



CHARGING CHAMPIONS

FRC TEAM 6560

Participating in FIRST Competitions since 2011

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CAD Engineering Notebook

<i>Picture</i>	<i>Explanation</i>
	<p><u><<Date>></u></p> <p>Work Done:</p>

CAD Engineering Notebook

This year, we used Solidworks Student 2016.

<u>Picture</u>	<u>Explanation</u>
	<p><u>November 26th, 2017</u></p> <p>Work Done:</p> <p>We had learning session with a mentor in the CAD field, Raul Cruz. He taught us how to use Solidworks and gave us some practice parts to make.</p>

<u>Picture</u>	<u>Explanation</u>
	<p><u>January 8-12th, 2017</u></p> <p>Work Done:</p> <p>We designed the bars for the chassis. The bars on the side have slots for the wheel hubs, with one hole in the center for the gearbox.</p> <p>The design will be 33" by 28", with a smaller 26" bar in the front 3" inside the chassis so that the gear mission has some extra space.</p>

<u>Picture</u>	<u>Explanation</u>
 	<p>January 13-18th, 2017</p> <p>Work Done:</p> <p>We realized that the chassis size we had designed did not include an extra 4" on the sides for the wheels, so we had to change the size of the bars to 21" by 32", with the gear bar and the back bar the same length.</p> <p>The new chassis looks like picture 1. There is still space in the front for the gear, but the main change is that the bar in the back is the same length as the bar in the front.</p>
	<p>On the longer, 32" bar, we still had the holes for the gearbox and for the versa wheel hubs. However, we changed the spacing. There is 6" between the end of the bar and the center of the first versa hub.</p> <p>On the short bar, there are holes so that we can attach the gear mission to the bar. Other than that, there are no new holes.</p>

<u>Picture</u>	<u>Explanation</u>
	<p><u>January 19th, 2017</u></p> <p>Work Done:</p> <p>We designed the electronics plate. In the past few years, we have put electronics on the side. However, this year, we decided to put them on the bottom because we didn't want the electronics to be too exposed in this year's ball shooting game.</p>

<u>Picture</u>	<u>Explanation</u>
	<p><u>January 21st, 2017</u></p> <p>Work Done:</p> <p>We finished the entire chassis!</p>

<u>Picture</u>	<u>Explanation</u>
	<p>January 22nd-27th, 2017</p> <p>Work Done:</p> <p>We started to design the gear mission. We wanted a piece of metal that would not bend too much but had some give to give the gear in, so we decided on a thickness of 0.125". We realized that it was best to angle the gear collector so that the gear could be contained properly. We will test it out when we are done building it.</p>
	<p>We plan on adding flaps to the sides to hold the gear in. The will be controlled by pneumatic pistons and have a 90 degree angle so that they can stop the gear from falling out if we suddenly brake on the field.</p>

<u>Picture</u>	<u>Explanation</u>
	<p>January 28th-31st, 2017</p> <p>Work Done:</p> <p>We had to decide how to attach the gear to the chassis. Previously, we had thought that we could attach the gear mission right to the bar, but we realized that the metal was bending too much. We decided to support it in certain key areas such as the extremities. We finished the gear mission!</p> <p>Because of that, we decided to rivet the support bar to the chassis from the top.</p> <p>Side note: We also helped the people who were building the second robot with the chassis size and the rivets.</p>

<u>Picture</u>	<u>Explanation</u>
<p>February 1st-7th, 2017</p> <p>Work Done:</p> <p>We started designing the hanger mission. Our first plan was to use velcro on the robot, but we did not know if it was legal in the game rules. We made one version of the hanging for velcro and another with a loop in the rope for hooks to catch on to. We are done with the hanger mission!</p>	
<p>The rope will look like this with hooks to grab onto the loop.</p>	
<p>This is the velcro version. There are no hooks, and the flywheels will be covered in one side of velcro to attach to the other side.</p>	

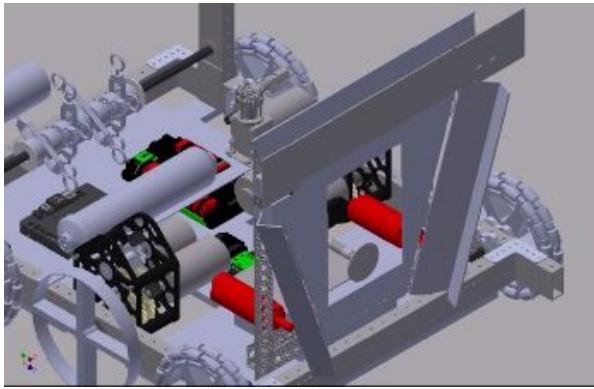
<u>Picture</u>	<u>Explanation</u>																											
<p>Technical drawing showing two views of a robot assembly. View 1 is a front view with a large wheel at the top and a smaller wheel at the bottom. View 2 is a side view. Below the drawings is a detailed parts list table.</p> <table border="1"> <tr> <td>Part No.</td> <td>Description</td> <td>QTY</td> </tr> <tr> <td>1</td> <td>Robot Body</td> <td>1</td> </tr> <tr> <td>2</td> <td>Front Wheel</td> <td>1</td> </tr> <tr> <td>3</td> <td>Rear Wheel</td> <td>1</td> </tr> <tr> <td>4</td> <td>Motor</td> <td>1</td> </tr> <tr> <td>5</td> <td>Gears</td> <td>1</td> </tr> <tr> <td>6</td> <td>Brackets</td> <td>1</td> </tr> <tr> <td>7</td> <td>Frame</td> <td>1</td> </tr> <tr> <td>8</td> <td>Bumper</td> <td>1</td> </tr> </table>	Part No.	Description	QTY	1	Robot Body	1	2	Front Wheel	1	3	Rear Wheel	1	4	Motor	1	5	Gears	1	6	Brackets	1	7	Frame	1	8	Bumper	1	<p>February 8th, 2017</p> <p>Work Done:</p> <p>We attached all of the robot together!</p>
Part No.	Description	QTY																										
1	Robot Body	1																										
2	Front Wheel	1																										
3	Rear Wheel	1																										
4	Motor	1																										
5	Gears	1																										
6	Brackets	1																										
7	Frame	1																										
8	Bumper	1																										

<u>Picture</u>	<u>Explanation</u>									
<p>Technical drawing showing four side views (labeled A-A) and two front views (labeled B-B) of bumper components. Below the drawings is a parts list table for the bumper.</p> <table border="1"> <tr> <td>Part No.</td> <td>Description</td> <td>QTY</td> </tr> <tr> <td>1</td> <td>Bumper</td> <td>1</td> </tr> <tr> <td>2</td> <td>Brackets</td> <td>2</td> </tr> </table>	Part No.	Description	QTY	1	Bumper	1	2	Brackets	2	<p>February 9th, 2017</p> <p>Work Done:</p> <p>We designed the bumper for the robot.</p> <p>We also placed them on the robot. We had to attach brackets around the frame so that the bumper had space between the wheels.</p>
Part No.	Description	QTY								
1	Bumper	1								
2	Brackets	2								

<u>Picture</u>	<u>Explanation</u>
<p>Feb 10th, 2017</p> <p>Work Done:</p> <p>We designed a hinged plexiglass piece that goes across the chassis that holds the pneumatic compressor and air tank.</p> <p>Here, it holds the compressor and the air tank. These were the best choices for the hinge because they did not have good positions.</p>	<p>Feb 10th, 2017</p> <p>Work Done:</p> <p>We designed a hinged plexiglass piece that goes across the chassis that holds the pneumatic compressor and air tank.</p> <p>Here, it holds the compressor and the air tank. These were the best choices for the hinge because they did not have good positions.</p>

<u>Picture</u>	<u>Explanation</u>
<p>Detailed description of the drawing: This technical drawing illustrates a complex mechanical system. At the top, there's a front view (labeled 'A') showing a large rectangular box with various internal parts and a small cylindrical component. Below it is a side view (labeled 'B') showing a similar box with a different internal configuration. To the right, there's a more detailed view of a hanger assembly and a gear mission component. The drawing is annotated with numbers 1, 2, A, and B. At the bottom, there is a standard engineering title block with fields for 'DESIGNER', 'DRAWN BY', 'DATE', 'TITLE', 'REV', and 'SCALE'. The title block specifies 'SEE DWG. NO. A Backing' and 'SCALE 1/12 WEIGHT SHEET 1 OF 1'.</p>	<p>February 17-25th, 2017</p> <p>Work Done:</p> <p>We created an idea for a ball shooter. There would be a large box in between the hanger and the gear mission. It would shoot out from the side of the hanger so that we could shoot and drop off the gear at the same time. However, we decided against it because we didn't want to make too many major changes at the last second. Also, it was very complicated.</p>

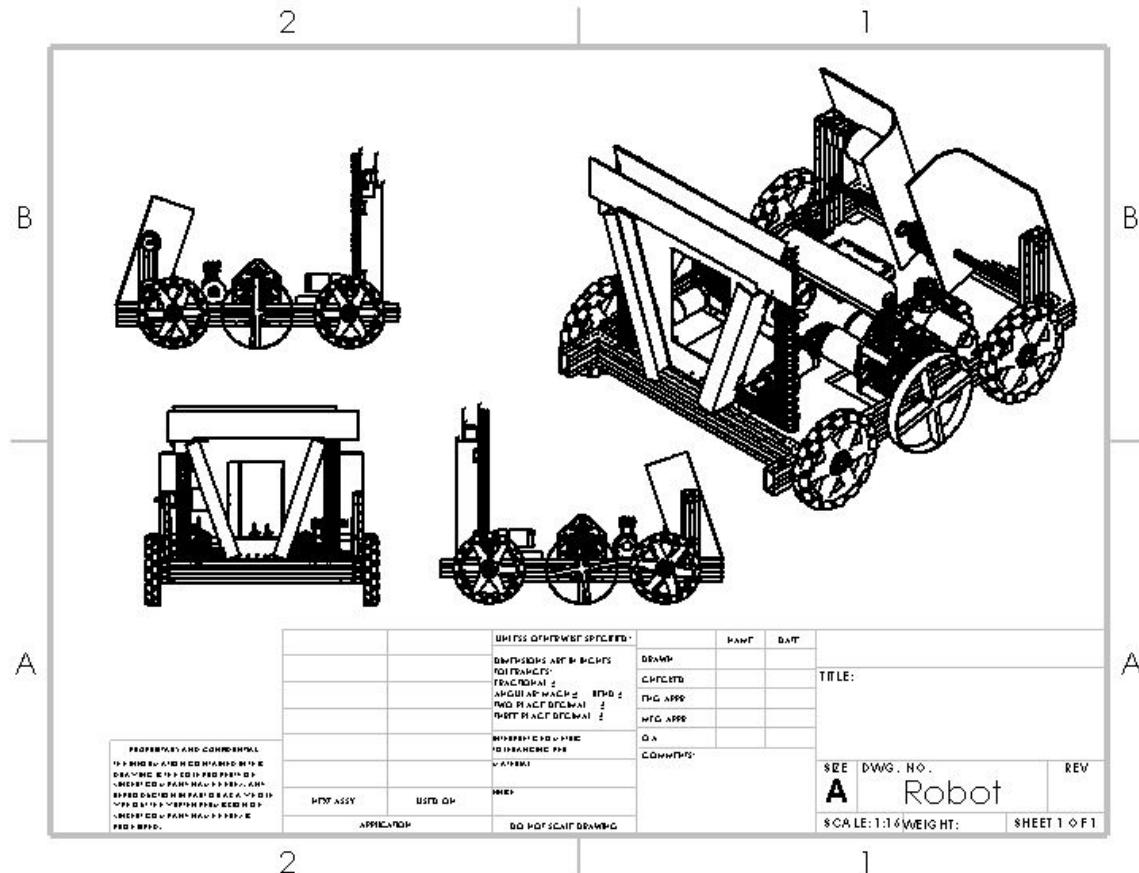
<u>Picture</u>	<u>Explanation</u>
<p>Detailed description of the drawing: This technical drawing shows the final design of the robot. It features a complex frame with multiple wheels and a gear mission component attached. The drawing is annotated with numbers 1, 2, A, and B. At the bottom, there is a standard engineering title block with fields for 'DESIGNER', 'DRAWN BY', 'DATE', 'TITLE', 'REV', and 'SCALE'. The title block specifies 'SEE DWG. NO. A Final Robot' and 'SCALE 1/14 WEIGHT SHEET 1 OF 1'.</p>	<p>February 25th- March 11th, 2017</p> <p>Work Done:</p> <p>We finished of all of the small changes to the robot and are ready for the first regional.</p>

<u>Picture</u>	<u>Explanation</u>
	<p><u>April 5th, 2017</u></p> <p>Work Done:</p> <p>We finished the CAD animation with all of the small changes and one large change, the bazooka piston in the center of the robot that pushes out the gear.</p>

Drawings

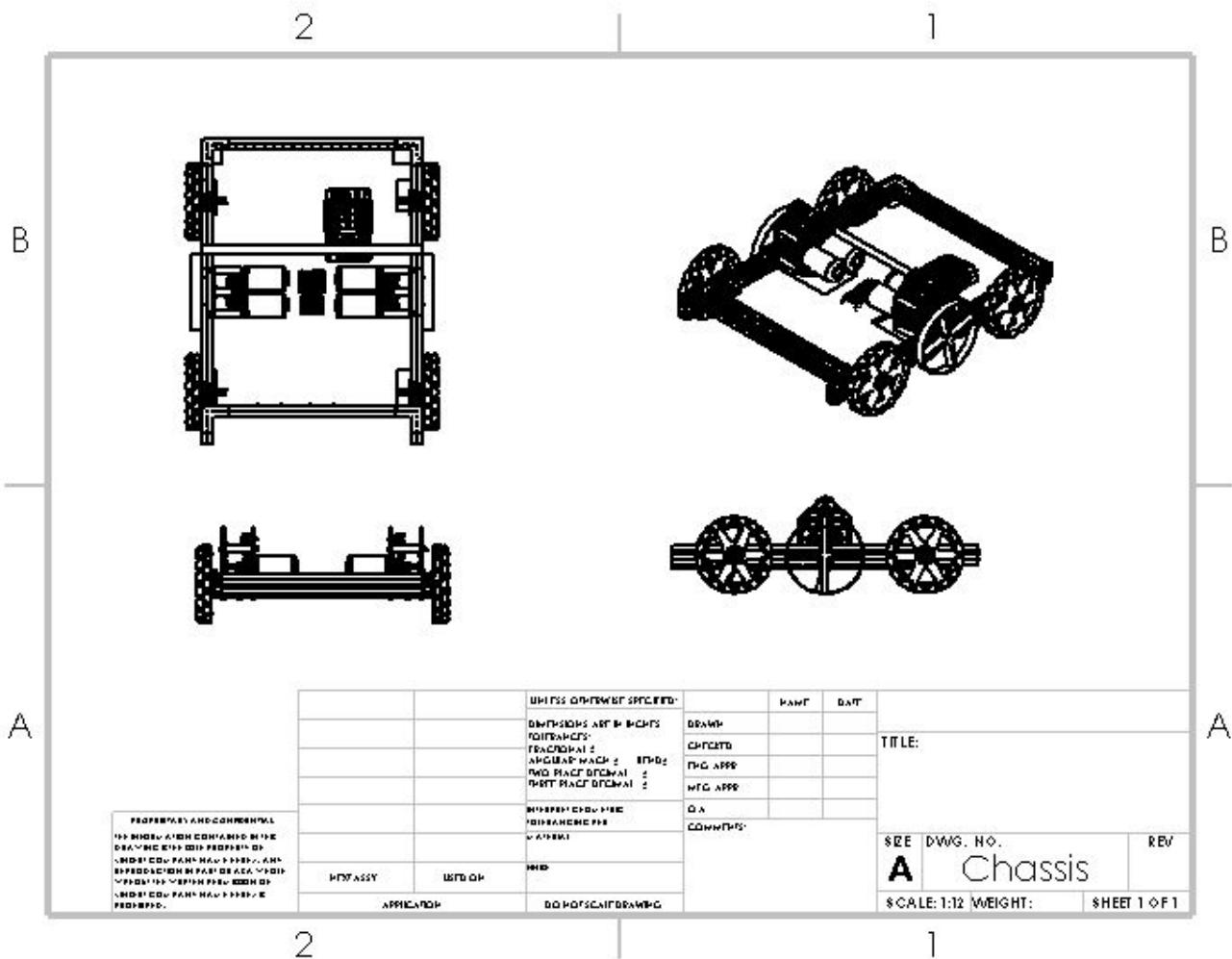
These are drawings of the parts that we have in the robot.

Robot



This is our entire robot's CAD file. There are three main subassemblies in our robot: the chassis, the hanger, and the gear mission. The next few pages will have these drawings.

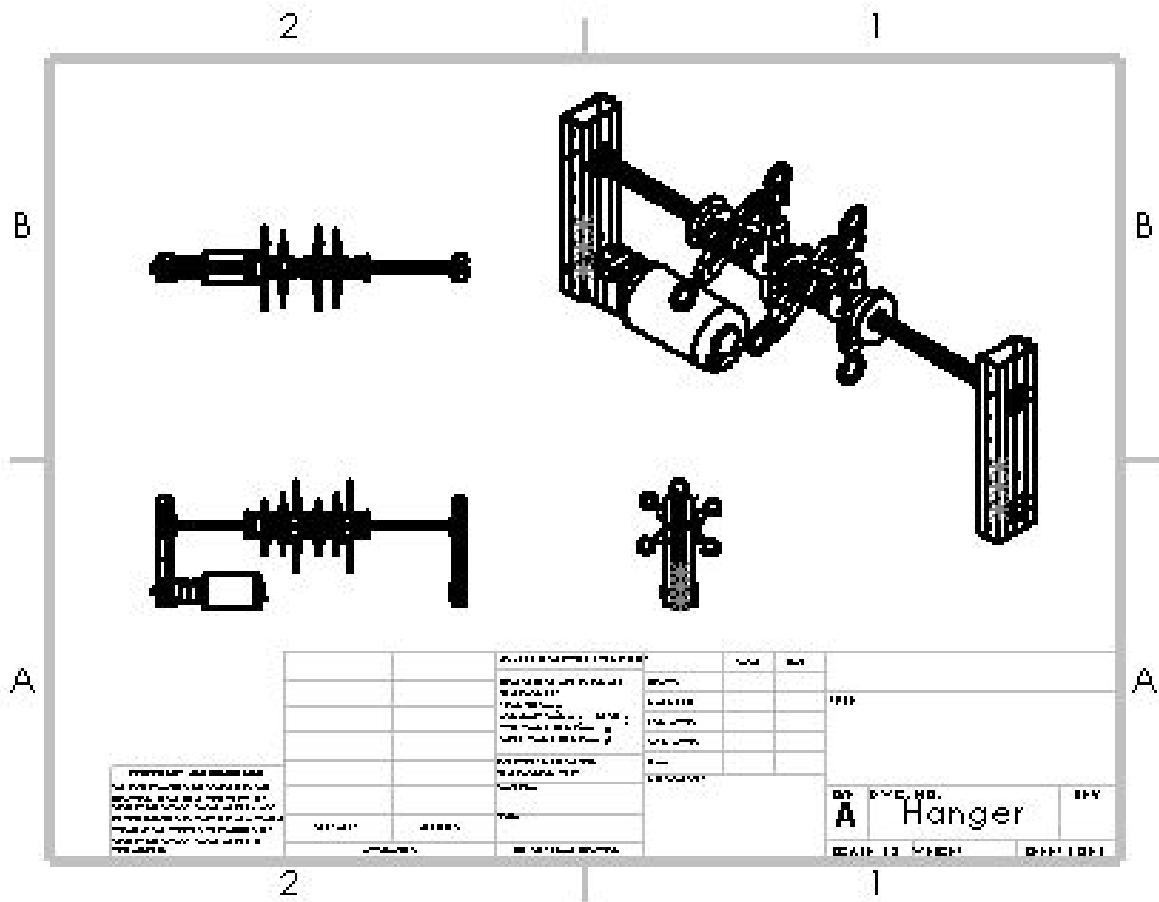
Chassis



This is our chassis. It supports the entire robot. There are four main support bars, along with a flat plate on the bottom for the electronics. The flat plate holds up the gearbox and electronics.

