WRRF Fall Workshops
2021

Registration

Register at https://forms.gle/Q5da9pYPeArAYkfa8 by end of day Friday, September 10.
Anyone after that will have to sign up on site as a walk-in. Note that workshops can be canceled at each presenter's discretion based on projected attendance, so please sign up as early as possible.

Rooms will be announced and posted at the event based on number of signups per workshop.

Attendance is $5 per attendee, except volunteers.
This covers snacks and supplies for you, and lunch for the volunteers!
You can pay with any of the following methods:
- Cash, when you check in at the event
- Check, when you check in at the event
- Zelle – send to Treasurer@WRRF.org
- PayPal – send to Treasurer@WRRF.org

If you will be paying with cash or check *and* will be coming late, please have a teammate/mentor check you in and cover your cost.

If you are paying via Zelle or PayPal, payment is due prior to the start of the event. The fees (typically 1-3%) for these online payments, if assessed, are in addition to the registration payment.

Teams can also pay as a group for all attending members via any of the above methods. The individual responsible for paying should be sure to put the team's number in the memo line of any check or digital payment, and, if paying digitally, should fill out the group payment info section on the registration form.

Teams can obtain a group discount (every 5th member free) via any of the following methods:
- Checking in as a group on the day of while paying via cash or check. We suggest having a representative from the team come to check-in with a list of all team members present.
- Paying as a group via digital payment.

For example, if you had a group of 10 members, you only need to pay for 8 ($40).

To modify or cancel your registration:

Use the form edit link provided to you after submission (change all your sessions to 'None' to let us know we should cancel it). If you lose this link, you can just submit a new form and note in the comment box that this is an updated form and that we should delete the old one.

Transit & Directions

This document will be updated with more details regarding these items at a later date.

Food

Attendees: Bring your own lunch, but we'll provide refreshments.
Presenters/Other Volunteers: Lunch is on us!

Check-In

Details on check-in location will be shared at a later date.

If you are paying with cash or check, please have that ready with you when you check in.

If you paid with Zelle or PayPal individually, please be prepared to show an email receipt, screenshot of your statement, or any other proof of your payment.

If your team paid for you, let us know what team you're from and we'll check it against our list of teams that paid as groups.

COVID Precautions

As per host district regulations, all attendees and volunteers – whether vaccinated or unvaccinated - are required to wear masks at all times during the event, except when not in close proximity with others. If you need some air, please wander off to an isolated area before taking off your mask.
We will also be disinfecting commonly touched surfaces in between each session, and encouraging presenters to keep windows and doors open to maximize ventilation.

Agenda

Time						
8-8:45	Attendee Check-In and Registration					
8:45-8:55	Event Kickoff and Welcome Announcements					
9:00-10:30	**Intro to Python Programming** Nick Carpenedo, FRC 6884 Programming Lead & Co-Captain	**Basic & Intermediate Electronics** Mike Schmit, WRRF	**Intro to OnShape** Tamara Kawa, FRC 1967 Alum/Mentor	**The Ins & Outs of Drivetrains** Jun Park, FRC 668 Design Captain	**Leadership & Mentor Roles on a Team** Lonny Weissman, FIRST Senior Mentor	
10:30-10:45	Snack Break					
10:45-12:15	**Intro to Java** FTC 9656	**Intro to Robot Subsystems - Drivetrain, Sensors, and Electronics** FRC 846	**Basic 3D Printing** Nick Carpenedo, FRC 6884 Programming Lead & Co-Captain	**Elevator Design** Anand Rajamani, FRC 1072 & 6619 Mentor	**How To Get Sued, Go To Jail, And Die Doing Robotics (Or Not)** Chris Kuszmaul, FRC 1967 Teaching Faculty Mentor	
12:15-1:15	Lunch Break					
1:15-2:45	**Intro to FRC Programming with a Mini FRC Robot** FRC 670	**Intro to Robot Subsystems - Electrical and Pneumatics** FRC 846	**Intermediate/ Advanced Design** Anand Rajamani, FRC 1072 & 6619 Mentor		**So You Want to Win an Award?** Nick Hammes, Google	**Match Strategy** Aidan Ferrer, FRC 1967 Co-Director
2:45-3:00	Snack Break					
3:00-4:30	**Finding Optimal Robot Autonomous Paths** Sid Kannan, Team 846	**Control & PID Programming for Beginners** Nick Carpenedo, FRC 6884 Programming Lead & Co-Captain	**Design for Manufacturability - FIRST Edition** Tamara Kawa, FRC 1967 Alum/Mentor	**Arm Design** Anand Rajamani, FRC 1072 & 6619 Mentor	**Great Outreach Opportunity: Hypercube's Sumobot Initiative!** FTC 14341	
4:30-4:45	Event Wrap-Up and Closing Announcements					

Morning Session 1 (9:00am-10:30am)

The italicized text with each title indicates suggested audience(s); please check prerequisites, if any, for details.

Basic & Intermediate Electronics *(Beginner, Intermediate)*
Mike Schmit, WRRF

[FRC - Lecture] For electronics members of the team. Covers electronics principles, concepts, and theory from the ground up – voltage, resistance, capacitance, Ohm's Law etc.

