of some of the complex successful robot designs from the 2015/2016 season.

Who Should Attend: This track is intended for veteran FTC members or students/mentors who already have some solid robotics experience.

Topics: Complex End Effector Design, Use of Plastics and Sheet Metal, Gears and Gear Ratios, Motor Capabilities & Limits, Omni Wheels, 3D Printing.

Topics: This year, the Track will also include a focused discussion on how to become more completive through both the design AND use of your robot.

Supplemental: Bring your tournament bot! We really love to have teams bring last year's bot so that we can share some of the great designs that we have seen. There are numerous beyond-the-kit topics which will be covered in the presentation materials. We've learned that the track is much more beneficial to all when we can reference some in-person real-life examples of best design practices. Please bring your bot and help out.

TRACK #4 - - Basics of JAVA / Android Control

Purpose: This track will teach how to set up your Software Development Environment, configure your hardware and be able to master the basics of JAVA/Android Control of your robot.

Who Should Attend: A team member who may be new to programming or JAVA is the target attendee for this hands-on track. These participants may not yet have their laptop configured (though we encourage an attempt to be made).

Start of Day: The first part of the day will be dedicated to explain configuring the environment for the Android Studio Software Development System slowly. The goal is that attendees leave the Workshop not only with a loaded laptop but can load it themselves in the future.

Topics: Installing Software, Configuring Android Devices, Mapping the Robot Configuration, Basic Programming Concepts, and Sample Program Execution.

More Track Detail: After a short review of the new electronics modules, the group will move into the configuration of your Android device as a Driver Station or Robot Controller. Next, students will be taught how to map a specific robot configuration (i.e., motor and sensor I/O locations into the Android device. Basic programming concepts will be covered and sample programs will be reviewed. Finally, the group will move into their hands-on programming work ….downloading an existing program and demonstration of it.

Requirements: Students should definitely bring a laptop and an Android ZTE Speed to participate in this Track. It is OK, in fact perhaps preferred, for two students to share a laptop and Android set up. Paired training has a number of advantages. Having your laptop with Android Studio already on it will really save time, of course.

Goal: Attendees should leave the Track with a loaded laptop, the knowledge of how to re-load it, an understanding of the software development environment, and experience in downloading a sample program, and in moving a robot.

Hardware Resource: Naturally, attendees who have a robot with the electronics modules on it, should bring it to the Track. Otherwise, students will program their Android device then mount it onto a captive NJ FTC robot for check-out. Note – This sharing of the limited number of robots means that any one team cannot tie up the bot too long for debug efforts. The more robots, the better. Please bring the new hardware if you have it.

TRACK #5 - - Intermediate Level : JAVA / Android Control

Purpose: This track teaches how to program the FTC robots using JAVA. The approach is to review JAVA code, understand the operation of functional programs (Tele-Op and Autonomous), then develop proficiency and confidence in modifying the programs. We will skip over the Android configuration and mapping materials (or treat them very lightly) and get into hands-on programming sooner. [Note – Students should attend Track #4 if that training is needed.]

Who Should Attend: This track is intended for programmers who have some experience with the new JAVA/ Android environment. If you've received your hardware, looked at the training materials on line, and tinkered SUCCESSFULLY, this more Track is for you.

Prerequisite: It is expected that the attendee has loaded the Software Development environment onto their laptop and can prove it (and some minor navigation skills) upon Check-In on Workshop day. We would hope that participants had spent some time playing with the sample programs available on the website prior to coming to the Workshop.

Start of Day: Downloading sample programs, executing them, and minor modifications will be the start of day activities. No time is to be spent in helping participants configure/load their laptop. Participants evidencing that kind of need will be assessed quickly and relocated into the reserve positions in the Basic Track before the morning proceeds too far.

Topics: JAVA Programming Basics and Understanding/Modifying Sample JAVA programs for FTC Robots. Participants will also work with very basic sensors and create some of the typical (and most useful) autonomous mode programs.

Requirements: Students should definitely bring a laptop and an Android ZTE Speed, to participate in this Track. Your laptop should already have Android Studio loaded on it. See the Hardware Resource comment for Track #4 (i.e., bring your own robot of you will be sharing a captive with other class members).