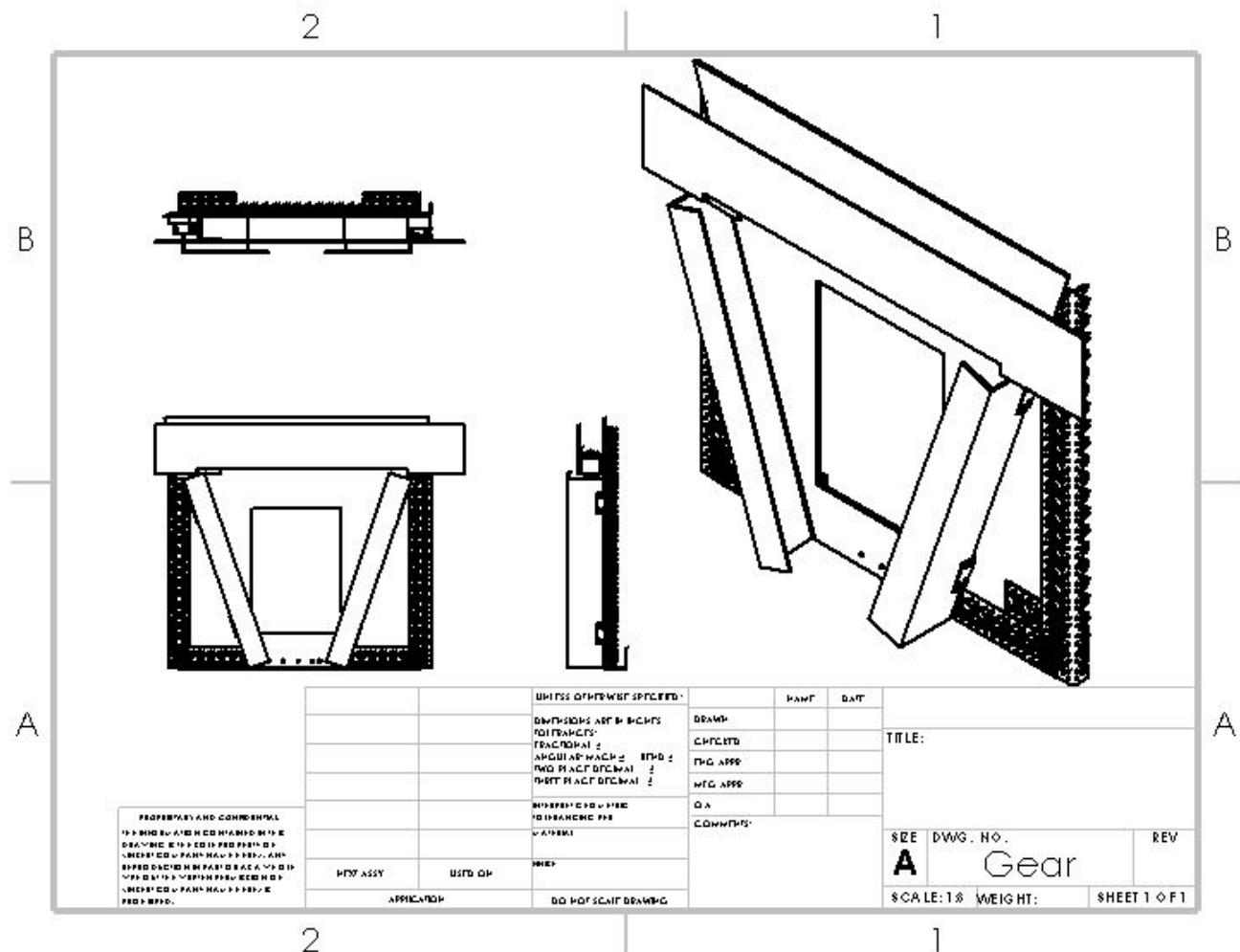
We have a six-wheel drive robot. The outer four wheels are 8" omni wheels, and the middle wheel is a plaction wheel that is slightly larger than the other wheels, which means that there is a west coast drive style drivetrain. As you can see in the innovations log part of our engineering notebook, the drivetrain style is there so that we can turn easily.

Hanger



This is our hanger. The bars on the side attach to the back of the chassis. There are multiple hooks so that there is a higher probability of the hooks grabbing the loop. On one side, there is a cim motor connected to a versaplanetary gearbox. This powers our entire hanging mission. The sprocket chain setup that connects the cim to the actual hooks is on the outside of the bar.

Gear

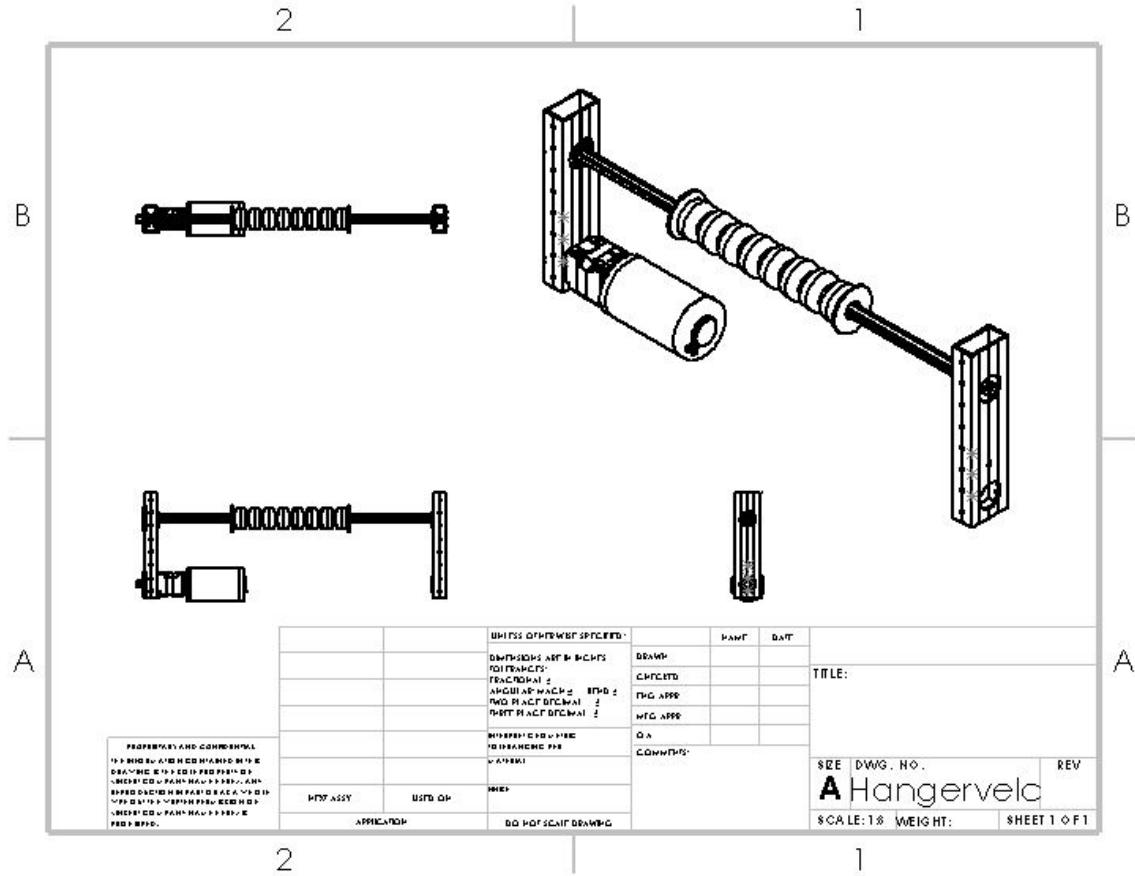


This is the main mission of our robot. There are two main flaps that keep the gear up, with pneumatic pistons to open and close the flap. There is a servo on the top that opens a flap, which guides in the gear into the assembly.

Extra Parts

These are parts that did not make it onto our main robot.

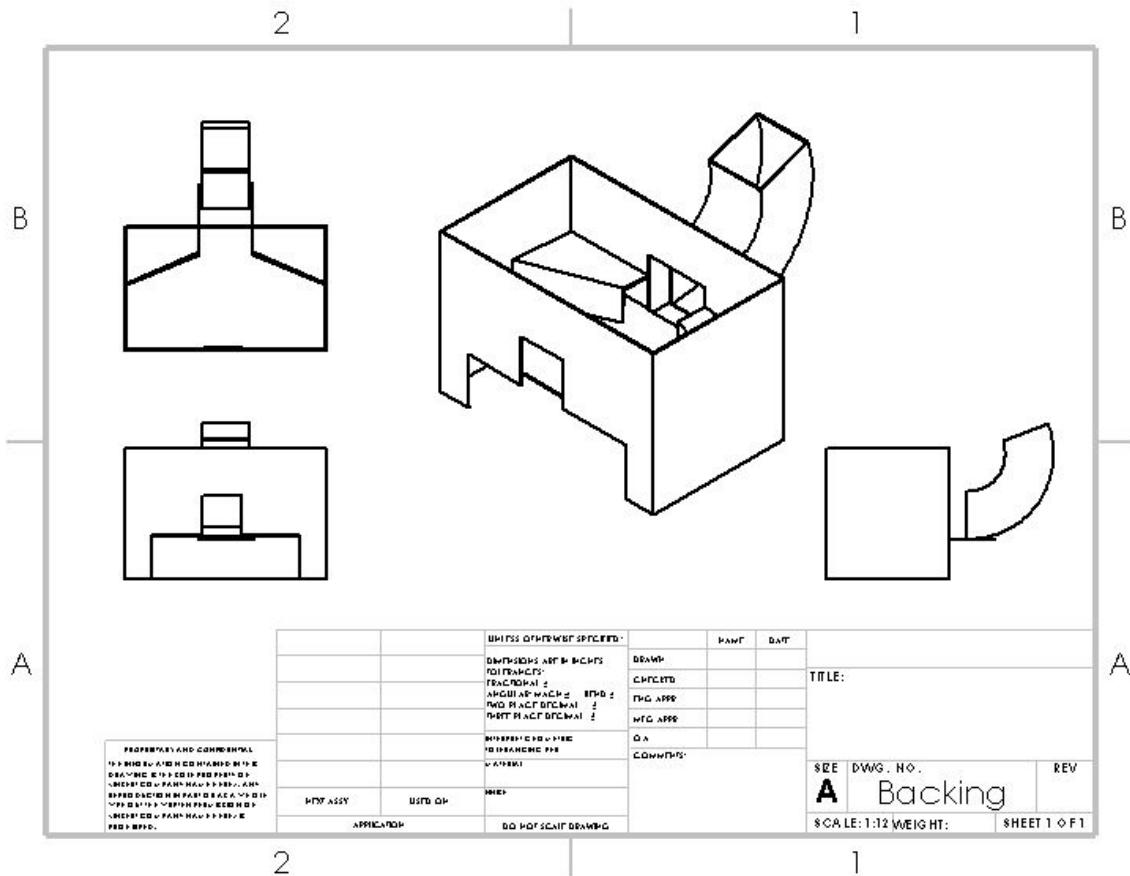
Second Hanger Design



This is our second velcro design that incorporates velcro. The wheels are covered in velcro.

We decided not to use this design because the hooks were more efficient and faster.

Ball Mechanism



This is the ball mechanism that we were planning on using. The main container held all of the balls, with a shooter on the end.

We decided not to use this because it would not be very efficient. Also, we did not want to make major changes to the robot at the last second.

CONTROL SYSTEM TIMELINE

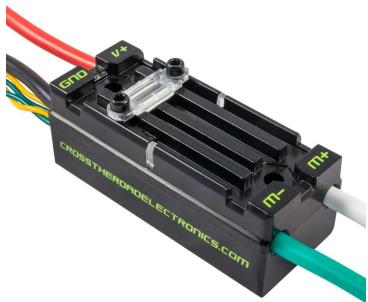
Nov 18 Began exploring components of the system; started wiring the PDP



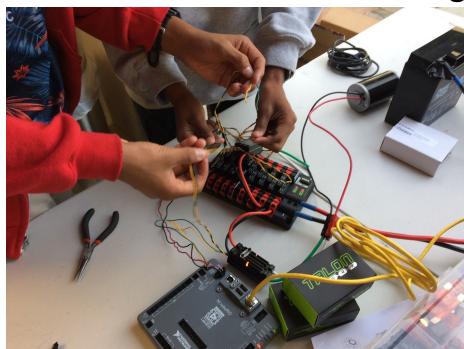
Nov 19 Downloaded Eclipse, FRC Update Suite, imaged RoboRio with JRE



Nov 20 Create rudimentary setup to get a basic Talon SRX hooked up to a CIM motor and get it spinning



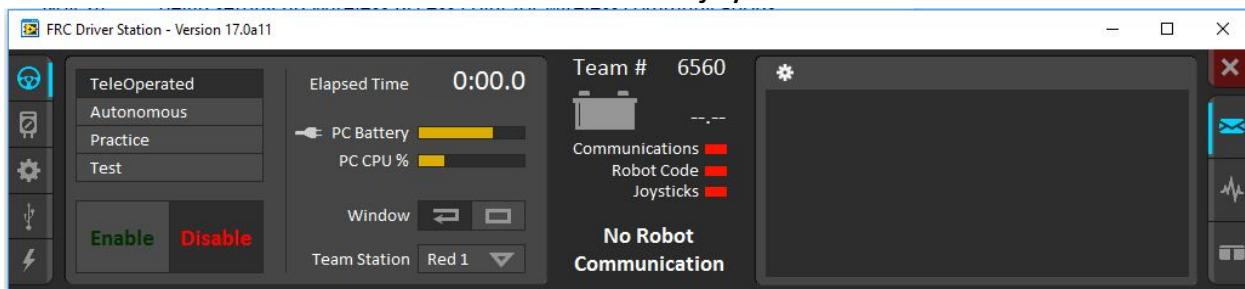
Nov 23 Begin electronics board setup and place electronics on plywood board with wiring.



Nov 24 Begin setting up Wireless Access Point for wireless communications



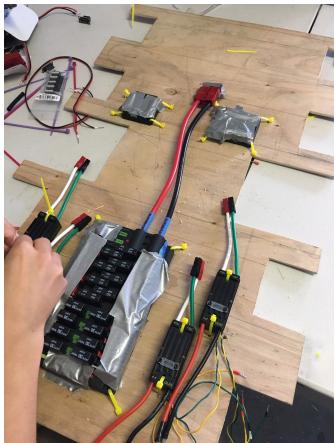
Nov 26 Established control between the joystick and the motor



Dec 3 Established basic control over pneumatics compressor and solenoids



Dec 10 Finished setting up a full electronics board on the plywood board for pre-season robot.



Dec 21 Pre-season robot completed and fully functioning! Time for a well-deserved winter break!



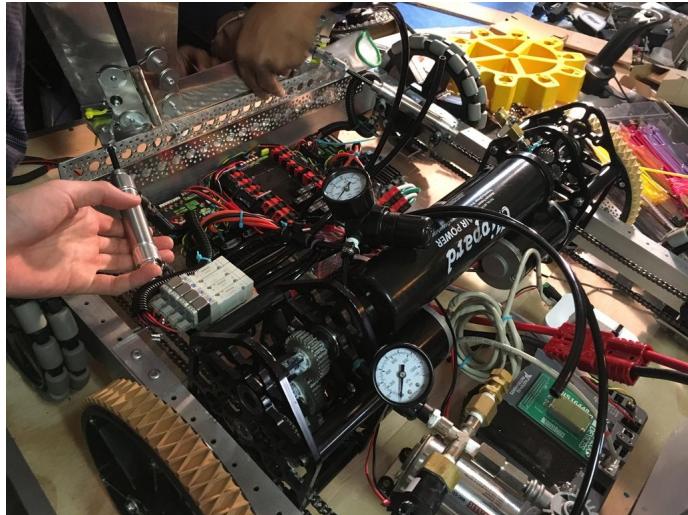
Jan 7 FRC Kickoff!!!



Jan 8 Setup github account and project

GitHub

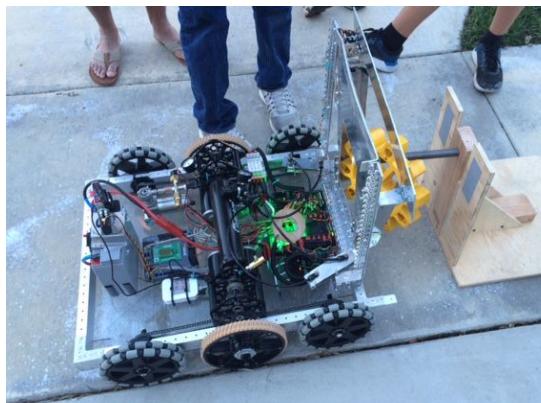
Jan 20 Start assembling electronics board with plexiglass and wiring
robot



Jan 28 Start teleop program

```
public class Robot extends IterativeRobot {  
    public static OI oi;
```

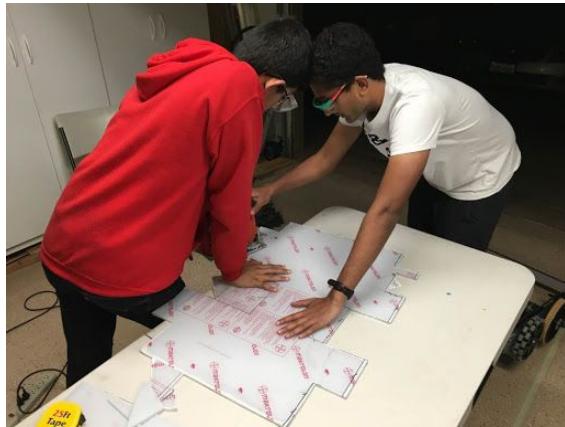
Jan 29 Basic teleop program is complete; robot components that have been added to the robot are programmed.



Feb 3 Begin programming servo that is on the gear mission with angles (or speed for 360 degree servos)



Feb 3 Begin wiring second robot.



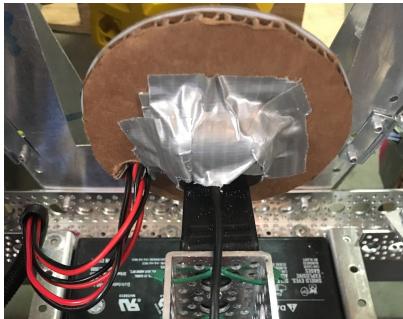
Feb 11 Rewire electronics on the main robot to make it cleaner



Feb 16 Add cameras to the robot; decide what sensors are needed for autonomous; program cameras to view on SmartDashboard



Feb 17 Setup camera to use for vision tracking



Feb 18 Wrap up any issues with electrical; finish cleaning up and finalizing wiring; program extra motor for hanging



Feb 19 Add hanging mission controls



Feb 21 Robot Stop Build Day! We will be working on our **backup robot** from now on.



Feb 26 Continue testing out driving operations and robot teleop operations this weekend. Add cameras and sensors needed for autonomous



Feb 27 Got ultrasonic sensor input to work



Mar 4 Decided to use Raspberry Pi external controller with its ultrasonic sensor as the sensor was more accurate and we could hook it up to a raspberry pi module, an external controller



Mar 5 Had problems with the robot not driving straight. Turns out that the motor controller was faulty; we switched to a different one



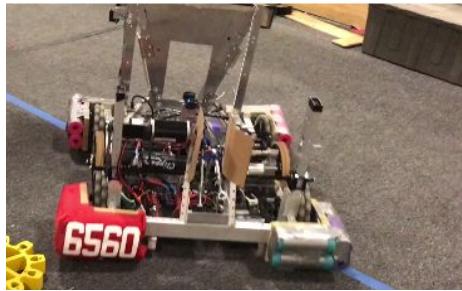
Mar 7 Successfully programmed two camera inputs on the SmartDashboard; can switch between any three cameras but can only see two at a time.



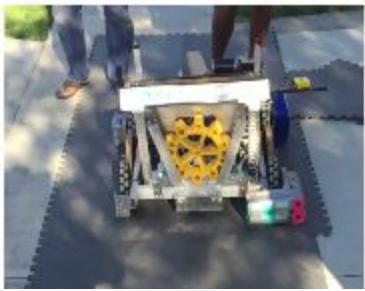
Mar 8 Went to Code Orange practice field; two of our CIM motors were not working on both sides; turned out to be a loose connection; however the robot was still not going straight when told to.



Mar 10 Continue testing out robot and fixing pending issues with speed of motors and making sure that teleop is reliable.



Mar 11 Program autonomous. Based on the calculations from Code Orange, we successfully programmed the robot to drive a certain distance, drop off the gear, and back out within 5 seconds.



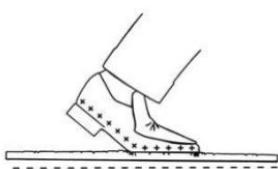
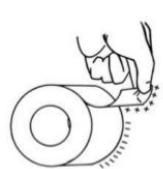
Control System Testing and Issues Log

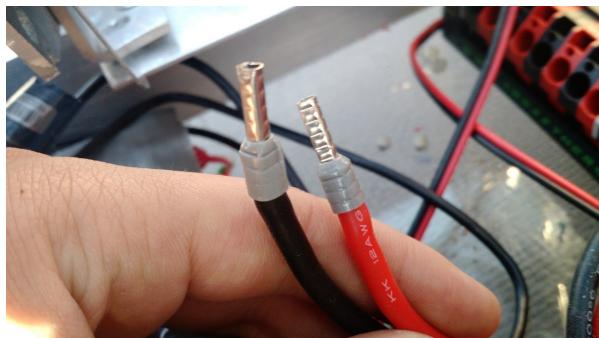
Date	Issue	Solution
10/30/2016	TeleOp: Could not spin motors based on controller input	Did not write motor1.set() command in the teleopPeriodic() method so it did not continuously update motor output
11/10/2016	TeleOp: Motors spinning too fast for operator to control.	Full throttle on the controller corresponded to 75% motor speed.
11/18/2016	Autonomous: Could not figure out how to control solenoids; using the methods predefined the wpilib did not work	We looked into the mechanical aspects and electrical; turned out that the solenoid itself was not set up and wired correctly; after fixing this issue, we manually tested out the solenoid, and confirmed that it worked manually first.
12/6/2016	TeleOp: Intake motor changes orientation too drastically, causing excessive heat generation and sparking	Set brake mode to coast to allow for smoother transition
1/23/2017	TeleOp: ArcadeDrive on a single joystick is too unreliable and control is restricted	Switched to TankDrive using both Y-axes of a XBox Controller
2/6/2017	TeleOp: Hanger can not spin backwards because of the ratchet system we implemented	Added a value of 1 to the axis and divided by 2 in order to scale the range from -1 - 1 to 0 - 1
2/7/2017	Teleop & Autonomous: Could not figure out how to control 360 degree servos accurately; they could only be controlled with speed.	We ended up sticking with the 180 degree servo for all of our applications on the robot as we could control it more easily.
2/12/2017	Autonomous/TeleOp: Running three CameraServers exceeds the bandwidth limit	Stream hanging mission camera continuously and switch between the two front cameras when needed
2/13/2017	TeleOp: Some commands meant to be run only when a button is held with the whileHeld() method did not work	Used whenPressed() and whenReleased() methods as a workaround
2/20/2017	TeleOp: In some cases, driving with 2 axes is unnecessary and difficult	Mapped A, B, X, Y buttons to drive backwards, spin clockwise, spin counter-clockwise, and drive forwards respectively
2/21/2017	TeleOp: Hanger too unreliable running at a fixed speed.	Configured hanger motor so that its speed can be controlled with a slider on the secondary controller and can be stopped/started at the push of a button

2/25/2017	Teleop: One of the servos could not be controlled regardless of which port it was plugged into	Ended up switching the servo out for a 360 degree one, which now works. We replaced it later for a 180 degree servo for simplicity of programming.
3/4/2017	Teleop: Robot was not driving straight.	Turns out that one of the motors on one side of the gearbox was not connected to a functional motor controller, so we had to connect it to a different one temporarily
3/7/2017	Teleop: We could not figure out how to view multiple camera streams on the SmartDashboard	We ended up implementing the CameraServer object differently in order to allow the robot to transmit multiple CameraServers to the driver station; however, we were still able to view only a maximum of two cameras at a time.
3/8/2017	Teleop: On each gearbox, one of the motors was not spinning and the other two are overheating	We simply unplugged the motor, replaced it with a new Anderson Powerpole, and plugged it back in, to make all four gearbox motors to work.
3/10/2017	Autonomous: When dropping a gear onto a lift, the robot drove backwards prematurely, jamming the gear dropping mechanism	Used addParallel() and addSequential() methods to drop gear and drive backwards in conjunction
3/11/2017	Autonomous: Program for placing gear in the central peg consistently overshot and rammed into the peg too quickly	Reduced drive time from 2 seconds to 1.8 seconds and reduced speed from 0.8 to 0.6

Electrical Best Practices

Below is a list of all of our electrical best practices, their applications in the robot, and why we used them.