Introduction to OnShape *(Beginner)*
Tamara Kawa, FRC 1967 Alum/Mentor

[FTC, FRC - Hands-On] Are you new to CAD? This workshop will cover the basics of creating parts and assemblies in Onshape, a common online-based CAD platform. If you have no experience in CAD, or maybe you used a different software and could use some help, this is the course for you!

Prereqs & supplies: Please make an education account in advance! Also, bring a 3-button mouse and a computer charger.

Introduction to Python Programming *(Beginner)*
Nick Carpenedo, FRC 6884 Programming Lead & Co-Captain

[FLL, FTC, FRC - Lecture, Hands-On]. Presentation covering basic Python programming with simple hands-on coding exercises. Not FIRST specific.

Prereqs & supplies: Computer with internet access recommended.

Leadership & Mentor Roles on a Team *(All Audiences)*
Lonny Weissman, FIRST Senior Mentor

[FTC, FRC - Discussion, Q & A] How should/may leadership work on a team? Is failure OK? This is a class on mentor roles in guiding a team without overriding the team members; setting reasonable and achievable goals; and making sure you reduce conflict and allow for student & team member growth.

The Ins & Outs of Drivetrains *(All Audiences)*
Jun Park, FRC 668 Design Captain

[FRC - Lecture, Discussion, Q & A] Goes into the depths of all the most common drivetrain designs. Teaches the numbers, the formulas, and the tools you might need in order to design one yourself.

Prereqs & supplies: Algebra II and Trigonometry

Morning Session 2 (10:45am-12:15pm)

The italicized text with each title indicates suggested audience(s); please check prerequisites, if any, for details.

Basic 3D Printing *(Beginner)*
Nick Carpenedo, FRC 6884 Programming Lead & Co-Captain

[FLL, FTC, FRC - Lecture, Features live demonstration of 3D Printer] Presentation covering basic 3D printing and techniques to create a strong and functional printed part. Non-FIRST specific.

Introduction to Java *(Beginner)*
Amogh Ramachandra, FTC 9656 Co-Captain
Amaan Mahammad, FTC 9656 Programming Lead

[FLL, FTC, FRC - Lecture, real time coding exercises] Intended for complete beginners. We will be covering operators, logic, loops, arrays, and possibly methods, while doing many practice problems.

Prereqs & supplies: Laptop, Repl.it account or Java IDE (IntelliJ, Eclipse, etc.)

Continue To Live At Home: How To Get Sued, Go To Jail, And Die Doing Robotics (Or, Rather, Not) *(All Audiences)*
Christopher L. Kuszmaul, FRC 1967 Teaching Faculty Mentor

[FLL, FTC, FRC - Lecture, Discussion] You wonder whether it is a good idea to let the students make that part, in that meeting off campus, with that mentor who nobody tells what to do, using that tool somebody bought with that money somebody got from that grant that was earmarked for...something. As a student, you think this is all fine, and this sort of thing is ridiculous to worry about. Everything is fine, you have always done it that way, no worries, you're good...until your team is *that* team. How to get your supervision, safety, and decision making right before an outside force steps in to do the job for you; a force like a lawsuit, or law enforcement, or Death himself.

Introduction to Robot Subsystems - Drivetrain, Sensors, and Electronics *(Intermediate)*
Sid Kannan, FRC 846 Co-President;
Ankith Madadi, FRC 846 Software Lead;
Yuvraj Dhadwal, FRC 846 Vice President
Lakshya Kalra, FRC 846 Member

[FRC - Lecture, Q & A] Explore the physics of turning a six-wheel "West Coast Drive" robot. See the voltage wave forms of a speed controller that powers DC motors, and those of the quadrature encoder that measures distance and speeds. This overview is intended to give intermediate to advanced students a solid start in building and understanding FIRST robots.

Prereqs & supplies: Experience in physics recommended, but not required.

Elevator Design *(All Audiences)*
Anand Rajamani, FRC 1072 & 6619 Mentor

[FRC - Lecture] Learn how to design elevators! Defining requirements, selecting motors, and designing bearing blocks, routing, and frames. Example designs available.

Prereqs & supplies: Some familiarity with what elevators are in FRC.

Afternoon Session 1 (1:15pm-2:45pm)

The italicized text with each title indicates suggested audience(s); please check prerequisites, if any, for details.

Intermediate/Advanced Design (*Intermediate, Advanced*)
Anand Rajamani, FRC 1072 & 6619 Mentor

[FRC - Lecture] Learn how to design reliable and effective mechanisms. We'll cover the building blocks of good design and lots of applications of COTS parts to make design easy.

Prereqs & supplies: Know basics of mechanical design. CAD recommended, but there will be no CAD in the class.