Goal: Throughout the Track, participants will learn more and more about basic JAVA programming and will be given assorted challenges to program, debug and demonstrate. The focus will be developing a proficiency in programming Tele-Op and Autonomous mode ….with a variety of scenarios and perhaps one basic sensor (but not many).

TRACK #6 - - Advanced Level : JAVA / Android Control

Purpose: This track is intended for programmers who have experience with the JAVA/ Android Control. If you participated in FTC last year or have tinkered extensively with it on your own, this more advanced Track is for you.. We will skip over the Android configuration and mapping materials and get into hands-on programming very early in the Track. In addition to modifying some sample programs, this Track will delve more deeply into the use of various sensors with the JAVA/Android controlled robots. Autonomous mode, including Line Following and Ultrasonic guidance of the robot will also be covered.

Who Should Attend: Participants in this Track have been JAVA Programmers with teams in the 2015/2016 season or folks who already have a basic proficiency in JAVA programming.

Start of Day: Similar to the Intermediate Track, folks come with a fully loaded and ready-to-go laptop. After a beginning exercise, to assess that all have the basic skill level to continue, the Track moves into the variety of sensors available for use in FTC. Those who do not prove themselves on the beginning exercise will be asked to relocate to the Intermediate Track.

Topics: Working with Sensors, Autonomous Mode, Software Engineering & Best Practices, Sensor Challenge Hands-On Workshop, and Introduction to Android App Inventor.

Material Requirements: See Track #5 for the recommendation about laptops and Android devices.

Supplemental: In addition to standard sensors, alternate sensors will be addressed, along with more advanced programming techniques. A survey to be sent to the Advanced Track participants prior to the Workshop in order to solicit sensors-of-interest information.

TRACK #7 - -Basics of PTC CAD Software Tools

Purpose: Attendees will receive an overview of PTC software such as the WindChill collaboration tool through which models may be created and stored. The CREO modeling application will be taught and students will learn how to attach parts from the existing library of model to design mechanical subassemblies.

Who Should Attend: If your team has not yet taken advantage of the great CAD Software package, made available by PTC without charge, here's your opportunity.

Prerequisites: This track assumes no prior CAD knowledge or experience. Help in "getting started" with PTC software is the goal of this track.

Topics: CREO, WindChill, Library of Part Models, Assembly of Part Models to Mechanical Subassemblies

Requirements: To get the most out of this track, student needs a laptop with the free PTC software loaded on it. Those who apply for this Track will receive guidance on how to download the software prior to coming to the Workshop. We will have the ability to download the software but your WindChill account must already have been set up at home. This is not difficult to do.

This track is largely comprised of hands-on CAD modeling and keyboarding. PTC may bring a few loaner laptops with them. Having your own laptop properly loaded at, or before, the event is a major milestone for many teams. Smart to do.

TRACK #8 - -Intermediate & Advanced PTC Topics

Purpose: The Track addresses more advanced PTC topics and is useful for those who have used the CAD modeling tool in a superficial way and wish to develop a stronger understanding.

Who Should Attend: If the student has successfully mastered the basic of Creo and would like to explore some of the advanced features, this Track is for you.

Prerequisites: This track assumes that the student arrives with their own PTC-loaded laptop and that they are able to navigate around the Creo application with relative ease.

Requirements: To get the most out of this track, student needs a laptop with the free PTC software loaded on it. This track is largely comprised of hands-on CAD modeling and keyboarding. Little time will be spent on basic set up during this Track. If that kind of help is needed, please register for the Basic PTC Track.

Topics (Tailoring): Teams signing up for PTC Training will be asked to advise NJ FTC regarding their experience level. If there are enough participants who have already been working with the PTC software, and are ready for more, it is possible to augment Track #8 with some extended training topics such as ….: Analyzing a Model, Part Modeling, Assembly Modeling, Structure and Drivetrain Subassemblies, Simulating and FMEA.

- o Creating a Drawing Package with PTC.
- o Exploded Assembly Drawing with Bill of Materials
- o Robot System Design in Creo
- o Robot Sub-System Definition
- o Drivetrain Design
- o System Integration
- o Dynamic Simulation
- o Advanced Part Creation (including exporting an STL file for 3D Printing)