<i>ESD Definition</i>	<i>Electrostatic Discharge</i>
<p>ESD – Electrostatic Discharge: The transfer of an electrostatic charge between bodies at different electrical potentials.</p> <ul style="list-style-type: none">■ Also referred to as static electricity■ Electrostatic charge is most commonly created by the contact and separation of two materials which results in Tribocharging   <p> Transforming Technologies Outstanding Alternatives in Static Control</p>	<p>Electrostatic discharge, or ESD, is the buildup of and discharge of static electricity when two surfaces are rubbed together. This phenomenon is called the Triboelectric Effect. This often drops the connection between the driver station and the robot on the field, and leaves robots stalled for the remainder of the match. Static often builds up in the wheels, which touch the mat. To prevent ESD, the robot uses ferrite chokes and anti-static spray to eliminate static charge. Also, before every match, we touch the frame of the robot to the metal portions of the field borders. This also discharges any remaining static charge.</p> <p>How we came to this solution: Last year, we lost 4 rounds out of 5 due to ESD. Our alliance captain, Team Electromedics Gold, suggested that we use antistatic spray, and in the following matches, the robot worked perfectly! During weeks after the competition, we researched about ESD and learned how to make our own static discharge solution.</p>



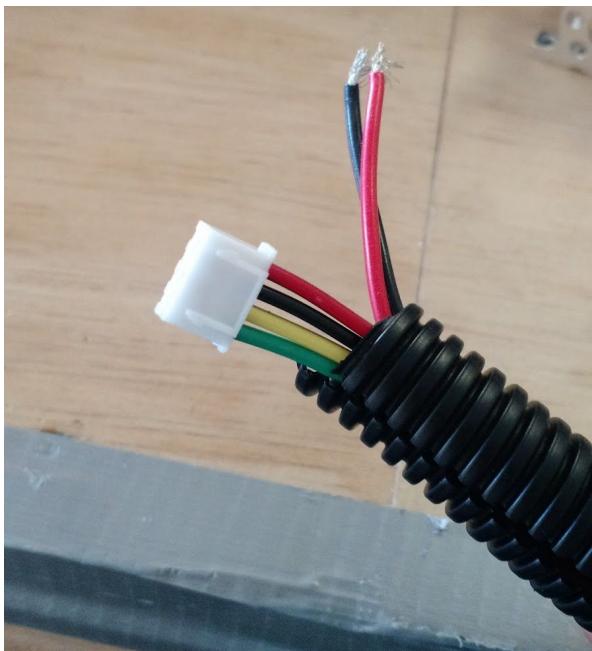
Ferrules:

These metal caps allow our connections to be clean and secure, unlike those made by unbound metal bristles.



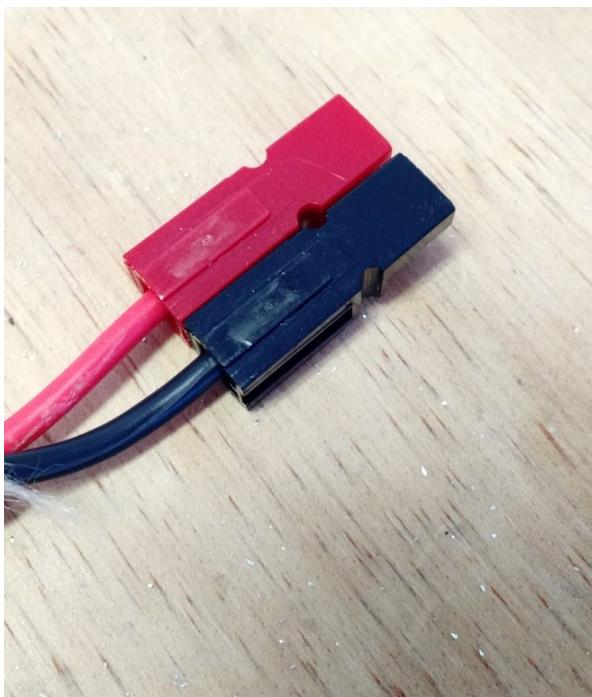
Zip-Ties:

We use zip-ties to tie down wires so as to keep the electrical layout of the breadboard clean and flush.



Cable-Sleeves

These coils of plastic are used to bind wires together in a neat way. They prevent wires from becoming tangled with other ones, and they also allow wires different systems to be organized and grouped.



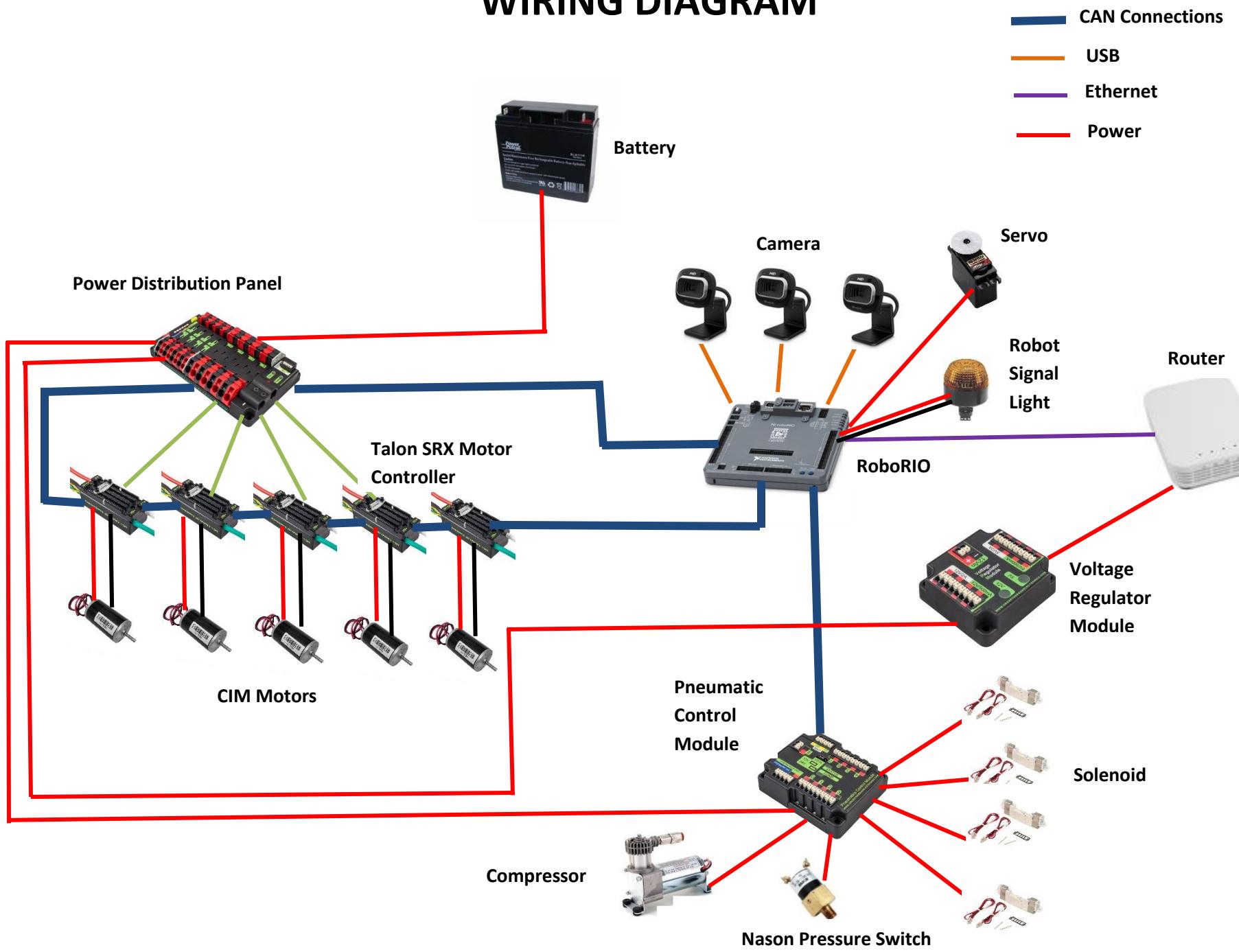
Anderson Powerpoles

These are cases of plastic that house metal connected to wires. Their ability to snap onto each other insures the creation of a stable and reliable electrical connection between two wires.

How we came to this solution:

Two years ago, during the west super-regional tournament, our robot lost 7 out of 9 rounds due to electrical issues, most of them relating to loose connections that could have been solved with an Anderson powerpole connector. We sought help from West Torrance Robotics, who introduced us to the Anderson Powerpole, and after the competition, we spent a couple weeks learning about the Anderson Powerpole connectors.

WIRING DIAGRAM



Safety Practices and Control Info

**Bolded points are information outside of the “Central Safety Rules” section regarding safety practices*

CENTRAL SAFETY RULES

- ★ Never, ever, ever wire with power applied!
- ★ Always make sure that the positive and negative leads are wired correctly!
- ★ Always make sure that the control tables (PWMS, etc.) are connected correctly!

Wire color and dress:

- Red wires: positive DC voltage
- Black wires: negative DC voltage
- Chassis must not be used as a conductor
- Install electrical and control wiring so that it is laid out logically and contained with jacketing, tie wraps, spiral tubing, shrink tubing or lacing cord
- Protect your electrical control system from other robots

Wire Gauge and Type

- **Use only stranded wire with a high strand count for flexibility**
- Use 6 AWG wire for battery and main disconnect breaker power
- Use 12 AWG wire for all motor power
- Use 18 AWG wire for all other power wiring EXCEPT:
 - Use pre made standard RC PWM cables for motor control
 - Use pre made cables for items like the Wireless Radio, Robot-Signal Light or purchased CAN bus cables
 - Self-made CAN bus cable is 20AWG wire (Low-Green and High-Yellow)
- All stranded wires should be tinned (this is optional)
 - Tin a wire by applying the tip of a heated, cleaned and primed soldering iron to the stripped wire for a short time and then apply a small amount of 60/40 rosin core solder to the wire. Solder flows into the wire to fill the wire from solder.

CONTROL AND PARTS INFO

Power-Related Info

- The RoboRIO requires 7-16VDC
 - **Max current 45W**
 - **Idle current 5**
- Voltages are: 3.3V (max 1.225A) 5V (max 1A) 6V (max 2.2A) 7-16V (120mA)
- Most of the signals are 5V tolerant
- **Beware! The UART is 5V EIA RS232**
 - **Ready to plug into a PC**
 - **Do not use level shifters on the UART or the magic blue smoke will escape!**
 - **Do not plug directly into BBB, Rpi or Arduinos either**

Safety Practices and Control Info

**Bolded points are information outside of the “Central Safety Rules” section regarding safety practices*

Digital I/O

- The main RoboRIO has:
 - 10 DIO lines (each can be programmed as input or output)
 - **20ns minimum pulse width**
 - 1 I2C (1 SDA and 1 CLK)
 - 3.3V
 - **400KHz max frequency**
 - 1 SPI bus (up to 4 devices)
 - **4 MHz max frequency**
- Logic level:
 - 5V-compatible LVTTL input
 - 3.3V LVTTL output
- MXC has
 - 16 additional DIOs
 - Some pins can be used as aux I2C and SPI
 - 4 analog inputs
 - 2 analog outputs
 - 1 UART

PWM and Relay Lines

- 10 PWM channels
 - **Output only**
 - **15mA max output current**
 - 330 ohm resistor in series
- 4 relay channels
 - 4 forward, 4 reverse
 - **5V output**
 - **7.5mA max current**
 - 680 ohm resistor in series
- **Max frequency 150 KHz**
- **Output High Voltage: 4.75V-5.25V max**
- **Output Low Voltage: 0.0V-0.25V max**

Analog I/O

- Analog input:
 - 500 kS/s @ 12-bit resolution
 - +/- 16V overvoltage protection
 - 500k ohm input impedance @ 500 kS/s

Safety Practices and Control Info

**Bolded points are information outside of the “Central Safety Rules” section regarding safety practices*

- Analog output:
 - 345 kS/s @ 12-bit resolution
 - +/- 16V overvoltage protection
 - 0-5V output range
 - 50 mV accuracy
 - 3mA current drive

Onboard 3-axis Accelerometer

- +/- 8G range
- 12-bit resolution
- 800 S/s
- Very little information available during the beta cycle about programming

Pneumatics System Overview

Pneumatic System

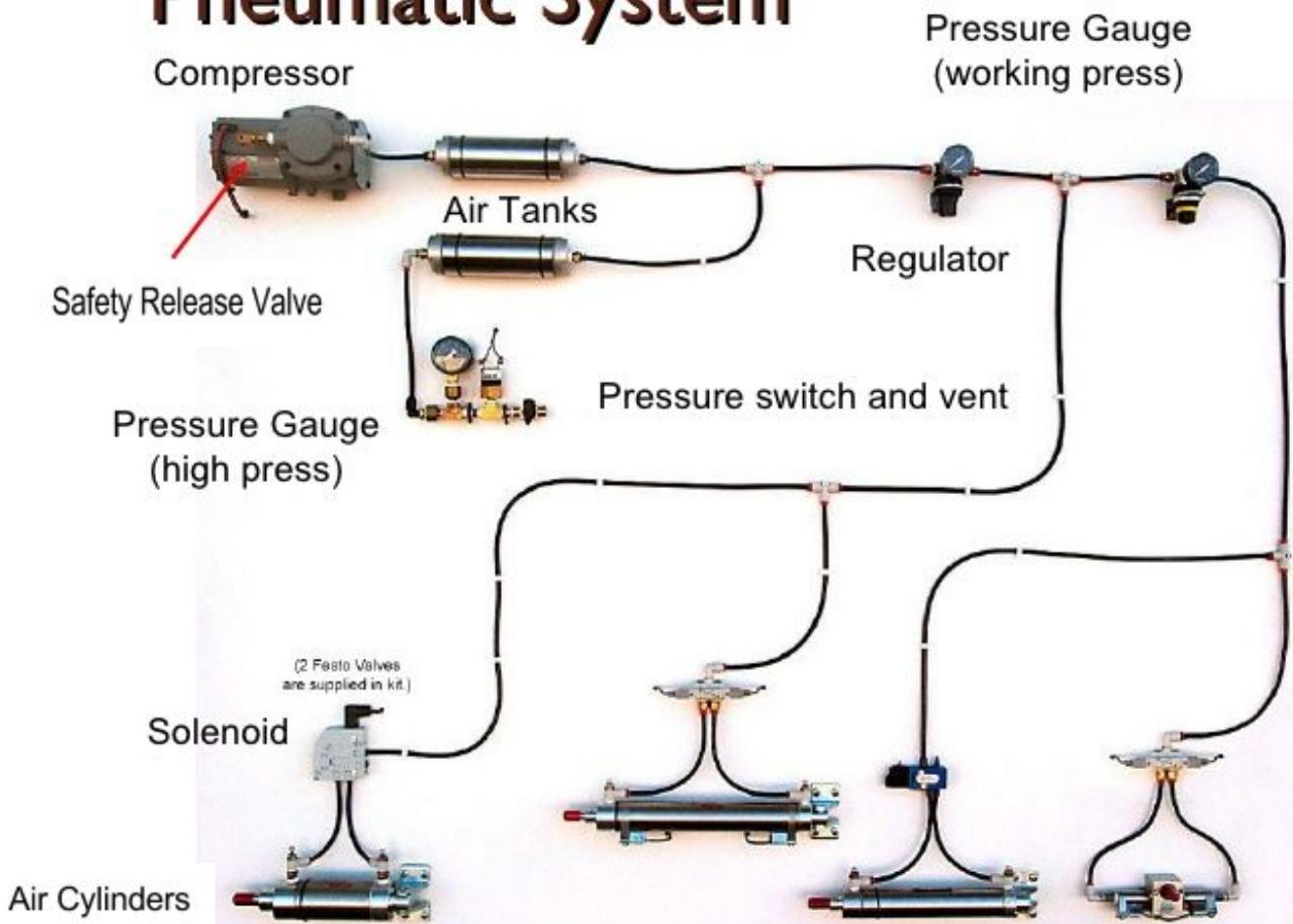
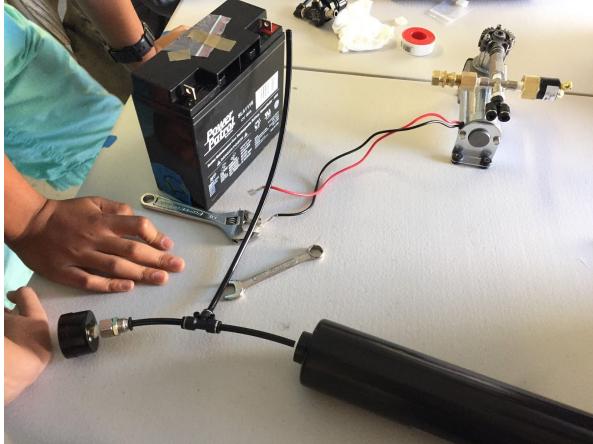
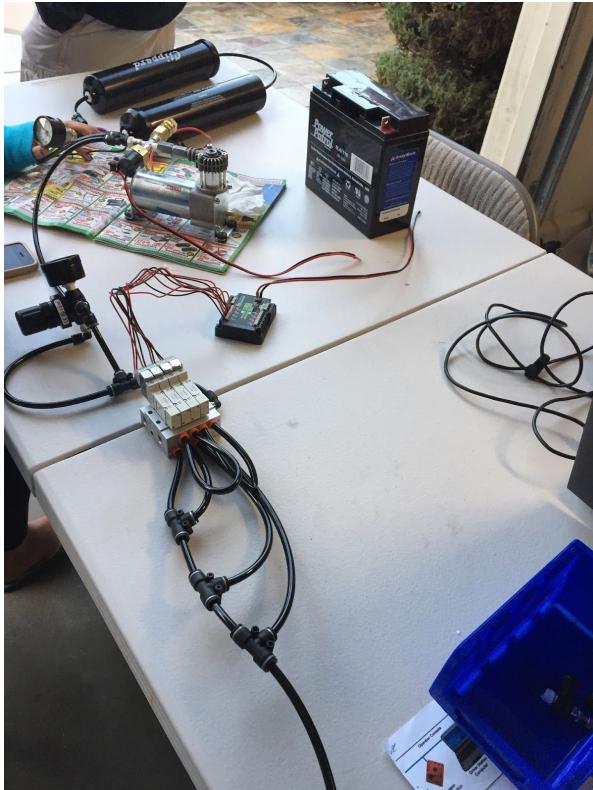


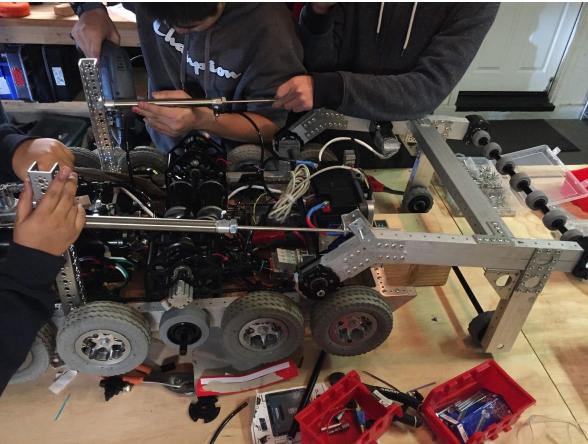
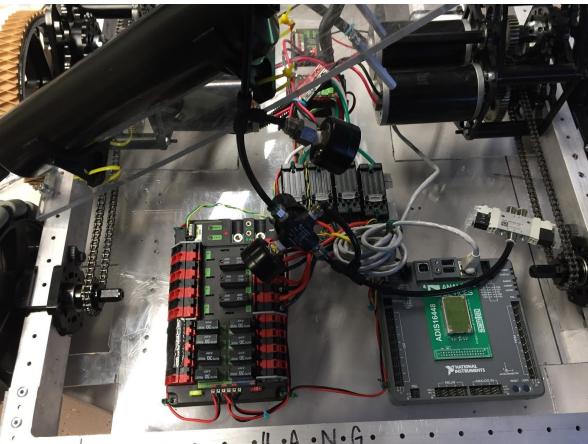
Photo taken from