Introduction to FRC Programming: Programming a Mini FRC Robot (*Intermediate, Advanced*)

Pallavi Das, FRC 670 Software Lead
Katia Bravo, FRC 670 Software Lead
Tarini Maram, FRC 670 Pit Boss
Aaditya Raj, FRC 670 Strategy Lead

[FRC - Lecture, Discussion, Q & A, Hands-On] Introduces the concepts behind FRC Programming, specifically Command Based Programming and PID Control. Members will be able to practice coding a PID Command on Mini FRC Robots.

Prereqs & supplies: Intended for members with prior programming experience, and knowledge of basic calculus.

Introduction to Robot Subsystems - Electrical and Pneumatics (*Beginner, Intermediate*)
Sid Kannan, FRC 846 Co-President
Arjun Kumar, FRC 846 Machining Lead
Aayush Talluri, FRC 846 Member
Lakshya Kalra, FRC 846 Member

[FRC - Lecture, Q & A] Find tips on how to make clean, secure electrical connections, and measure the force of a pneumatic actuator. This overview is intended to give rookie to intermediate students a solid start in building and understanding FIRST robots. Intended for new members getting started in FRC!

Match Strategy (*All Audiences*)
Aidan Ferrer, FRC 1967 Co-Director

[FRC - Lecture] We will discuss some key aspects to developing strategy, such as alliance member roles, tactics, creating backup plans, and robot positioning to help you understand how to make the most with what you've got.

Prereqs & supplies: Would prefer teams know the basics of the 2018 through 2020 seasons for the sake of streamlined discussions. Will be open to reviewing match videos from attendees who really want their matches discussed.

So You Want to Win an Award? (*Beginner, Intermediate*)
Nick Hammes, Google, Technical Program Manager

[FTC, FRC - Lecture] How to assess award criteria, and target a team towards earning that award

The italicized text with each title indicates suggested audience(s); please check prerequisites, if any, for details.

Arm Design *(Intermediate, Advanced)*
Anand Rajamani, FRC 1072 & 6619 Mentor

[FRC - Lecture] Learn how to design an arm. Select axles, motors, gear ratios, and structures for an arm with various loads. Emphasis on reliability and ease of design. Meant for people who have some exposure to FRC and want to learn more (no CAD needed).

Prereqs & supplies: Some level of exposure to FRC mechanical systems. Knowing what a motor and a gear ratio are.

Control & PID Programming for Beginners *(Beginner, Intermediate)*
Nick Carpenedo, Team 6884 Programming Lead & Co-Captain

[FTC, FRC – Lecture] Presentation covering how hardware components, such as motor controllers and sensors, are controlled through code and how they can interact with each other. Also covers basic closed loop control. Concepts will be covered thoroughly but specific code and syntax will be explained only cursorily.

Prereqs & supplies: None required, but basic programming knowledge would be beneficial.

Design for Manufacturability - FIRST Edition *(Intermediate, Advanced)*
Tamara Kawa, FRC 1967 Alum/Mentor

[FTC, FRC, non-FIRST project stuffs - Lecture, Discussion] Design for Manufacturability (DFM) and Design for Assembly (DFA) describe practices that optimize various aspects of a design, from lifespan to maintenance. We'll discuss several elements of DFM and DFA, such as materials selection, common modes of failure, and tolerancing, and we will explore case studies in and out of FRC. This is aimed at more experienced students (mentors welcome too!) and if you have any specific examples of your own you're welcome to share!

P:rereqs & supplies: Previous design experience is good - especially if it was on a physical robot. Knowledge of common materials and parts used on robots would also help, as would some physics and math, but not required.

Finding Optimal Robot Autonomous Paths *(Advanced)*
Sid Kannan, Team 846 Co-President

[FRC - Lecture] Learn how to use state space modeling for differential drivetrain to generate and follow autonomous paths that push your robot to the limits of its capabilities! This talk will delve into the mathematics behind how to model a system, and how we can use systems modeling to solve the problem of trajectory generation.

Prereqs & supplies: An understanding of mechanical physics is strongly recommended. A conceptual understanding of derivatives and matrix algebra is also recommended, but this will be explained in the lecture.

Great Outreach Opportunity: Hypercube's Sumobot Initiative! *(All Audiences)*
Sarone Kelete, FTC 14341 Business Team
Wesley Jeng, FTC 14341 Business Team

[FTC - Lecture, Q & A] Hypercube has been running an outreach program called the "Sumobot Initiative" for the last 3 years, bringing aspects of STEM and business to Title 1 schools around the Bay Area. One of the key aspects to this program is its sustainability, which is why we will be teaching participants how to adopt the program. This includes going over the class structure and curriculum, needed materials, and general tips on how to have the largest impact on your school of choice.

Planning Committee

Amogh Ramachandra FTC 9656	Clayton Ou WRRF Workshops Manager	Michael Tun Zan FTC 8375	Nick Gellrich FRC 100	Nico Paoli FTC 8375
Nikhita Law FRC 4159	Shaunak Dam FTC 9656	Shweta Arun FRC 2135	Victoria Liao FRC 8	

About Western Region Robotics Forum

Western Region Robotics Forum (WRRF) is a registered 501(c)(3) nonprofit formed to contribute in a meaningful way to STEM education for K-16 students. For more information, visit wrrf.org.