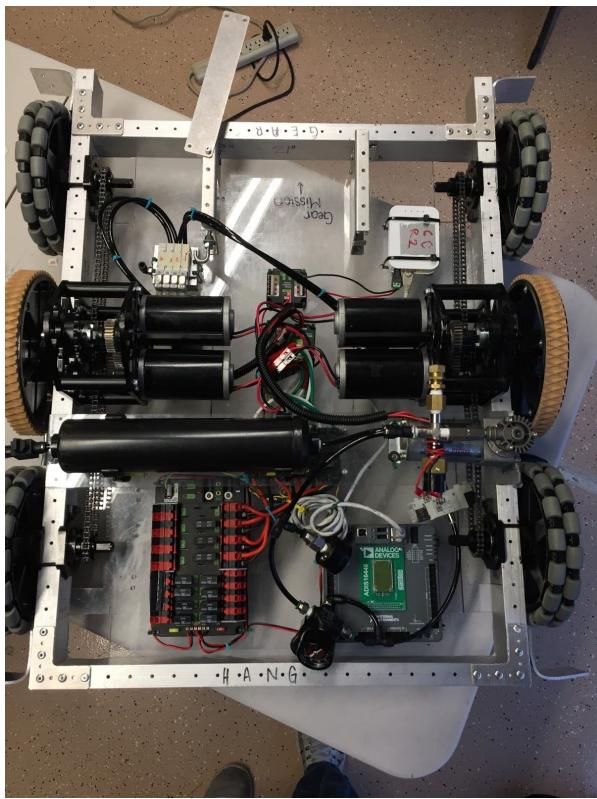
<https://www.slideshare.net/oregonfirst/first-fare-2011-overview-of-pneumatics2012 1425>
Wilsonville Robotics FRC Team

Progression of Pneumatics System Build:

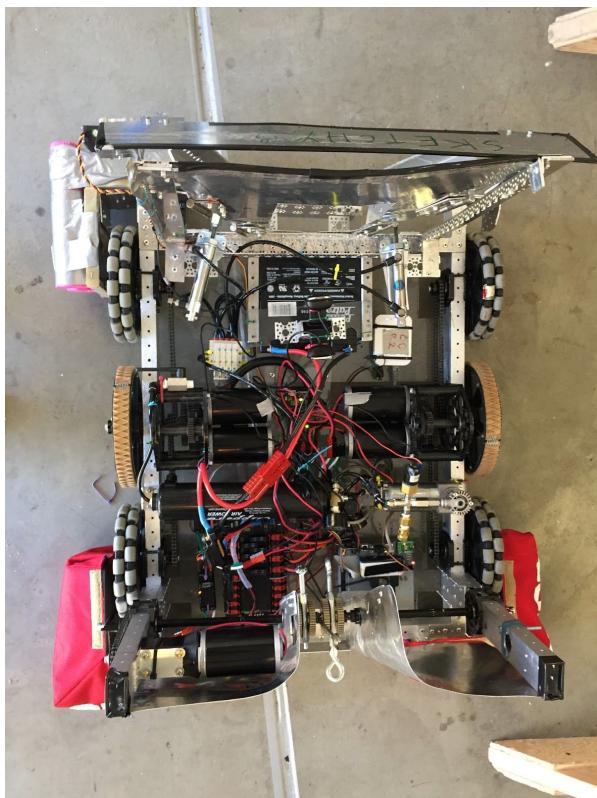
 	<p>Nov 18: Researched the uses of the compressor and its compatibility with other devices, as well as how to hook it up with the t-cross pneumatic fitting</p>
	<p>Nov 19: checked out the tubing and fittings, looked for possible setups and connections Filled up the air tanks to 120psi as a test for operation Compressor attached with t-cross fitting and pressure switch and relief valve</p>

	<p>Nov 23: Air was leaking, needed to use soap water to identify its location Thread seal tape used to patch up the air leak at the pneumatic fittings attachment sites</p>
	<p>Nov 20: set up a pneumatic build with regulator attached, tried to control pressure of compartments with regulator, tried to control flow of pressure with solenoids Solenoids needed to be researched, was uncertain on how to operate it - tried various combinations of plugging up A and B ports Successfully able to operate solenoids manually with pressurizes air</p>

	<p>Nov 26: Solenoids were able to be electronically toggled</p> <p>Found that one solenoid was not functioning, replacement was bought</p> <p>Found that solenoids sometimes were on the wrong settings, and they needed to be pressurized with at least 15psi to operate correctly - used a pneumatic switch to attain rapid increase in pressure</p>
	<p>Dec 21: Pneumatic air cylinders hooked up to system after other systems were completed, able to be operated through manual toggling and eventually electronically</p>
	<p>Jan 26: Space limited on season robot, hinge was constructed to house the air tank, compressor, and regulator</p>



Jan 27: Pneumatics system completely transferred to season robot with clean attachment through use of zip-ties



Jan 28: pneumatic air cylinder heads zip-tied to gear mission flaps, mount constructed to keep them in the most optimal place

Test run initiated, gear mission flaps opening and closing correctly

Pneumatics System Issues Log:

Leaks:

- Occurred consistently throughout build, fixed through locating with soap water and subsequent appliance of thread seal tape
- Fittings were not always screwed in all the way
- Tubing was not always pushed in all the way

Solenoids:

- Not all of them seemed configured on the right setting, learned that they had a minimal pressure operating requirement
- One solenoid broke, replacement was bought

Pressure switch:

- Wires were accidentally short-circuited, replacement was needed to be bought

Relief valve:

- Initially not configured properly, needed to be set to operate at the right pressure threshold

Regulator:

- Had 4 open ports - three outputs and one input, was first built with an output port accidentally paired with an input one, a continuous leak occurred
- All three outputs binded together to solve the problem

Pressure Valve:

- Initially had a plastic, faulty one - was replaced with a sturdy metal-capped valve

Github

[alexialalex / ChargingChampionsFRC2017](#) Private

Code Issues 0 Pull requests 0 Projects 0 Wiki Pulse Graphs

Branch: master ▾

- o Commits on Feb 3, 2017
 -  Merge pull request #1 from alexialalex/alexialalex-patch-1 ...
alexialalex committed on GitHub on Feb 3
[View](#) [3568022](#) [Copy](#)
 -  Add files via upload
alexialalex committed on GitHub on Feb 3
[View](#) [bcc8821](#) [Copy](#)
- o Commits on Jan 29, 2017
 -  Updated for camera feed + gear mission
alexialalex committed on GitHub on Jan 29
[View](#) [e0966df](#) [Copy](#)
 -  Delete PushGears.java
alexialalex committed on GitHub on Jan 29
[View](#) [f197f18](#) [Copy](#)
- o Commits on Jan 28, 2017
 -  Updated for Gear Mission
alexialalex committed on GitHub on Jan 28
[View](#) [3d9ac28](#) [Copy](#)

Commits on Jan 23, 2017

 Delete VisionSystem.java alexlialex committed on GitHub on Jan 23	View c4a1ea2	Copy
 Updated for tank drive and vision alexlialex committed on GitHub on Jan 23	View 004f299	Copy
 Delete RobotMap.java alexlialex committed on GitHub on Jan 23	View 5d797b4	Copy
 Delete PlaceGear.java alexlialex committed on GitHub on Jan 23	View 60120c0	Copy
 Delete Vision.java alexlialex committed on GitHub on Jan 23	View 57714c9	Copy
 Delete Robot.java alexlialex committed on GitHub on Jan 23	View 60241a6	Copy
 Delete Ol.java alexlialex committed on GitHub on Jan 23	View 15ad5e4	Copy
 Delete GetCameraFeed.java alexlialex committed on GitHub on Jan 23	View 054bfb2	Copy
 Delete DriveWithJoysticks.java alexlialex committed on GitHub on Jan 23	View e330605	Copy
 Delete Drive.java alexlialex committed on GitHub on Jan 23	View b7726f5	Copy
 Delete Control360.java alexlialex committed on GitHub on Jan 23	View 984b10f	Copy
 Updated for tank drive + vision alexlialex committed on GitHub on Jan 23	View 80a514f	Copy
 Delete LogitechJoystick.java alexlialex committed on GitHub on Jan 23	View 5b44506	Copy

Commits on Jan 8, 2017

 Add files via upload ... alexlialex committed on GitHub on Jan 8	View daf8739	Copy
Commits on Jan 8, 2017		
 Add files via upload alexlialex committed on GitHub on Jan 8	View 062b6b3	Copy
 Update README.md alexlialex committed on GitHub on Jan 8	View e9e72dd	Copy
 Initial commit alexlialex committed on Jan 8	View bef4be2	Copy

Troll.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;

import edu.wpi.first.wpilibj.Timer;
import edu.wpi.first.wpilibj.command.Command;

public class Troll extends Command {

    public Troll() {
        // Use requires() here to declare subsystem dependencies
        // eg. requires(chassis);
    }

    // Called just before this Command runs the first time
    protected void initialize() {
    }

    // Called repeatedly when this Command is scheduled to run
    protected void execute() {
        Robot.gearMission.solenoid_1.set(true);
        Timer.delay(2);
        Robot.gearMission.solenoid_1.set(false);
    }

    // Make this return true when this Command no longer needs to run execute()
    protected boolean isFinished() {
        return false;
    }

    // Called once after isFinished returns true
    protected void end() {
    }

    // Called when another command which requires one or more of the same
    // subsystems is scheduled to run
    protected void interrupted() {
    }
}
```

TurnToAngle.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Spin robot until the gyro reads a given angle
 *
 * If input angle is greater than 0, turn clockwise
 * If input angle is less than 0, turn counterclockwise
 */
public class TurnToAngle extends Command {
    private int angle;

    public TurnToAngle(int n) {
        requires(Robot.drive);
        angle = n;
    }

    protected void initialize() {
        Robot.drive.gyro.reset();
    }

    protected void execute() {
        if (angle > 0)
            Robot.drive.spinRight(0.25);
        if (angle < 0)
            Robot.drive.spinLeft(0.25);
    }

    protected boolean isFinished() {
        if (angle > 0)
            return Robot.drive.getGyroAngle() >= angle;
        else
            return Robot.drive.getGyroAngle() <= angle;
    }

    protected void end() {
        Robot.drive.stop();
    }

    protected void interrupted() {
        end();
    }
}
```

DriveWithJoysticks.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Tank Drive robot with two joystick axes as input
 */
public class DriveWithJoysticks extends Command {

    public DriveWithJoysticks() {
        requires(Robot.drive);
    }

    protected void initialize() {
    }

    protected void execute() {
        //Drivetrain is inverted so negative values are needed
        Robot.drive.driveWithJoysticks(-0.9 * Robot.oi.getLeftYAxis(), -0.9 *
Robot.oi.getRightYAxis());
    }

    protected boolean isFinished() {
        return false;
    }

    protected void end() {
        Robot.drive.stop();
    }

    protected void interrupted() {
        end();
    }
}
```

DropGear.java

```
package org.usfirst.frc.team6560.robot.commands;

import edu.wpi.first.wpilibj.command.CommandGroup;

/**
 * Opens flaps (delay 0.1 seconds to avoid collision), pushes gear out, then closes flaps on
gear subsystem
 */
public class DropGear extends CommandGroup {

    public DropGear() {
        addSequential(new OpenFlaps());
        addSequential(new PushGear(0.8));
        addSequential(new CloseFlaps());
    }
}
```

DriveCurvedTime.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;

import edu.wpi.first.wpilibj.Timer;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Drives the robot at a curve until a certain time is reached
 */
public class DriveCurvedTime extends Command {

    private double speed;
    private int angle;
    private double time;
    private Timer timer;

    public DriveCurvedTime(double s, int a, double t) {
        requires(Robot.drive);
        speed = s;
        angle = a;
        time = t;
    }

    protected void initialize() {
        Robot.drive.gyro.reset();
        timer = new Timer();
        timer.reset();
        timer.start();
    }

    protected void execute() {
        Robot.drive.driveCurve(angle, speed);
    }

    protected boolean isFinished() {
        return timer.get() >= time;
    }

    protected void end() {
        Robot.drive.stop();
    }

    protected void interrupted() {
        end();
    }
}
```

DriveStraightBackwardsTime.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;

import edu.wpi.first.wpilibj.Timer;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Drives straight backwards for an input time and speed
 */
public class DriveStraightBackwardsTime extends Command {

    private double time;
    private double speed;
    private Timer timer;

    public DriveStraightBackwardsTime(double t, double s) {
        requires(Robot.drive);
        time = t;
        speed = s;
    }

    protected void initialize() {
        Robot.drive.gyro.reset();
        timer = new Timer();
        timer.reset();
        timer.start();
    }

    protected void execute() {
        Robot.drive.driveStraightBackwards(speed);
    }

    protected boolean isFinished() {
        return (timer.get() >= time);
    }

    protected void end() {
        Robot.drive.stop();
        timer.stop();
    }

    protected void interrupted() {
        end();
    }
}
```

DriveStraightTime.java

```
package org.usfirst.frc.team6560.robot.commands;

import edu.wpi.first.wpilibj.Timer;
import edu.wpi.first.wpilibj.command.Command;
import org.usfirst.frc.team6560.robot.Robot;

/**
 * Drives straight for an input time and speed
 */
public class DriveStraightTime extends Command {

    private double time;
    private double speed;
    private Timer timer;

    public DriveStraightTime(double t, double s) {
        requires(Robot.drive);
        time = t;
        speed = s;
    }

    protected void initialize() {
        Robot.drive.gyro.reset();
        timer = new Timer();
        timer.reset();
        timer.start();
    }

    protected void execute() {
        Robot.drive.driveStraight(speed);
    }

    protected boolean isFinished() {
        return (timer.get() >= time);
    }

    protected void end() {
        Robot.drive.stop();
        timer.stop();
    }

    protected void interrupted() {
        end();
    }
}
```

DriveStraight.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Drives straight with an input speed
 */
public class DriveStraight extends Command {
    private double speed;

    public DriveStraight(double dbl) {
        requires(Robot.drive);
        speed = dbl;
    }

    protected void initialize() {
        Robot.drive.gyro.reset();
    }

    protected void execute() {
        Robot.drive.driveStraight(speed);
    }

    protected boolean isFinished() {
        return false;
    }

    protected void end() {
        Robot.drive.stop();
    }

    protected void interrupted() {
        end();
    }
}
```

OpenFlaps.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;

import edu.wpi.first.wpilibj.Timer;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Opens flaps on gear subsystem
 *
 * Utilizes a 0.1 second timer in order to return true for the isFinished() method
 * TODO: Implement a better way to do this
 */
public class OpenFlaps extends Command {

    private Timer timer;

    public OpenFlaps() {
        requires(Robot.gearMission);
    }

    protected void initialize() {
        timer = new Timer();
        timer.reset();
        timer.start();
    }

    protected void execute() {
        Robot.gearMission.openFlaps();
    }

    protected boolean isFinished() {
        return (timer.get() >= 0.1);
    }

    protected void end() {
        Robot.gearMission.openFlaps();

    }

    protected void interrupted() {
        end();
    }
}
```

PushGear.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;

import edu.wpi.first.wpilibj.Timer;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Pushes gear out using pneumatic piston until a certain time is reached
 * Retracts the piston once time is reached
 */
public class PushGear extends Command {

    private double time;
    private Timer timer;

    public PushGear(double t) {
        requires(Robot.gearMission);
        time = t;
    }

    protected void initialize() {
        timer = new Timer();
        timer.reset();
        timer.start();
    }

    protected void execute() {
        Robot.gearMission.pushGear();
    }

    protected boolean isFinished() {
        return timer.get() >= time;
    }

    protected void end() {
        Robot.gearMission.retract();
    }

    protected void interrupted() {
        end();
    }
}
```

RunHangSlider.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Runs the hanger motor at a speed provided by input from Driver Station slider
 */
public class RunHangerSlider extends Command {

    public RunHangerSlider() {
        requires(Robot.hanger);
    }

    protected void initialize() {
    }

    protected void execute() {
        //Scales the -1.0 to 1.0 range outputted by the Slider to a range of 0 to 1.0 to avoid
        hanger from spinning backwards
        Robot.hanger.runHangerSlider(((Robot.oi.getDSSlider() - 1.0) / 2.0));
    }

    protected boolean isFinished() {
        return false;
    }

    protected void end() {
        Robot.hanger.stopHanger();
    }

    protected void interrupted() {
        end();
    }
}
```

StopDriveTime.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;
import edu.wpi.first.wpilibj.Timer;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Stops all drive for a given time
 */
public class StopDriveTime extends Command {

    double time;
    Timer timer;

    public StopDriveTime(double t) {
        requires(Robot.drive);
        time = t;
    }

    protected void initialize() {
        timer = new Timer();
        timer.reset();
        timer.start();
    }

    protected void execute() {
        Robot.drive.stop();
    }

    protected boolean isFinished() {
        return timer.get() >= time;
    }

    protected void end() {
        timer.stop();
    }

    protected void interrupted() {
        end();
    }
}
```

SpinHangBackwards.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;

import edu.wpi.first.wpilibj.command.Command;

/***
 * Spins hanger backwards at a set speed (20%)
 * WARNING: This command should only be used after a match after the ratchet is removed to
 * avoid damaging the ratchet
 */
public class SpinHangBackwards extends Command {

    public SpinHangBackwards() {
        requires(Robot.hanger);
    }

    protected void initialize() {
    }

    protected void execute() {
        Robot.hanger.runHangerBackwards();
    }

    protected boolean isFinished() {
        return false;
    }

    protected void end() {
        Robot.hanger.stopHanger();
    }

    protected void interrupted() {
        end();
    }
}
```

SpinRight.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Spins the Robot clockwise at an input speed
 */
public class SpinRight extends Command {

    private double speed;

    public SpinRight(double dbl) {
        requires(Robot.drive);
        speed = dbl;
    }

    protected void initialize() {
    }

    protected void execute() {
        Robot.drive.spinRight(speed);
    }

    protected boolean isFinished() {
        return false;
    }

    protected void end() {
        Robot.drive.stop();
    }

    protected void interrupted() {
        end();
    }
}
```

SpinLeft.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Spins the Robot counterclockwise at an input speed
 */
public class SpinLeft extends Command {

    private double speed;

    public SpinLeft(double dbl) {
        requires(Robot.drive);
        speed = dbl;
    }

    protected void initialize() {
    }

    protected void execute() {
        Robot.drive.spinLeft(speed);
    }

    protected boolean isFinished() {
        return false;
    }

    protected void end() {
        Robot.drive.stop();
    }

    protected void interrupted() {
        end();
    }
}
```

OI.java

```
package org.usfirst.frc.team6560.robot;

import edu.wpi.first.wpilibj.Joystick;
import org.usfirst.frc.team6560.robot.commands.*;
import org.usfirst.frc.team6560.robot.RobotMap.Joysticks;
import edu.wpi.first.wpilibj.buttons.JoystickButton;

/**
 * Holds everything to be used by the Operator Interface
 */
public class OI {
    public final Joystick gamepad;
    public final Joystick driverstation;

    public OI() {
        gamepad = new Joystick(Joysticks.JOYSTICK1);
        driverstation = new Joystick(Joysticks.DRV_STATION);

        JoystickButton aButton = new JoystickButton(gamepad, Joysticks.A_BUTTON);
        JoystickButton bButton = new JoystickButton(gamepad, Joysticks.B_BUTTON);
        JoystickButton xButton = new JoystickButton(gamepad, Joysticks.X_BUTTON);
        JoystickButton yButton = new JoystickButton(gamepad, Joysticks.Y_BUTTON);
        JoystickButton trigger = new JoystickButton(driverstation, Joysticks.TRIGGER_BUTTON);
        JoystickButton rightThumb = new JoystickButton(driverstation,
Joysticks.RIGHT_THUMB_BUTTON);
        JoystickButton button3 = new JoystickButton(driverstation, Joysticks.BUTTON_3);
        JoystickButton button4 = new JoystickButton(driverstation, Joysticks.BUTTON_4);
        JoystickButton button5 = new JoystickButton(driverstation, Joysticks.BUTTON_5);
        JoystickButton button12 = new JoystickButton(driverstation, Joysticks.BUTTON_12);

        //Commands
        trigger.whenPressed(new DropGear());
        button5.whenPressed(new PushGear(0.8));
        rightThumb.whileHeld(new CollectGear());
        button3.whileHeld(new RunHangerSlider());
        yButton.whileHeld(new DriveStraight(0.9));
        aButton.whileHeld(new DriveStraightBackwards(-0.9));
        xButton.whileHeld(new SpinLeft(0.8));
        bButton.whileHeld(new SpinRight(0.8));
        button12.whileHeld(new SpinHangBackwards());
        button4.whenPressed(new OpenFlaps());
        button4.whenReleased(new CloseFlaps());
    }

    // Axes
    public double getLeftXAxis() {
        return gamepad.getRawAxis(Joysticks.LEFT_X_AXIS);
    }
}
```

```
public double getLeftYAxis() {
    return gamepad.getRawAxis(Joysticks.LEFT_Y_AXIS);
}

public double getLeftTrigger() {
    return gamepad.getRawAxis(Joysticks.LEFT_TRIGGER);
}

public double getRightTrigger() {
    return gamepad.getRawAxis(Joysticks.RIGHT_TRIGGER);
}

public double getRightXAxis() {
    return gamepad.getRawAxis(Joysticks.RIGHT_X_AXIS);
}

public double getRightYAxis() {
    return gamepad.getRawAxis(Joysticks.RIGHT_Y_AXIS);
}

public int getPOV() {
    return gamepad.getPOV();
}

public double getDSXAxis() {
    return driverstation.getRawAxis(Joysticks.DS_X_AXIS);
}

public double getDSYAxis() {
    return driverstation.getRawAxis(Joysticks.DS_Y_AXIS);
}

public double getDSZAxis() {
    return driverstation.getRawAxis(Joysticks.DS_Z_AXIS);
}

public double getDSSlider() {
    return driverstation.getRawAxis(Joysticks.DS_SLIDER);
}

}
```

Robot.java

```
package org.usfirst.frc.team6560.robot;

import org.usfirst.frc.team6560.robot.commands.autonomous.*;
import org.usfirst.frc.team6560.robot.subsystems.*;
import edu.wpi.cscore.UsbCamera;
import edu.wpi.first.wpilibj.CameraServer;
import edu.wpi.first.wpilibj.IterativeRobot;
import edu.wpi.first.wpilibj.command.Command;
import edu.wpi.first.wpilibj.command.Scheduler;
import edu.wpi.first.wpilibj.livewindow.LiveWindow;
import edu.wpi.first.wpilibj.smartdashboard.SendableChooser;
import edu.wpi.first.wpilibj.smartdashboard.SmartDashboard;

public class Robot extends IterativeRobot {

    public static OI oi;

    //Subsystems
    public static Drive drive;
    public static GearMission gearMission;
    public static Hanger hanger;
    public static UsbCamera gearCamera;

    Command autonomousCommand;
    SendableChooser<Command> chooser = new SendableChooser<>();

    public void robotInit() {
        drive = new Drive();
        gearMission = new GearMission();
        hanger = new Hanger();
        oi = new OI();

        gearCamera = CameraServer.getInstance().startAutomaticCapture();

        chooser.addDefault("Center Gear Auto", new CenterPegAutonomous());
        chooser.addObject("Left Gear Auto", new LeftPegAutonomous());
        chooser.addObject("Right Gear Auto", new RightPegAutonomous());
        chooser.addObject("Go Straight Auto", new GoStraightAutonomous());
        chooser.addObject("Do Nothing Auto", null);
        SmartDashboard.putData("Autonomous Mode Chooser", chooser);
    }

    public void disabledInit(){
    }
}
```

```

public void disabledPeriodic() {
    Scheduler.getInstance().run();
}

public void autonomousInit() {
    autonomousCommand = chooser.getSelected();
    if(autonomousCommand != null) {
        autonomousCommand.start();
    }
}

public void autonomousPeriodic() {
    SmartDashboard.putNumber("Gyro Angle", drive.getGyroAngle());
    Scheduler.getInstance().run();
    //SmartDashboard.putNumber("Ultrasonic Distance", drive.ultra.getRangeInches());
}

public void teleopInit() {
    if(autonomousCommand != null)
        autonomousCommand.cancel();
}

public void teleopPeriodic() {
    SmartDashboard.putNumber("Gyro Angle", drive.getGyroAngle());
    Scheduler.getInstance().run();
}

public void testPeriodic() {
    LiveWindow.run();
}
}

```

RobotMap.java

```
package org.usfirst.frc.team6560.robot;

/**
 * Holds all important constants
 */

public class RobotMap {
    public static class Joysticks {
        public static final int JOYSTICK1 = 5;
        public static final int DRV_STATION = 0;

        //Joystick buttons
        public static final int A_BUTTON = 1;
        public static final int B_BUTTON = 2;
        public static final int X_BUTTON = 3;
        public static final int Y_BUTTON = 4;
        public static final int LEFT_INDEX_BUTTON = 5;
        public static final int RIGHT_INDEX_BUTTON = 6;
        public static final int BACK_BUTTON = 7;
        public static final int START_BUTTON = 8;
        public static final int LEFT_AXIS_BUTTON = 9;
        public static final int RIGHT_AXIS_BUTTON = 10;

        //Joystick axes
        public static final int LEFT_X_AXIS = 0;
        public static final int LEFT_Y_AXIS = 1;
        public static final int LEFT_TRIGGER = 2;
        public static final int RIGHT_TRIGGER = 3;
        public static final int RIGHT_X_AXIS = 4;
        public static final int RIGHT_Y_AXIS = 5;

        //DS Buttons
        public static final int TRIGGER_BUTTON = 1;
        public static final int RIGHT_THUMB_BUTTON = 2;
        public static final int BUTTON_3 = 3;
        public static final int BUTTON_4 = 4;
        public static final int BUTTON_5 = 5;
        public static final int BUTTON_6 = 6;
        public static final int BUTTON_7 = 7;
        public static final int BUTTON_8 = 8;
        public static final int BUTTON_9 = 9;
        public static final int BUTTON_10 = 10;
        public static final int BUTTON_11 = 11;
        public static final int BUTTON_12 = 12;

        //DS Axes
    }
}
```

```

        public static final int DS_X_AXIS = 0;
        public static final int DS_Y_AXIS = 1;
        public static final int DS_Z_AXIS = 2;
        public static final int DS_SLIDER = 3;
    }

    public static class Can {
        //Drive Motors
        public static final int LEFT_FWD_MOTOR = 12;
        public static final int LEFT_REAR_MOTOR = 13;
        public static final int RIGHT_FWD_MOTOR = 14;
        public static final int RIGHT_REAR_MOTOR = 15;

        //Hanger Motors
        public static final int MOTOR = 61;
        public static final int MOTOR1 = 62;

        //Pneumatics
        public static final int SOLENOID_0 = 0;
        public static final int SOLENOID_1 = 1;
        public static final int SOLENOID_2 = 2;
        public static final int SOLENOID_3 = 3;
        public static final int SOLENOID_4 = 4;
        public static final int SOLENOID_5 = 5;
        public static final int SOLENOID_6 = 6;
        public static final int SOLENOID_7 = 7;
        public static final int COMPRESSOR = 0;
    }

    public static class Pwm {
        //Gear Mission
        public static final int GEAR_SERVO = 0;
    }
}

```

CollectGear.java

```
package org.usfirst.frc.team6560.robot.subsystems;

import com.ctre.CANTalon;
import edu.wpi.first.wpilibj.command.Subsystem;
import org.usfirst.frc.team6560.robot.RobotMap.Can;

public class Hanger extends Subsystem {

    CANTalon hangerMotor = new CANTalon(Can.MOTOR);

    public void runHanger() {
        hangerMotor.set(-0.7);
    }

    /**
     * Stops hanger motor
     */
    public void stopHanger() {
        hangerMotor.set(0.0);
    }

    /**
     * Runs hanger backwards at a speed of 0.2
     */
    public void runHangerBackwards() {
        hangerMotor.set(0.2);
    }

    /**
     * Runs hanger forwards at a speed given by input value
     *
     * @param num      Input value corresponding to speed to run hanger motor
     */
    public void runHangerSlider(double num) {
        hangerMotor.set(num);
    }
    public void initDefaultCommand() {
    }
}
```

Hanger.java

```
package org.usfirst.frc.team6560.robot.subsystems;

import com.ctre.CANTalon;
import edu.wpi.first.wpilibj.command.Subsystem;
import org.usfirst.frc.team6560.robot.RobotMap.Can;

public class Hanger extends Subsystem {

    CANTalon hangerMotor = new CANTalon(Can.MOTOR);

    public void runHanger() {
        hangerMotor.set(-0.7);
    }

    /**
     * Stops hanger motor
     */
    public void stopHanger() {
        hangerMotor.set(0.0);
    }

    /**
     * Runs hanger backwards at a speed of 0.2
     */
    public void runHangerBackwards() {
        hangerMotor.set(0.2);
    }

    /**
     * Runs hanger forwards at a speed given by input value
     *
     * @param num      Input value corresponding to speed to run hanger motor
     */
    public void runHangerSlider(double num) {
        hangerMotor.set(num);
    }
    public void initDefaultCommand() {
    }
}
```

GearMission

```
package org.usfirst.frc.team6560.robot.subsystems;

import edu.wpi.first.wpilibj.command.Subsystem;
import org.usfirst.frc.team6560.robot.RobotMap;
import edu.wpi.first.wpilibj.Solenoid;
import edu.wpi.first.wpilibj.Compressor;
import edu.wpi.first.wpilibj.Servo;

public class GearMission extends Subsystem {

    public Solenoid solenoid_0 = new Solenoid(RobotMap.Can.SOLENOID_0);
    public Solenoid solenoid_1 = new Solenoid(RobotMap.Can.SOLENOID_1);
    public Solenoid solenoid_2 = new Solenoid(RobotMap.Can.SOLENOID_2);
    public Solenoid solenoid_3 = new Solenoid(RobotMap.Can.SOLENOID_3);
    public Compressor compressor_0 = new Compressor(RobotMap.Can.COMPRESSOR);
    public Servo gearServo = new Servo(RobotMap.Pwm.GEAR_SERVO);
    public boolean gearShiftStatus;

    /**
     * Starts compressor when initialized
     */
    public GearMission() {
        compressor_0.setClosedLoopControl(true);
    }

    /**
     * Opens the two flaps on the gear collection system
     */
    public void openFlaps() {
        solenoid_0.set(true);
        solenoid_3.set(true);
    }

    /**
     * Closes the two flaps on the gear collection system
     */
    public void closeFlaps() {
        solenoid_0.set(false);
        solenoid_3.set(false);
    }

    /**
     * Tilts servo to receive gear from gear drop
     */
    public void collectGear() {
        gearServo.set(1.0);
    }

    /**

```

```
* Resets servo to default position
*/
public void resetServo() {
    gearServo.set(0.45);
}

/***
 * Activates piston to push gear out of gear collection system
 */
public void pushGear() {
    solenoid_1.set(true);
}

/***
 * Retracts pusher piston
 */
public void retract() {
    solenoid_1.set(false);
}

public void initDefaultCommand() {
    compressor_0.start();
    solenoid_0.set(false);
    solenoid_1.set(false);
    solenoid_2.set(false);
    solenoid_3.set(false);
}
}
```

Drive.java

```
package org.usfirst.frc.team6560.robot.subsystems;

import com.ctre.CANTalon;
import edu.wpi.first.wpilibj.command.Subsystem;
import edu.wpi.first.wpilibj.ADXRS450_Gyro;
import edu.wpi.first.wpilibj.RobotDrive;
import edu.wpi.first.wpilibj.Ultrasonic;

import org.usfirst.frc.team6560.robot.RobotMap.Can;
import org.usfirst.frc.team6560.robot.commands.DriveWithJoysticks;

public class Drive extends Subsystem {
    CANTalon leftTopMotor = new CANTalon(Can.LEFT_FWD_MOTOR);
    CANTalon leftBottomMotor = new CANTalon(Can.LEFT_REAR_MOTOR);
    CANTalon rightTopMotor = new CANTalon(Can.RIGHT_FWD_MOTOR);
    CANTalon rightBottomMotor = new CANTalon(Can.RIGHT_REAR_MOTOR);
    public RobotDrive drivetrain = new RobotDrive(leftTopMotor, leftBottomMotor,
rightTopMotor, rightBottomMotor);
    public ADXRS450_Gyro gyro = new ADXRS450_Gyro();
    public Ultrasonic ultra = new Ultrasonic(0, 1);
    private final double kP = 0.03; //Proportional scaling constant

    /**
     * Calibrates gyro when initialized and sets current angle to 0
     */
    public Drive() {
        gyro.calibrate();
        gyro.reset();
    }

    /**
     * Drives robot with tank drive with two input values
     *
     * @param left   Input value corresponding to speed of left side of drivetrain
     * @param right  Input value corresponding to speed of right side of drivetrain
     */
    public void driveWithJoysticks(double left, double right) {
        drivetrain.tankDrive(left, right);
    }

    /**
     * Drives robot straight with an input speed, using gyro output to course-correct
     *
     * @param speed  Input value corresponding to speed value from -1.0 to 1.0 (Speed will
     always be positive)
     */
    public void driveStraight(double speed) {
```

```

        speed = Math.abs(speed);
        int angle = getGyroAngle();
        drivetrain.drive(speed, -1 * angle * kP);
    }

    /**
     * Drives robot straight backwards with an input speed, using gyro output to
     course-correct
     *
     * @param speed Input value corresponding to speed value from -1.0 to 1.0 (Speed will
     always be positive)
     */
    public void driveStraightBackwards(double speed) {
        speed = Math.abs(speed);
        int angle = getGyroAngle();
        drivetrain.drive(-1 * speed, angle * kP);
    }

    /**
     * Drives robot at an input angle and speed, using the drive method
     *
     * @param angle Input value corresponding to angle value to turn to
     * @param speed Input value corresponding to speed value from -1.0 to 1.0
     */
    public void driveCurve(int angle, double speed) {
        drivetrain.drive(speed, angle);
    }

    /**
     * Spins robot clockwise at an input speed by driving the left side of the drivetrain
     * forward and the right side backwards
     *
     * @param speed Input value corresponding to speed value from -1.0 to 1.0 (Speed will
     always be positive)
     */
    public void spinRight(double speed) {
        speed = Math.abs(speed);
        leftTopMotor.set(speed);
        leftBottomMotor.set(speed);
        rightTopMotor.set(speed);
        rightBottomMotor.set(speed);
    }

    /**
     * Spins robot counterclockwise at an input speed by driving the right side of the
     * drivetrain forward and the left side backwards
     *
     * @param speed Input value corresponding to speed value from -1.0 to 1.0 (Speed will
     always be positive)
     */

```

```

public void spinLeft(double speed) {
    speed = Math.abs(speed);
    leftTopMotor.set(-1 * speed);
    leftBottomMotor.set(-1 * speed);
    rightTopMotor.set(-1 * speed);
    rightBottomMotor.set(-1 * speed);
}

/**
 * Rounds the current gyro heading as an integer and returns it
 *
 * @return the current gyro angle as an int
 */
public int getGyroAngle() {
    return (int) Math.round(gyro.getAngle());
}

/**
 * Stops all drive
 */
public void stop() {
    leftTopMotor.set(0);
    leftBottomMotor.set(0);
    rightTopMotor.set(0);
    rightBottomMotor.set(0);
}

public void initDefaultCommand() {
    setDefaultCommand(new DriveWithJoysticks());
}
}

```

DriveStraightBackwards.java

```
package org.usfirst.frc.team6560.robot.commands;

import org.usfirst.frc.team6560.robot.Robot;
import edu.wpi.first.wpilibj.command.Command;

/**
 * Drive straight with the gyro
 */
public class DriveStraightBackwards extends Command {

    public DriveStraightBackwards() {
        requires(Robot.drive);
    }

    protected void initialize() {
    }

    protected void execute() {
        Robot.drive.driveStraightBackwards();
    }

    protected boolean isFinished() {
        return false;
    }

    protected void end() {
        Robot.drive.stop();
    }

    protected void interrupted() {
        end();
    }
}
```

Innovations

Below is a summary of the innovations in our robot.

Picture	Explanation
Chassis and Drivetrain Innovations	
 	<p>Switchable Bumper Fabric</p> <p>We had originally decided to take the bumpers completely off (to change the colors), but later, we found out that doing so would go way beyond the time limit. Our next idea was to flip the fabric back and forth between the middle-corner axis, but the idea was ruled out once we found out that it will only work for one color and not the other. To accommodate for this time constraint, we decided to settle with something simple: a single piece of fabric that serves for both colors by compensating for the corner folds on both sides. Combined with the velcro, this concept will provide easy replacement and saves worry for the time constraints.</p>
	<p>Different-Sized Wheels for Tilttable Robot</p> <p>With the design of having the bigger wheel in the center, the robot tilts back and forth. Though it may seem that the robot is unstable, it ultimately serves as an ally for our intentions. Since the gear collection mechanism is the main feature for our robot to gain points, speed and handling is crucial. By allowing the robot to tilt, we only need 2 wheels to turn as opposed to three wheels, reducing friction by 50%. This causes the robot to turn faster on the field. This drivetrain is similar to the west-coast drive system.</p>



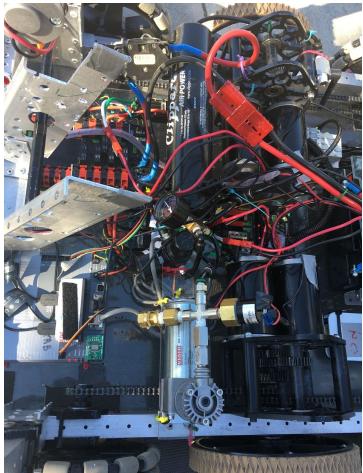
Wheel Axle Reinforces Bumper Resistance

We realize that since the bumper is going to be under a lot of stress trying to cushion all the impacts, it might get bent out of shape and get caught in the wheel. For convenience, we extended the axle further outwards to support the bumper and prevent it from caving inwards.



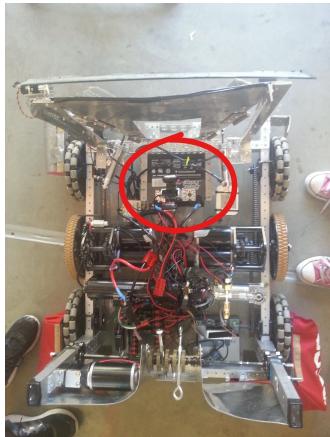
Big wheels allow robot to pass over gear

The 8" wheels on the drivetrain allow the robot to ride over the gear without pushing it. This is crucial to the gear dropping mechanism because there are often gears in front of the peg, and the robot needs to be able to reach the peg. Creating a tall chassis solves this problem.



Plexiglass Support for Air Tank and Compressor

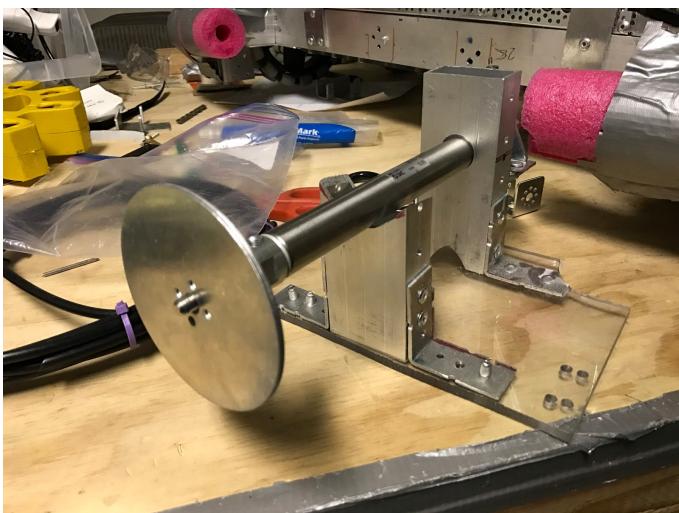
This plexiglass flap gave us much needed space in order to keep the compressor and air tank on the robot, while still being able to access the electronics underneath. It also helped keep the robot neater, separating pneumatic parts from electronics, and makes sure that when the compressor heats up, it won't disturb the electronics.



Position of the Battery to Distribute the Mass during Hanging

In order to make sure the robot doesn't fall when climbing the rope during the hanging mission, we placed the battery on the opposite side of the spool so that when it climbs, the battery is closer to the ground, thus having less potential energy, and is resting on the chassis instead of having to put in a new support for the battery.

Gear Collection Innovations



Gear Shooter

After the Ventura Regional, we decided to implement a gear shooter mechanism to save time, as we noticed that many teams at the competition were able to save time by shooting the gear onto the peg rather than dropping it off. We repurposed our camera mount by drilling a hole in it and passing a 7" pneumatic piston through it, and at the OC regional, saw a remarkable improvement in the gear cycle time.



Plexiglass Support for Gear Mistakes

It makes sure the gear falls into the right place so that the gear mission goes smoothly. Also, if the driver accidentally opens the gear mission, the plexiglass will either get the gear to fall out or make it stay there so it will be easy for the gear to go back into the gear collecting system. Without the plexiglass plate on the bottom, we saw that the gear would get stuck in a weird position on the gear collecting system and would make it unusable for the rest of the game.



Servo for Gear Intake

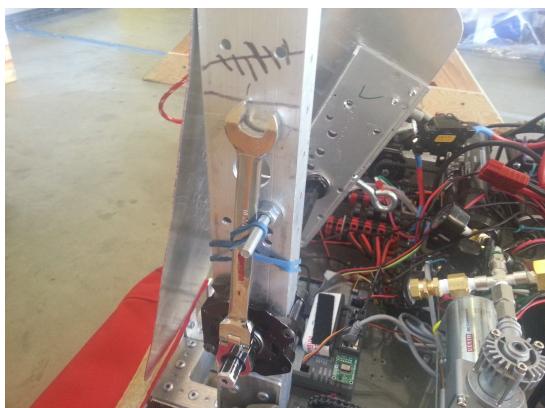
In order to make sure the gear enters the gear dropping system properly and consistently, we put a servo-controlled flap that pushes the gear into the gear mission after it is dropped onto the robot. This ensures the gear enters properly and that the robot is able to carry out the mission. Without the servo we were noticing that we were having trouble getting the gear into the gear collector.



V shaped Gear Collector

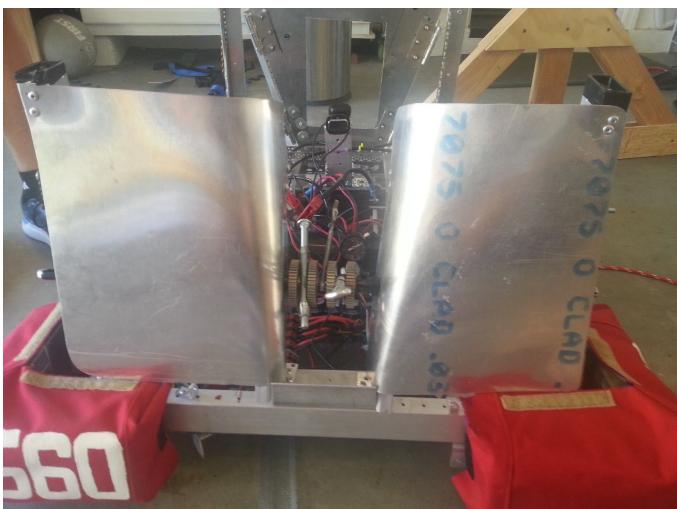
By having a V-shaped gear collector, we make sure the gear stays still and upright on the robot, making it easy for it to be dropped onto the lift. It also minimizes the use of material that is needed for the gear mission.

Hanging Innovations



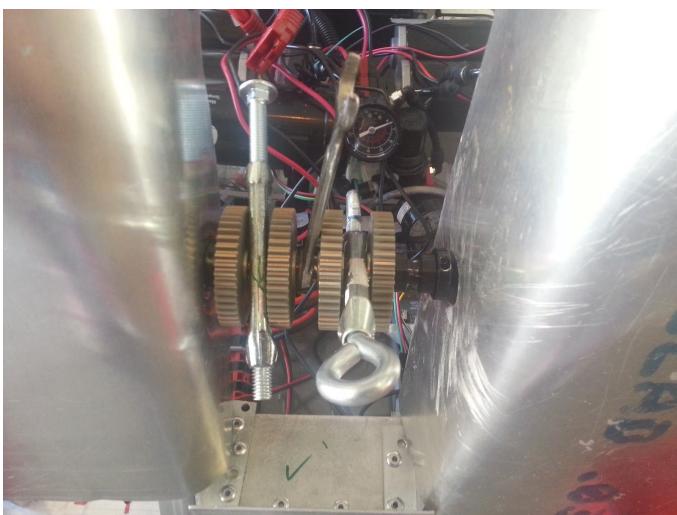
Ratchet Wrench for Support after T=0

We put a ratchet on our system so that the robot would be able to climb up the rope, but not fall down, even when the power is cut at the end of the match. This ensures we get the points for pressing the button at the end of the match, even if we press the touchpad less than 1 second before t=0 and if it continues holding the button for at least a total of 1 second.



Funnel to Guide Rope

By placing a guidance system for the rope to reach the spool, we ensure that the robot will catch onto the rope and be able to climb up the rope in order to complete the mission. It also saves time for the robot to find the rope and catch onto it; time that we cannot afford to lose.



Wrenches as the Spikes for Climbing

We used wrenches because they do not slip when the spool is turning, and they are good at catching the rope in time. They are also longer than the hooks that we were planning to use, so it would take a little less time to hook onto the rope.

Season Error Log			
Date	Problem Description	Solved ?	Solution
1/8/2017	The Cad team had a problem trying to figure out how the two models would affect the weight distribution	Yes	Had to research the parts' weights to figure out the weight distribution of the system
1/13/2017	The design team realized that the gear missions was much larger than the rest of the robot, causing an disproportionate weight distribution.	Yes	Realized that we could make the collector out of a thin piece of metal and support it a little bit, causing it to weigh less
1/13/2017	The original chassis size was planned for 33" by 28". However, when we added 7 inches of bumper to both sides, they were too close to the limit. For the width of 28 inches, we also realized that we did not include 2 inches on either side for the wheels	Yes	We changed the size of the chassis to 32" by 21" to accommodate for the bumper
1/13/2017	We realized that the wheels were outside the frame perimeter, and the bumper had to go around the frame perimeter. This meant that the wheels would get into the way of the bumper	Yes	We had to add a piece of metal around the wheels so that they would not get in the way
1/19/2017	The design our CAD team had sent to the build team was wrong	Yes	We made sure to double check the CAD models so that there would be no problems later on
1/19/2017	Our circular drill was too dull to cut	Yes	We switched to our alternative step drill
1/20/2017	Headstock of the drill press fell out while drilling	Yes/No	Consulted manual, could not find solution, tightened some screws to hold it in place
1/20/2017	A retaining ring was placed too far down, past the key on the motor.	Yes	Used two screwdrivers on opposite sides to push the retaining ring back up.
1/20/2017	Some holes were not drilled correctly	Yes	Redrilled the holes
1/21/2017	There were some leaks in the pneumatic system.	Yes	We tried using soap water to locate the leaks, but we were unable to do so. We fixed it by replacing the pressure switch with a better one.
1/22/2017	Air pressure runs out quickly	Yes	We are trying to make a system where the gear collector is in an on position without any pressure, and the only pressure needed is to quickly drop it off
1/27/2017	We were a little crushed on time	Yes/No	We finished the gear collector, but it was a little weak and sketchy.
1/27/2017	Sheet metal is flimsy	Yes	Since thick sheet metal is expensive and heavy, we'll strengthen certain parts to save on cost and time.
1/27/2017	Pneumatics hard to install	Yes	Unsure how to install pneumatics, probably try to sleep on it to solve next time.
1/27/2017	Stuff on plexiglass getting crowded	Yes	Drilled new holes and rearranged electronics and pneumatics
1/28/2017	Drilling holes in chassis weren't exact	Yes	We measured and re-measured it many times
1/28/2017	Encoder wouldn't fit on motor, as the motor was the wrong type	Yes	Decided to not use encoder

1/28/2017	We had the wrong screws for the gearbox	Yes	Had to order the right screws and stop working on the gearbox
1/28/2017	The drill bit was too dull to efficiently drill holes	Yes	We had to get a new set of drill bits.
1/28/2017	The field part of the gear kept breaking off	Yes	We put on wood bar through the spring and attached it to the field element using a washer and screw to make the whole thing as one
1/28/2017	The gear's material was too weak.	Yes	We attached supporting arms to reduce the instability of the gear system.
1/29/2017	Drill bit was blunt	Yes	We found a similar sized drill bit to finish cutting the holes into the bar
1/29/2017	Holes were off	Yes	Had to ream them further
1/29/2017	The gear wasn't sliding in smoothly	Yes	We added an indent onto the flap and bent the backboard to get a slight amount to give
2/3/2017	Plexiglass measurement were congruent to that of the original robot build, but weren't optimal for the 2nd robot.	Yes	Shifted measurements to maximize glass-to-free space area, robot is now more sturdy (wires won't hang out or slide on the ground with turbulence)
2/3/2017	For the plexiglass backboard, we had to figure out the height at which to put the glass platform in order to be high enough to prevent the gear from falling to low and not being able to be put on the gear peg, but also low enough so the gear would catch onto the triangle peg	Yes	We measured the minimum and maximum possible height of the plexiglass and found a middle ground in height in order to accomplish both requirements
2/3/2017	Programming team experienced bugs with the servos	Yes	They researched possible solutions and decided to reimage the roboRio.
2/4/2017	We figured out how to lock the circular saw so we can replace the blade	Yes	We solved this problem by using the locking mechanism to secure the blade.
2/4/2017	We didn't know which cloth we had to use to cover up the borders.	Yes	We realized that the cloth was provided to us in the kit of parts.
2/4/2017	We weren't able to test the code	Yes	Both robot electronics were being modified so the code was not able to be tested. We needed to learn how to program the sensors.
2/10/2017	Zip-tying the electronics - there were too many holes pre-drilled.	Yes	We restructured the battery braces and the electronics completely.
2/16/2017	We did not have enough space for larger numbers on the sides of the bumper.	Yes	The current plan is to stick with the same sized bumpers, but write numbers on both bumpers on a given side of the robot
2/17/2017	The solenoids on our second robot are broken.	Yes	We have ordered new ones.
2/17/2017	The cloth coverings for the bumpers didn't completely cover the pool noodles as per regulations	Yes	We restarted our design and began thinking about sewing/stapling the cloth the an interchangeable design so that we did not need to take off clothes to change colors

2/17/2017	The band saw was over heating the metal we cut and it wasn't cutting the metal efficiently.	Yes	After hours of struggling to cut, we replaced the metal strip that cut metal bars and replaced it with a new one. Before that, we used water in a cup to cool the metal down
2/17/2017	The camera was smoking and hard to drill through	Yes	We used the same water trick above to cool the drill bit down and we wore a mask to prevent us from inhaling the potentially carcinogenic gas
2/20/2017	The support Beam Bearing Holes were too small.	Yes	We used a hand-held filer to widen holes drilled with the septa drill.
2/24/2017	The adapter for the hanging mission gearbox was difficult to remove off of the CIM motor	Yes	We soaked it in acetone overnight and pried it off the socket.
2/25/2017	We had trouble screwing in the wood bumper.	Yes	Solved it by putting in the screw first and then putting the nut in afterwards and then screwing it in
2/25/2017	The rope for the hanging mission was not long enough to tie all of the loops.	Yes	We bought a bigger rope and sewed the two ropes together.
2/26/2017	The hook screws did not fit within the threads	Yes	Once we found the right match, we then clamped the entire unit and then cut it using the hacksaw, not the band saw
2/26/2017	There might have been an issue with looking up websites.	Yes	They have been resolved with extra research.
3/4/2017	The ratchet wrench broke due to the force against the mechanism.	Yes	We changed the program so that there would be no possibility to fight against the wrench
3/5/2017	Robot was not driving straight	Yes/No	We tried to test out if the program was the problem; but when we switched to an earlier version of the program that had worked, the robot's drive system started acting weird and the motors on one side of the robot started counteracting each other. We discovered that it was a problem with the motor controller; we switched to a different one and the problem went away, but the robot was slightly curving
3/7/2017	Camera mount in way of battery cable wires	Yes	Cut into the mount to clear the way
3/7/2017	Can only access one camera at a time	Yes	New code as suggested by Chief Delphi allowed multiple streams
3/7/2017	Only two cameras recognized out of three	No	Tried to manipulate input recognition and port, but it had little to no success
3/8/2017	Two of the four motors overheated. It appeared that each motor on either side was being used too much while the other two were not being used	Yes	We solved this problem by removing the wire and reconnecting it.
3/8/2017	The climbing rope was of the wrong length	Yes	We adjusted the rope knotting.

3/8/2017	The robot drove very slow. Compared to Code Orange's robot, when our robot successfully transported a gear from the drop off area to the proper location, Code Orange had already took three trips	Yes	We did not realize that the gear setting was set to low. We responded by increasing the motor's full potential through programming
3/8/2017	The gear and ball field items got stuck on the barrier of the robot	Yes	To fix this, we chose to have no ap in the frame, so no balls could get stuck. The frame had to be increased in length as the gear got stuck underneath the robot
3/8/2017	Vision through the camera is awful, there's not a very clear image and everything was very pixelated.	No	We don't know how to fix the problem
3/8/2017	The remote control buttons for driving was slow than expected	Yes	The program was improved to better fit our likings.
3/10/2017	Angle at which to attach the funnel mechanism.	Yes	At first we attach the funnel mechanism at a 45 degree angle with the chassis of our robot, but then we realized that this angle didn't maximise the area of the funnel, so we took out the rivets and replaced the funnel at a 90 degree angle with the chassis which increased the area the rope could be away from the center of the spool because the funnel would guide it back to the center of the spool.

Driving Operator Instructions

1. Power on robot
2. Connect laptop to team 6560 wifi network
3. Open up driver station program
4. Check that communications, robot code, and joysticks are all live
5. Check for camera feed - make sure that the hanging mission and gear mission cameras are live and streaming
6. Set to Autonomous mode:
 - a. Robot needs to be flat against the starting wall
 - b. Make sure that alignment to the gear mission is done correctly (will elaborate further based on autonomous setup)
7. Set to Tele-op mode, enable when ready to control

Controls:

1. Left Side Drivetrain Motor Control
2. Right Side Drivetrain Motor Control
3. Forwards Drive
4. Left Turn
5. Right Turn
6. Backwards Drive



7. Hanging Mission Motor Control
8. Gear Mission Solenoids Toggle
9. Servos Toggle
10. Hanging Mission Motor Speed Control
11. Hanging Mission Motor Slow Reverse



Game Plan Instructions

Before Game

1. Determine with alliance which side the robots will start on

Autonomous

1. Run a program that is specific to where the robot starts (eg. If the robot is in the left most spot, run a program that will get the robot to the nearest gear lift)

Tele-op

1. If autonomous doesn't work or we choose not to do autonomous, deposit the first gear and head to the retrieval zone to pick up more gears.
2. Get the robot to go back and forth from the retrieval zone to pick up gears and try to score the most amount of points with that.
3. If there are two enemy robots in our retrieval zone, one person in our alliance will try to block two of them. If one of them escapes, the one robot that was blocking will back off and continue to do what they were doing.
4. When the pilots lower the ropes down, we will immediately try to go for the hanging and climb up to get the points.

Team Info



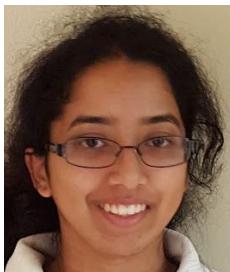
Nandita Joshi

Nandita is a junior at Northwood High School. Nandita is responsible for building certain missions on the robot and community outreach. She has also contributed to the Engineering Notebook and fundraising activities. Nandita enjoys playing viola and Indian classical dance.



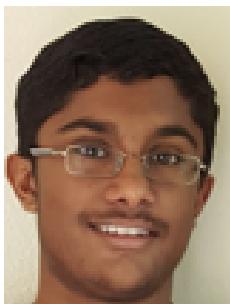
Noopur Siroya

Noopur is a junior at Woodbridge High School. Noopur has contributed to robot design and build and has also contributed to connect and fundraising activities. She enjoys video gaming, watching movies and shows, playing viola and harp.



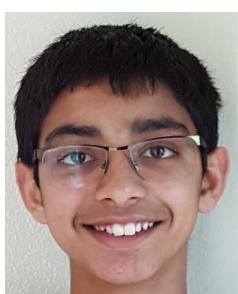
Pallavi Kolli

Pallavi is a junior at University High School. She works on setting up community outreach events and is interested in getting girls to be involved in STEM related activities. She enjoys singing Carnatic Music..



Anish Neervannan

Anish is a junior at University High School. As the team captain, he has been primarily responsible for the overall team performance and drives robot design, build, and programming. He also drives community outreach events, business plan and fundraising. Outside of robotics, he enjoys playing violin, running, math, and biking.



Anish Joshi (AJ)

Anish is a 9th grade student at Portola High Schools. He is the primary contributor and lead for the CAD team and contributed to robot design. He enjoys boy scouts activities, biking and playing tennis, and is on the Portola Cubesat.



Arjun Neervannan

Arjun is a freshman at University High School. He has been the lead for the overall robot design and build teams and has contributed to the CAD, engineering notebook and Community Outreach. He enjoys playing violin and biking, and is on University High's water polo and track teams.



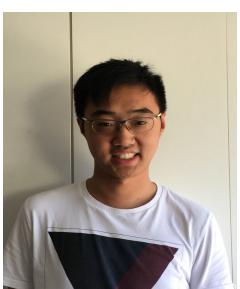
Rithik Lingineni

Rithik is a junior at University High School. He has been primarily responsible for the engineering notebook and has contributed to the robot CAD models, build and robot design. He is interested in fundraising activity as well. He enjoys running, sports, video games, and programming.



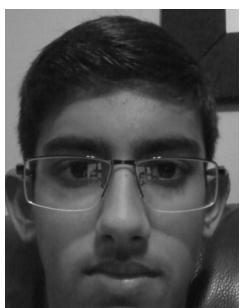
Alex Li

Alex is an 11th grade student at Northwood High School. Alex has been primarily developing the code for the robot and has actively leading the electrical and electronics activities and contributed with the robot's sleek look. He enjoys modeling, speaking spanish at home, and running track.



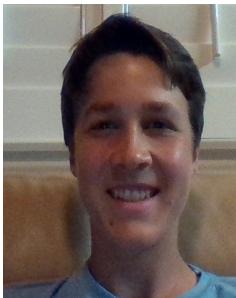
Christopher Wei

Chris is a Junior student at Northwood High School, he has been touching wood and glue since elementary. Chris has helped on both robot building and community outreach, he also loves competing in science olympiad and international bridge building competition.



Aryan Mathur

Aryan is a 9th grade student at Woodbridge High School. He is an active member in the fundraising and outreach program and has helped with build activities. Aryan enjoys math and science and plays water polo



Charlie Gooding

Charlie Gooding is a Sophomore at University High School. Charlie is a member of the robot design and build team and contributed to certain key missions. He loves playing Tennis, going surfing, and playing around with circuits and the Arduino



David Kurniawan

David is a Sophomore at University High School. He has been mainly involved in the robot design and build. He enjoys playing the viola in Uni's Philharmonic Orchestra, is on the school golf team, loves soccer, and enjoys taking part in STEM activities.



Albert Lin

Albert is a sophomore at University High School. He has been an active key member of the robot design and build and was responsible for design and building key missions. He enjoys participating in STEM-related activities, plays the violin, and has a video-making hobby.



Aditya Sasanur

Aditya is an 9th grade student at Portola High School. He is a member of the connect team and works on fundraising and outreach. He also assisted the team in building the robot. Aditya loves playing tennis and also enjoys Science and Math. In his free time, Aditya likes to learn about things that are interesting and open ended.



Jason Lin

Jason is a Junior at Northwood High School. He has a unique background coming from Portugal after living there for 13 years. With his interest in robotics and mechanical engineering, he has played an active and key role with the robot design and build. He enjoys his free time participating in small STEM projects.



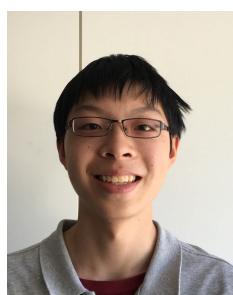
David Crampton

David is an 11th grade student at Northwood High School. David helped with the robot mechanical build. He enjoys biking and surfing.



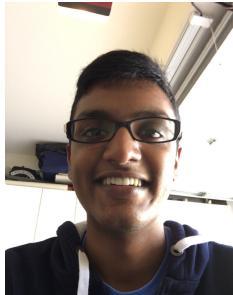
Charlie Du

Charlie is an 11th grade student at Northwood High School. Charlie has been part of the outreach program. He enjoys biking and traveling.



Victor Chang

Victor is a sophomore at Northwood High School. He has been working with the design team to bring CAD models to life and helping them locate and resolve errors of the build. During his free time, he enjoys playing guitar, learning Chinese, doing math, and surfing the web for the next big science innovation.



Rudraksha Gupta

Rudraksha is a junior at Northwood High School. He has been developing CAD models for the robot and he has actively helped with the robot design and build. He enjoys wrestling, playing video games, robotics, artificial intelligence, and messing around with his friends.



Yiming Jia

Yiming is a freshman at University High School. He has helped slightly with the robot design and build team, but has spent a majority of his time working with the community outreach and connect team. Otherwise, he enjoys playing video games, swimming, and practicing various instruments.



Harvey Zhou

Harvey is a junior at Northwood High School. Harvey has helped with the build team, and contributes to the connect team. He enjoys playing basketball and the piano, as well as hanging out with his friends.

Coaches and Mentors



Raj Neervannan is the [head coach](#). He has been [coaching FLL](#) since 2012 and [FTC Team](#) since 2014. He thoroughly enjoys coaching and super enthusiastic when talking about Robots and bringing them to life. For his real world job, he [runs a financial search engine startup](#), used widely by Wall Street. He enjoys playing Racquetball, watching movies and listening to music with his family.



Srini Lingineni is an [assistant coach](#) focussing on non-profit set up, accounting, robot build and one can see him in his elements when working in his workshop. He currently works for [Canon](#) and [Sharp](#). Outside of the work, he enjoys playing volleyball with his friends and always tunes into football, basketball, and soccer games on TV.



Raja Kolli is an [assistant coach](#) and has been an integral part of the team since 2012. He started an FLL team in 2011. He is helping with [robot build, purchasing, and engg notebook](#). He works for a major telecom company in San Diego. He is an Assistant Scout Master, and Life to Eagle head coach with Boy Scout Troop 606, and teaches Indian language Telugu at temple.



Gunjan Siroya is an [assistant coach](#) focusing on [Connect, Outreach and fundraising activities](#) for the team since 2015. Gunjan enjoys mentoring and has been [advising and guiding 30+ technology and Biotech startups](#). Gunjan is an Electronics Engineer with expertise in business, marketing, sales, and business strategy.



Aruna Neervannan is the [programming mentor](#) for the team. She is helping the team get up to speed on the infrastructure including Java programming, FRC SDK, Control System and using Github for Source Code Management. With both her kids on the team, she thoroughly enjoys and assists in the robot build as well. She is a [Software Engineer](#) for a Content Management company and enjoys biking and yoga.



Ravi Joshi is a mentor advising the team in the matters of Computer-Aided-Design (CAD) and manufacturing of different components that go into the robot. He really enjoys working with the new engineers as they figure out how to bring a product to life. He enjoys playing Racquetball, Tennis, Golf and watching movies with his family.

Summary of Connect Activities Throughout FTC Season 2016-2017

Our Connect activities are focussed on:

1. Social Media
2. Scientific Outreach
3. Connect with other teams - to offer and get help
4. Community Outreach to spread STEM/FIRST knowledge (This is covered in a separate section)
5. Fundraising Outreach (This is covered in a separate section)

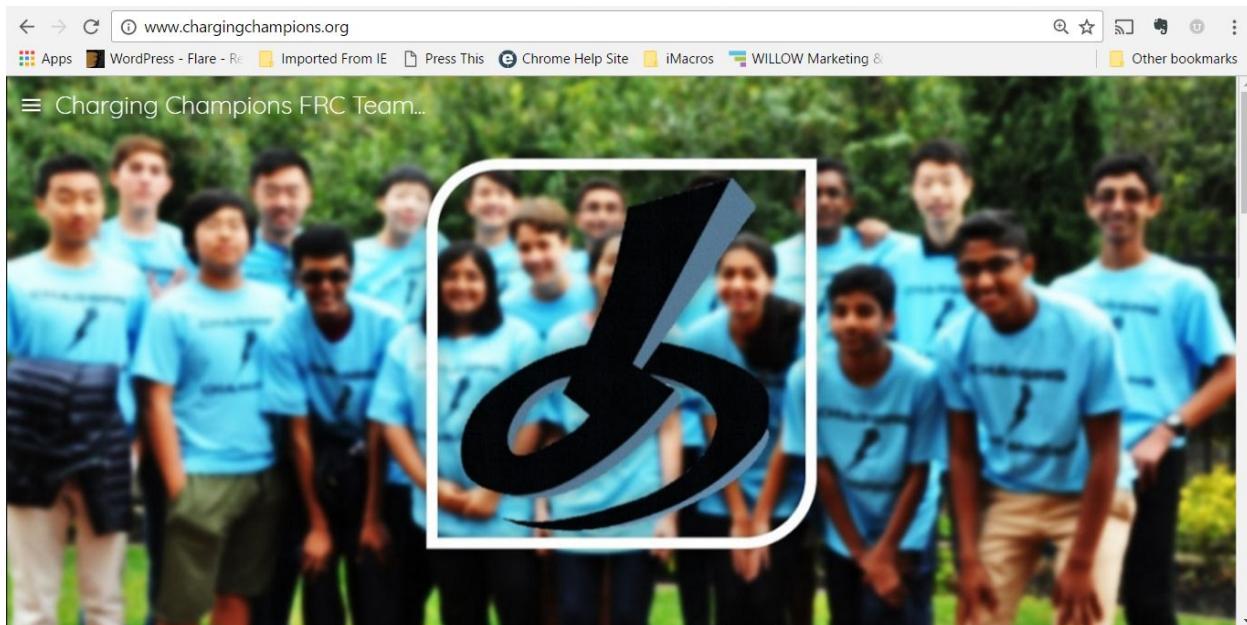
OUR CHALLENGES



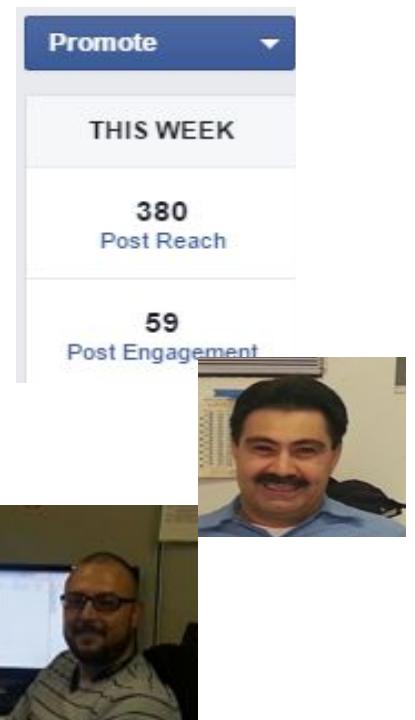
- Choosing:
 - Team Name - Selected using a survey - see page I-19
 - Team Logo - Selected using a survey- see page I-22
- Setting up Social media accounts, and Website development - Learning New Tools
 - Business Plan
- Setting up an outreach program

Online Social Media activities

- Created a new and improved website (www.chargingchampions.org) that explains our mission, who we are, and what we are currently in the process of doing



- The website is always being updated and is the go-to place for information on our team and upcoming dates.
- We also update our followers regularly on social media accounts such as Facebook, Twitter, Tumblr, Google+, YouTube, BlogSpot, Instagram
- All of the social media links have been posted on our website
- The social media sites are helpful because you can go there and see our accomplishments
- We use Udemy and YouTube to share videos and tutorials



Scientific Outreach - People that helped us during our season

- Mr. Raul Cruz helped with custom parts on CAD
- Mr. Manuel helped with Power Tools training
- Mr. Mahesh Vagharia – provided fiberglass pieces

Connecting With Other Teams

We provided help at qualifiers and regionals:

- We helped 5 teams with :
 - static

- programming
- electrical/hardware problems
- provided tools to help them with their current and future problems
- We also were contacted by out of state teams and helped them with their problems too
- At the FTC West Super Regionals, our team created an Anti-Static Solution, which we were ready to provide for teams in need

Teams that helped us:

- Code Orange: FRC registration, strategies, spares for pre-season practice robot, team organization, budgeting
- CDM - FRC strategies
- Electromedics Gold helped us with static problems
- West Torrance Robotics helped us when we were rookies last year

Online Outreach

Facebook

The screenshot shows the Charging Champions Facebook page. At the top, there's a large group photo of the team members in blue shirts. Below the photo is a black and white logo. The page title is "Charging Champions". Below the title are buttons for "Friend Request Sent", "Suggest Friends", "Message", and more. Underneath the main image are navigation links: Timeline, About, Friends (1 Mutual), Photos, and More. On the left, there's an "Intro" section with a bio: "We are a robotics team participating in the FIRST Robotics Competition from Irvine, California." It also lists locations: "Lives in Irvine, California" and "From Irvine, California". To the right, there's a news feed item from "Charging Champions" with a timestamp of "9 hrs". The post says "Today is Picture Day! Meet the full team." and includes a photo of the team outdoors.

Twitter

The screenshot shows the Charging Champions Twitter profile. The header image is a group photo of four team members in blue shirts. Below the header is a black and white logo. The profile information includes the name "Charging Champions" and the handle "@FRCTeamCC". The bio reads: "Hello! We are FRC Team 6560, from Irvine, CA!" It also shows location "Irvine, CA", website "chargingchampions.org", and joined date "Joined January 2015". Below the profile info are statistics: TWEETS 79, FOLLOWING 1,329, FOLLOWERS 764, and LIKES 35. Underneath these are tabs for Tweets, Tweets & replies, and Media. A recent tweet by "Charging Champions" (@FRCTeamCC) is visible, listing four names: 1) Rudy, 2) Alex, 3) Arjun, 4) Charlie G.

Communication and Collaboration Tools

1. Slack

Slack is a collaboration tool that we used for intra team communication. Slack is not just a regular messaging service; as shown in the picture below. We have different channels so that team members send messages to only those involved in that task. For example, if a team member chooses to send a message only to the people working on the robot, he or she can send a message only in the “robot-build” channel. This tool has made communication within our team much less overwhelming and clutter-free. **We exchanged more than 18,800 messages so far.**

The screenshot shows a Slack interface. On the left, there's a sidebar with a list of channels: 'Charging Cham...', '#preseason-build', '#procurements', '#programming', '#random', '#recruitment', '#regionals', '#resources', '#season-build', '#snacks', '#tasks', '#ventura-logistics', and '#website'. Below that is a 'DIRECT MESSAGES' section with entries for 'slackbot', 'Nandita Joshi (you)', 'Albert, Noopur', 'Arjun Neervannan', and 'Anjan Mather'. At the bottom of the sidebar is a search bar with a magnifying glass icon. The main area is titled '#electrical'. It shows a message from Jason Lin at 9:01 PM asking about electronics for a second robot. Raj Neervannan replies at 9:04 PM asking if it's the same as another one. Arjun Neervannan then uploads an image of a complex electronic assembly with various components like a motor, gears, and sensors. A caption below the image reads 'uploaded this image: Image uploaded from iOS'. At the bottom of the main area is a text input field with a '+' icon and the placeholder 'Message #electrical'.

Number of messages exchanged by month:

Sept: 1400	Oct: 1200	Nov: 2200	Dec: 2000
Jan :1000	Feb: 2200	Mar: 2500	

2. Google Drive

Google Drive is an online file storage and synchronization service that we used to store and organize all of our files. Google Drive not only has a large storage space, but also lets multiple people work on the same document at the same time, which was extremely useful for us,

especially when two or more people were working on the same engineering notebook entry. As shown in the picture, we have organized all of our files into various folders and subfolders so that anyone can navigate through them.

Name	Owner	Last modified	File size
Business	Nandita Joshi	7:09 PM (Nandita Joshi)	-
CAD Section	Anish Joshi	Feb 19, 2015 (Anish Joshi)	-
Connect	Ajith Neethanran	7:08 PM (Ajith Neethanran)	-
Doc	me	Mar 17, 2016 (me)	-
electrical	me	Dec 7, 2015 (me)	-
Fob	me	Mar 17, 2016 (me)	-
Innovation	Ajith Neethanran	8:49 PM (Ajith Neethanran)	-
Jan	me	Mar 17, 2016 (me)	-
Mar	me	Mar 17, 2016 (me)	-
Nov	me	Mar 17, 2016 (me)	-
Oct	me	Mar 17, 2016 (me)	-
Old 12/2/12	Surendra Kell	Dec 6, 2012 (Surendra Kell)	-
Pictures	Raja Kell	Dec 2, 2012 (Raja Kell)	-
programming	Ajith Neethanran	8:49 PM (Ajith Neethanran)	-
Sept	me	Mar 17, 2016 (me)	-
timeline	Surendra Kell	Dec 6, 2012 (me)	-
write ups	Ajith Neethanran	8:49 PM (Ajith Neethanran)	-

3. Email



4. Video Conferencing Tools



6. Github

The screenshot shows a GitHub repository page for 'ftc_app-master' under the 'FtcRobotController' organization. The 'Code' tab is selected. The branch is set to 'master'. The top navigation bar includes links for Issues, Pull requests, Wiki, Pulse, Graphs, and Settings. Below the navigation is a 'New file' button and a 'Upload files' button. A 'Find file' and 'History' link are also present. The main content area displays a list of commits:

Author	Commit Message	Date
chargingchampions	Added files via upload	Latest commit c9b1554 17 days ago
..		
AdafruitRGBExample.java	GyroTest	4 months ago
Autonomous.java	Charging Champions Teleop and Autonomous program updates	3 months ago
AutonomousOp.java	Charging Champions Teleop and Autonomous program updates	3 months ago
CCAutoBlueWithShelter.java	Added files via upload	17 days ago
CCAutoRed2.java	Added files via upload	17 days ago
CCAutoRedWithShelter.java	Added files via upload	17 days ago
CCAutonomous.java	Autonomous changes	a month ago
CCAutonomousBlue.java	Added files via upload	17 days ago
CCAutonomousRed.java	Added files via upload	17 days ago
CCTeleOp.java	Added files via upload	17 days ago
CCTestAutonomous2.java	Added files via upload	17 days ago
ColorSensorDriver.java	GyroTest	4 months ago

We used Github to version control the programs developed by multiple team members.

In addition, we used several software tools like Microsoft Office, Visio, etc. to prepare the communication messages.

Team Surveys

 **Anish Neervannan** 8:29 PM
We will be having a vote to decide which one we want to order for everyone. The poll will close on Wed night. Please cast your vote by then (team members only!)

📌 Pinned by Anish Neervannan
 **Simple Poll** APP 8:29 PM

Which t-shirt design do you like better (options above)?

1 Option #1 **18**

anish.neervannan, charlie.gooding, rudrakshagupta, anish.joshi, victorchang, pallavikolli, jason_lin, wetlll, alexlialex, arjun.neervannan, adityas02, rithik, aryanm05, nandita, yimingjia, albertlin, noopursiroya, davidkurniawan

2 Option #2 **3**

harvzh, ganesh, dmcrampston



 Simple Poll Edit Settings

📌 Pinned by Rudraksha Gupta
 **Simple Poll** APP 1:43 PM

Look at the pics above and visualize #2 without the ramp. Which would you like? The main dif is hangar placement.

1 1 **3**

jason_lin, arjun.neervannan, anish.joshi

2 2 **1**

rudrakshagupta



 Simple Poll Edit Settings

Simple Poll APP 7:47 PM

What meal options would you guys be interested in having

1 Pizza (non-Costco)

2 Sandwiches/Burgers **3**

arjun.neervannan, rudrakshagupta, anish.joshi

3 Italian (salad, pasta, breadsticks) **10**

anish.neervannan, arjun.neervannan, rudrakshagupta, pallavikolli, nandita, anish.joshi, noopursiroya, victorchang, aryanm05, jason_lin

4 Chinese (dumplings, noodles, rice) **10**

anish.neervannan, arjun.neervannan, rudrakshagupta, pallavikolli, anish.joshi, noopursiroya, victorchang, aryanm05, charlie.gooding, harvzh

5 Indian (rice, flatbread, curry) **8**

anish.neervannan, arjun.neervannan, rudrakshagupta, ganesh, pallavikolli, anish.joshi, victorchang, charlie.gooding

6 Mexican (taco bar, burritos, nachos) **10**

anish.neervannan, arjun.neervannan, rudrakshagupta, ganesh, pallavikolli, nandita, anish.joshi, noopursiroya, victorchang, aryanm05

7 Korean (kimbab, bibimbap, kimchi) **8**

anish.neervannan, arjun.neervannan, rudrakshagupta, ganesh, pallavikolli, noopursiroya, victorchang, aryanm05

8 Greek/Middle-Eastern (falafel, pita with hummus, gyros, salad) **10**

anish.neervannan, arjun.neervannan, rudrakshagupta, ganesh, pallavikolli, nandita, anish.joshi, victorchang, charlie.gooding, jason_lin

9 British (fish and chips)

10 Others (suggest below)

1	2	3	4	5
----------	----------	----------	----------	----------

6	7	8	9	10
----------	----------	----------	----------	-----------

Simple Poll Edit Settings

How the STEM Professionals Helped Us

Over the course of the season, we had a lot of help with our robot, from our mentors to outside help. The biggest outside help came from STEM professionals , who work in the world of metal and electronics. Below is our story of how we got invaluable help **from 2 STEM professionals:**

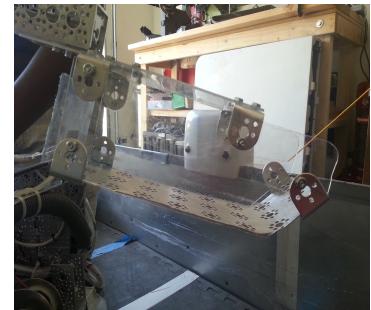


Mr. Raul Cruz: During the middle of last season, AJ and Arjun went to AMD International and were taught how to use CAD to the team's advantage by Mr. Raul Cruz and also a little bit by Mr. Srujan Joshi. Mr. Cruz taught the boys about CAD functions such as extruding (giving height to a drawing) and revolving and answered any questions the boys had. Over the course of the year, he helped the boys not only learn CAD but how to problem solve on their own. One example of this was when **Mr. Cruz** taught the boys why a feature was not the same length through the animation sweep, and **helped them problem solve, teaching them life skills along the way**. Over the course of the next year, **he made many parts for our robot such as the zipline knockers** and the electronics plate on our robot this year.



Mr. Manuel Martinez: Before we got too far into the Build Season, Mr. Manuel Martinez visited the garage to give us advice on how to properly and safely use equipment such as the band saw, sander, and drill press. He also gave insight on how to care for the products to increase their lifespan and effectiveness.

Mr. Mahesh Vaghasia: During the middle of the season, we found out that we needed lightweight plastic parts for our robot to function. Our robot was already super heavy from all the metal we were using, and we needed thin, lightweight parts that were sturdy and durable. So, through our mentor Mr. Joshi, we contacted Mr. **Mahesh Vaghasia at Universal Wire and Plexi**. He **provided materials and used a router machine to not only make custom parts for our robot**. This was extremely generous of him and very valuable to our team.



Tasks	Names: what each person has to do for the website	Date	Content Completion	Website Upload			
Website ideas/ tasks:							
Home page with news feed and social media feed; links to other tabs	yiming			CAD	Arjun	x	
Page for each subcategory/award category/slack category	yiming			Programming	Pallavi		
Interviews; make it pretty looking				Robot Build	Nandita		
Updates tab; tell people what is happening with our team recently				Community Outreach	Noopur	x	
All social media comes here/ social media links us here							
Contact us tab; with email, social media, etc	yiming						
Calendar of events where we will be, fundraising, scrimmages, etc							
Kickstarter/ public funding (have to ask fundraisers or forward info to that team)							
About tab with our history	i						
Maybe add a few more categories, like the community page	yiming						
Every team would post something every week (needs to be told to post)							
Everyone has to push other people to post once a week on social media							
Everyone also write for the other teams they are a part of	everyone						
CAD	yiming						
Robot build							
Programming							
Fundraising							

Social Media	Names:	Date	Content Completion	Website Upload
Blog 1	Pallavi			
Blog 2	Nandita			
Blog 3	Noopur			
Blog 4	Noopur			
Blog 5	Pallavi			
Blog 6				
Weekly updates to Social channels - 3 comments per weekend				
Add videos with comments - 2 per week				

Sustaining Plan

Charging Champions started as a neighborhood team of elementary school kids in 2011 and started participating in First Lego League (FLL), then evolved into an FTC team in 2014 and now continue to participate as a rookie First Robotics Challenge (FRC) team this year.

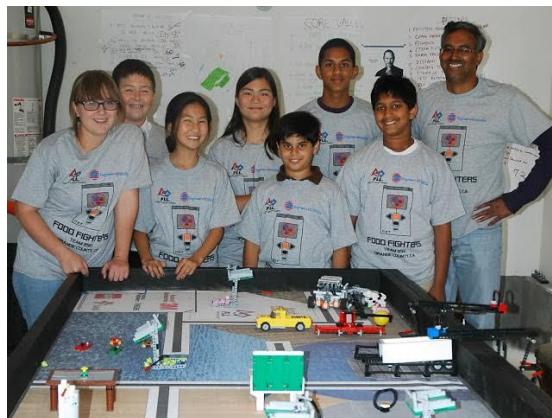
Team has evolved over the years. Few members have left the team, but many have stayed and moved onto FTC and FRC. During FLL and FTC seasons, we have recruited new members from the neighborhood with an average team size of 8.

As a rookie FRC team, we had a major recruitment campaign in Sept across all high schools within the City Of Irvine to increase the team size. More than 40 students expressed interest in joining the team. We conducted rigorous interviews over couple of weeks in Sept/Oct and selected 15. Our team size is 21, mostly juniors with several sophomores and freshmen who are expected to continue to participate in FRC in future. Many senior members will continue to mentor and we plan to continue recruiting freshman and sophomores every year to keep a steady supply of interested kids that can work alongside the senior members. We also expect the adult (parents or other adult mentors) to transition the institutionalized knowledge.

Our active outreach program in various organizations such as schools, boy scouts, girl scouts, and youth sports organizations has helped spread interest in building STEM careers. We've been actively recruiting new team members from the community, and we expect this to continue in future.

The following pictures show our teams over the years.

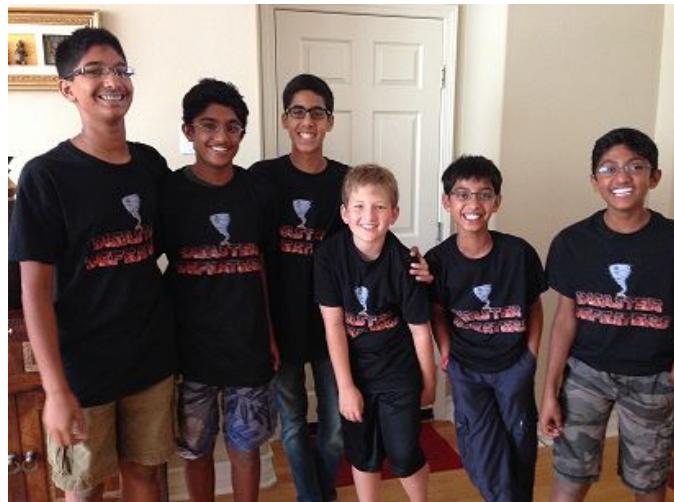
2011 - FLL: Food Factor



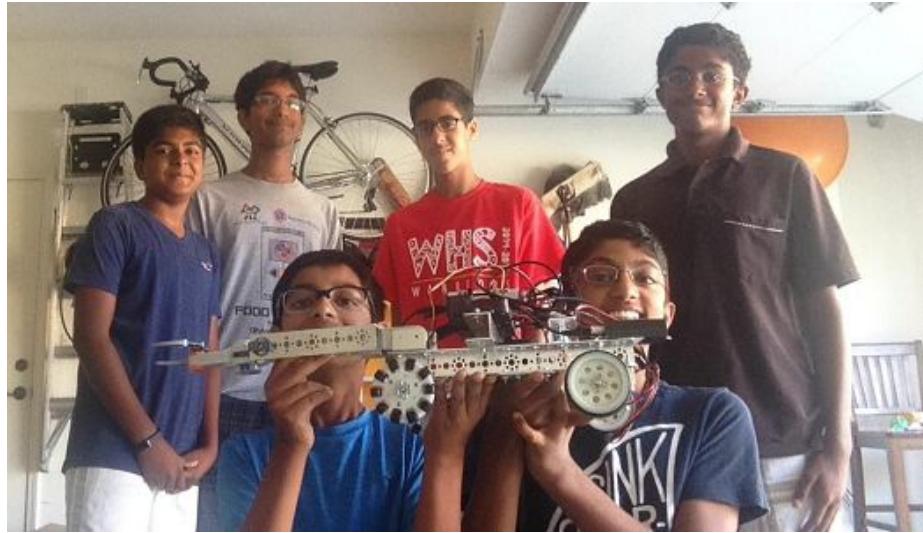
2012 - FLL: Senior Solutions



2013 - FLL: Nature's Fury



2014 - FTC: Cascade Effect



2015 - FTC: RES-Q



2016 - FRC - STEAMWORKS



Community Outreach Summary

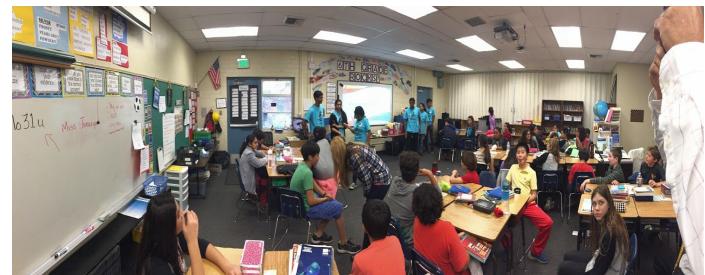
The team has made STEM Presentations and Robot demo at:

- Boys Scout Troop 622- 30 Boy Scouts attended
- Boys Scout Troop 606- 80 Scouts and parents attended
- Woodbridge Tennis Academy- 30 People
- University Park Elementary School- 6th Grade Class A - 35 Kids
- University Park Elementary School - 6th Grade Class B - 35 Kids
- Corona Del Mar High School FRC Team- 15 Students
- Boy Scouts Troop 105- 40 Boy Scouts
- Irvine Community College Outreach- 30 High School Students



Our team helped with FIRST FLL Grant applications for:

- University Park Elementary School
- Vista Del Mar Elementary School



Our Outreach Impact:

- Corona del Mar High School used our tips from the January Outreach to kickstart their successful rookie *FIRST* Robotics Competition season.
- University Park Elementary School was inspired by our outreach event. We are helping them form two *FIRST* LEGO League teams for the next season.
- We have also inspired another local elementary school, Vista del Mar Elementary to form a *FIRST* LEGO League team for next year.

Plans for the rest of the season - Reach out to other schools in the community:

- La Mirada and Norwalk School Districts
(Presentation scheduled for May)



- Alderwood Elementary School
- Jeffrey Trails Middle School
- Red Hill Lutheran School
- Arroyo Canyon School
- Cerritos Elementary School
- Tustin Elementary School
- Santa Ana Unified School District Schools
- Tustin Unified School District Schools
- ABC Unified School District Schools

WHAT DO WE SHOW THEM?

- What **FIRST Robotics Challenge** is all about
- Our Season and Build Processes, Robot Build Process, including our strategy, CAD, Programming, and the associated STEM concepts
- Connect Summary- how we inspired other teams to join FIRST
- Starting a *FIRST* team

Boy Scout Troop 622:

Date: 12/7/15

Location: Turtle Rock Community Center

Number of People Present: 30 people

On December 7th, 2015, our team had our first outreach event. Half of our team showed up ready to present to AJ's Boy Scout Troop 622. Tensions were high to do well, and we worked hard to set up the projector. Our powerpoint was all ready, and we went through the presentation one more time before the troop came in. When the troop came in, we were all ready to present and we captured the young boys attentions with our powerpoint and videos we showed. There were about 30 kids and parents present for the presentation, and we had their undivided attention throughout our powerpoint. At the end, the boys were excited to see our robot be driven around and even the parents were interested in joining the FIRST world, whether through FLL or FTC. We left the troop with smiles on our faces, knowing that we had spread the STEM ideals to the younger generation.



Boy Scout Troop 606

Date: 12/14/15

Location: University United Methodist Church

Number of People Present: 80 people

On December 14, 2015, the team had its second outreach event with Ganesh's Boy Scout Troop 606. We set up our presentation while the huge group was eating at their party, and waited patiently for them to finish up their food and come in. About 40 kids and parents came for the presentation, and they were excited to see the robot move. We explained what FIRST is, showed this year's game video, and told them what we do to create a robot, plus much more. After we had presented, many parents and kids came up to us, asking about the specifications of our robot (for many of the adults had backgrounds in engineering) and how they can get involved in FIRST.



Woodbridge Tennis Academy

Date: 12/15/15

Location: Woodbridge North Lake Tennis Courts

Number of People Present: 30 people

The very next day, on the 15th of December, our team presented through the Woodbridge Tennis Academy. As this was our 3rd outreach event, we were well prepared and calm about what we had to say and do. About 30 parents and children showed up, ready to learn even after an exhausting day playing tennis. Even the coaches showed up to watch the presentation. We used our powerpoint and got the kids interested by referencing robots in their favorite movies and shows, such as Star Wars. At the end of the presentation, we even let the kids drive the robot with some members of our team teaching them how the control worked, while other members talked to the adults about how they can join FLL or FTC.



Corona Del Mar High School

Date: 1/7/16

Location: Corona Del Mar High School

Number of People Present: 15 people

On January 7th, 2016, we presented to Corona Del Mar. This presentation was different than our last 3 outreach events, for these high school kids knew that they were going to join FRC this season, but didn't know how to begin their journey. Last year, we inspired them to join the FIRST world with our success on reaching the super regionals, but because they were a high school team, they decided to join FRC instead of FTC. We helped this team find out how to start brainstorming, where to search for parts, and where to look for help. We also told them our story about how we grew from our mistakes in hopes that they will learn from our mistakes. We left them with a better understanding on how to start their rookie season, and now they are going to the World Championships too!



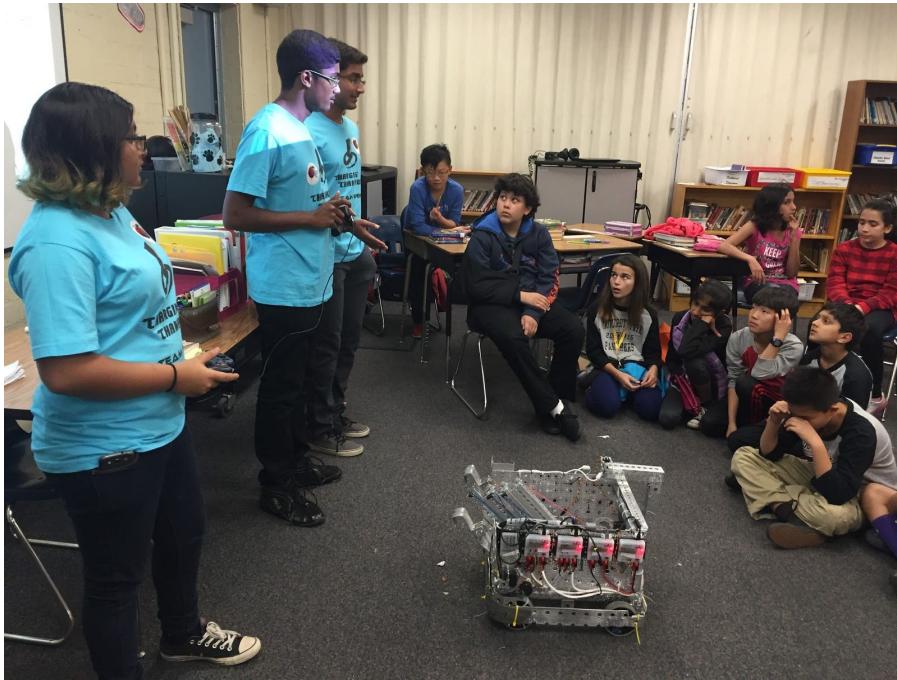
University Park Elementary School

Date: 1/22/16

Location: University Park Elementary School

Number of People Present: 70 people

Our team first presented to a school on January 22, 2016. We presented to 2 6th grade classes at University Park Elementary in Irvine, California. This outreach event was our greatest because it really helped us spread STEM knowledge to the younger generation of students. Each classroom had about 35 attentive children, and we took about 30 minutes to present in each class. The children were very curious about our robot and asked a lot of great questions. They also got very excited when we drive the robot around, and the teacher found it hard to contain their laughter when we used the robot to play around with them. They were very interested by FIRST and robotics, and when they heard that our robot was going to regionals, they exclaimed “Our robot has won!” And they weren’t the only people interested with what FIRST has to offer. The principle is now using our help to create 2 FLL teams and is actively searching for funding, especially since they are a magnet school for special needs children. Our team has offered to donate 1 FLL table as well as mentor the kids throughout their FIRST journey. Also, they aren’t the only school planning to form 2 FLL teams. Vista Del Mar Elementary School is also seeking funding for 2 new FLL teams which we are going to mentor and donate a table to.



Boy Scouts Troop 105

Date: 3/13/16

Location: Plaza Vista

Number of People Present: 40 people

On March 13th, 2016, we presented to about 20 kids in Boy Scouts Troop 105 at Plaza Vista K-8 school. These boys were looking to complete their robotics merit badge, and we were hoping to help them find a way to reach their goals. Through our mentor Coach Raja, who is the assistant scout master and robotics merit badge leader, we explained to the kids how robots work and what you have to do to get a fully functioning robot. Some of the kids already had done other robotics groups, and knew what we were talking about. Coach Raja also explained the specifications on how to get a boy scouts robotics merit badge, and referred them to the Boy Scouts robotics handbook for more information. At the end, we drove the robot around and are now in the process of talking about creating another FLL team within their troop.



Neighborhood Outreach

Date: 4/10/16

Location: Our garage

Number of People Present: 40 people

On April 10th, 2016, our team had an outreach event for our Irvine neighborhood in our garage where we worked. We explained to all the adults and kids what we did, what the challenge was this year, and showed our robot doing the challenges. After showing of what our robot can do, part of our team let all the kids try hanging on the pullup bar, while other team members talked to the adults about what FIRST is and how our robot works. The guests had fun watching the robot hang while munching on refreshments, and even gasped when the robot fell back. Everyone was very interested, and many kids came back multiple times to drive the robot. All in all, it was a success and we have many children interested in joining FIRST in the years to come.



Irvine Community College Outreach

Date: July 2016

Location: IVC

Number of People Present: 20 + high school students

On July 2016 , our team went to Irvine Valley College to present to high school students. We want to inspire them to join the team . Before the presentation, we checked and fixed a couple of minor problems on the robot. Our team set up the whole field at the college so the kids can view the game. We presented to our audience regarding last year's challenge and then showed our robot. After we presented to the audience, they asked questions on how the robot works and what each part is. They were curious on how the robot was able to hang itself on the bar. Finally the excitement bursted throughout when we told them that it is your turn to operate the robot . All of the high school students were energized to control the robot . It was a good learning experience for them .

Summery about last year's accomplishment:

We helped University Park and Vista Del Mar Elementary School with their FIRST Lego League grant application. We also reached out to Tustin and Santa Ana Unified School Districts for scheduling a time and day we can present to the kids for future outreach events. We are in the process of contacting more schools to inspire 500 kids to join FIRST .



Charging Champions Support Letter

March 11, 2016

Mr. Troy Hunt, Ed.D.
Vista del Mar Elementary School
1130 Avenida Talega
San Clemente, California 92673

Dear Mr. Hunt,

Charging Champions, *FIRST* Team 8660 is pleased to provide this letter of support for the Vista Del Mar Elementary School proposal to the *FIRST* Diversity Grant: 2016 *FIRST* STEM EQUITY COMMUNITY INNOVATION GRANT.

As collaborator, our team members will support Vista del Mar Elementary School with its application process for the *FIRST* Grant and other fundraising opportunities in the future, provide mentoring and operational support and help develop skills for parent participation and involvement. *FIRST* Team 8660 has team members with 3 or more years of FLL and FTC experience and will be actively supported by our team mentors and coach.

Charging Champions has been successful in solving FLL and FTC Challenges with innovation, collaboration and motivation for the past four years, and we are excited to inspire other students to achieve a similar skill development and learning environment.

In support of this Grant proposal, *FIRST* Team 8660 would be delighted to offer Vista del Mar Elementary School our support and expertise in Robot Build, Software Development, Project Management, Competition Planning, Core Values, Professionalism, Connect and Outreach Skills.

Sincerely,
Ganesh Kolli
Charging Champions
FIRST Team 8660
www.chargingchampions.org



Vista del Mar Elementary School

1130 Avenida Talega

San Clemente, California 92673

Troy Hunt, Ed.D., Principal

tshunt@capousd.org - 949-234-5950



March 11, 2016

Dear FIRST STEM Equity Community Staff:

Vista del Mar Elementary School (VdMES) is a K-5 school with a student body of 1,098 students located in small community of San Clemente in south Orange County. VdMES is committed to engaging K-5 grades students in a meaningful, challenging, and innovative educational experiences resulting in increased post-secondary options for all students. Over the last three years, we have increased Science Technology Engineering and Mathematic (STEM) programs. We have provided additional technology access from 36 to 548 computers, created a science resource center, school coding classes, and increased students' mathematic problem-solving skills. The increase in STEM focus has earned us both the California Distinguished and Gold Ribbon School awards. In addition to excellence, we have tremendous parent support who also shares their professional STEM skills with our students.

VdMES's next venture is to seek support to create and develop a FIRST Lego League team in collaboration with the FTC Team 8660 - Charging Champion. Our goal is provide an advanced opportunity for select individuals to work at a higher level. However, we struggle with the lack of financial support to participate in engaging extracurricular experiences that leads to more promising STEM real-world opportunities. The team will include a diverse group of boys/girls, with various ethnicities and social/economic backgrounds. Our goal is to share our experiences and foster additional robotics programs in the other 35 elementary Capistrano Unified School District schools.

We as lead will collaborate Charging Champions FIRST Team 8660, who competed in the FIRST Tech Challenge (FTC), and parent computer and engineering professionals. Our teacher/coach, parents and community experts will provide additional support and real-world knowledge.

The robotics team will need to purchase our FIRST Lego League registration, team kit, registration competition costs, Connect Project supplies, along with teacher stipends at an estimated cost of \$12,000. In order to establish and compete we will need support from a Grant from FIRST of \$10,000 along with parent donations and expertise along with grants from our MAKO Foundation at VdMES. We believe that approximately 15 students will benefit in year from this FLL program in 2016- 2017, and we plan to sustain this program in coming years with corporate, school district and parent support. We look forward to an opportunity to compete in the FIRST Lego League in the 2016-2017 school year.

Sincerely,

Troy Hunt, Ed.D.

Principal



March 10, 2016

To Whom It May Concern:

University Park Elementary School seeks support for creating and developing two FIRST Lego League (FLL) teams. We are requesting \$9,425.

University Park is located in the city of Irvine, approximately 40 miles south of Los Angeles, California. As a Title 1 school, approximately 25% of our students qualify for and receive free and reduced lunches, and over 55% of our students speak 35 different languages at home. Students with special needs represent 5% of our student population and are mainstreamed into our general education classes creating an atmosphere of equality amongst the students. Because of this diversity, our student population often struggles to maneuver through problem solving and conflict resolution. Many of them lack the funding to participate in engaging extracurricular experiences that would lead to a more promising future; however, the interest that was generated within our sixth grade classrooms when the FTC team 8660 Charging Champions visited was amazing. The Charging Champions demonstrated to our students the skills they had gained by working together as a team to create a robot that served a purpose. This experience has kindled a desire in the children to have real world experiences with math and science in a fun and competitive environment. We are excited about this opportunity to form after school robotics teams that will help change the lives of many of our young people forever.

We plan to use the grant amount of \$9,425 to encourage approximately 15 students to learn new skills, generate interest in STEM and providing a foundation for future STEM learning at University Park Elementary school. These funds will be supplemented with in kind support from our school, local school district, and parents (as mentors). This funding will provide us a foundation in the first year, helping us build a long term sustainability plan on it's success. We believe the cost from the second year and succeeding years will be far lower. We are confident that we will be able to continue this program for many years. To achieve that, we plan to acquire active mentoring and financial support from parents, IPSF (local non-profit for schools in Irvine) and approach several corporate sponsors that support us today. A detailed breakdown of our proposed use of funds is enclosed in the attached document.

I'll be the point of contact for University Park Elementary, the lead organization requesting this grant, supported by FTC team 8660 (also former FLL team members) for mentoring and organizational support. Thank you so much for this opportunity and what you do for our young people. Please let me know if additional information is required at this time. I look forward to hearing from you.

Sincerely,

Barbara Cone
6th Grade Teacher
University Park Elementary
4572 Sandburg Way
Irvine, CA 92612
Email: BarbaraCone@IUSD.org

Tel: 949-395-5270

TEAM EXPENDITURES

FIRST Registration - FLL (two teams)	\$ 550
FLL Team Kit (2 pieces, 2 controllers, and 2 spares)	\$1,500
2 Tables	\$ 200
Qualifier Registration	\$ 200
Regional Registration	\$ 400
Connect Project Supplies	\$ 200
Office Banners, Sponsor Banners	\$ 500
Stipend for Staff Member @ 5 hrs per week at \$30/hr for 17 wks	\$2,550
Stipend at Qualifiers @ 20 hrs at \$30/hr	\$ 600
World Registration	\$ 500
Rolling Toolbox, storage supplies, etc.	\$ 500
Robot Build Season Food	<u>\$1,125</u>
TOTAL	\$9,425



March 11, 2016

Ms. Barbara Cone
University Park Elementary School
4572 Sandburg Way
Irvine, CA 92612

Dear Ms. Cone,

Charging Champions, FIRST Team 8660 is pleased to provide this letter of support for the University Park Elementary School proposal to the FIRST Diversity Grant: 2016 FIRST STEM EQUITY COMMUNITY INNOVATION GRANT.

As collaborator, our team members will support University Park Elementary School with its application process for FIRST Grant and other fundraising opportunities in the future, provide mentoring and operational support and help develop skills for parent participation and involvement. FIRST Team 8660 has team members with 3 or more years of FLL and FTC experience and will be actively supported by our team mentors and coach.

Charging Champions has been successful in solving FLL and FTC Challenges with innovation, collaboration and motivation for the past four years, and we are excited to inspire other students to achieve a similar skill development and learning environment.

In support of this Grant proposal, FIRST Team 8660 would be delighted to offer University Park Elementary School our support and expertise in Robot Build, Software Development, Project Management, Competition Planning, Core Values, Professionalism, Connect and Outreach Skills.

Sincerely,



Ganesh Kolli
Charging Champions
FIRST Team 8660
www.chargingchampions.org

Tustin and Santa Ana Schools	Public or Private School	Principal	Email Address
Arroyo Elementary School	Public	Amy Jones	anjones@tustin.k12.ca.us
Pioneer Middle School	Public	Ms. Vander Hayden	tvanderhayden@tustin.k12.ca.us
Peters Canyon Elementary School	Private	Brooke Carreras	<u>bcarreras@tustin.k12.ca.us</u> (could not find updated email)
Santiago Elementary School	Public	Mr. Norris Perez	<u>Norris.Perez@sauds.us</u>
Red Hill Elementary School	Public	Will Nedd Ersen	<u>wneddersen@tustin.k12.ca.us</u>
Orange County Educational Arts Academy	Private	Kristin Collins	<u>kcollins@oceaa.org</u>
Helen Estok Elementary School	Public	Wendy	<u>whudson@tustin.k12.ca.us</u>

		Hudson	
Columbus Tustin Middle School (has their own robotics team)	Public	Maggie Burdette	mburdette@tustin.k12.ca.us
Barbara Benson Elementary School	Public	Jackie Christy	jchristy@tustin.k12.ca.us
Red Hill Lutheran School	Private	Mr. Paul Marquardt	http://www.redhillschool.org/apps/email/index.jsp?e=0745073907150749074707550715073907210753064907490723072107290731073707370751071907290743074307370613074307490727&n=Paul%20Marquardt
Madison Elementary School	Public	John Mccombs	jmccombs@rusd.k12.ca.us
James Monroe Elementary School	Public	Betty Tamarara-Rios	[did not find]
Panorama Elementary School(Orange Unified School district)	Public	Jeremy Mortenson	jmortensen@orangeusd.org

2-12-2017

Amy Jones

Arroyo Elementary School

11112 Coronel Rd , North Tustin , Ca 92705

Dear Mrs. Jones ,

Team Charging Champions, affiliated to a non-profit organization is made up of high school students that receive their education in Irvine. We are a member of [FIRST](#) (For Inspiration and Recognition of Science and Technology) Robotics, the world's largest competitive robot organization focused on STEM. Charging Champions will be excited to introduce the Arroyo students to STEM by sharing our experience, answering questions about the process of building robots, developing technology, as well as forming and working in teams.

FIRST promotes the STEM related activities of those from grades K through 12, that can help them in their future career. Students will learn the basic skills for mechanical design, electronics, fabrication, software and website design, and technical writing. They will also learn soft skills such as: how to work in teams, make new friends, learn project management, build websites, create audio visuals and raise funds which are all necessary in a work and school environment. Studies have shown that mentoring and early encouragement helps students to establish positive study and work habits, critical thinking skills and helping them acquire new skills, thus augur college readiness.

We would like to reach out to 5th/6th grade students from your school in order to encourage them to build an interest in math and science subjects as they experiment in robotics. We will demonstrate our robots (if it is not being used for competitions) for them to gain a first hand experience. We expect this to be for 30 minutes for each group. We would require an overhead projector and clear floor space if we plan to

demonstrate the robot. If you are further interested in this project, we may help set up your team and may be able to help you acquire funding up to 25,000 dollars.

Please visit the [FRC](#), [FTC](#), and [FLL](#) websites for more information regarding the local groups for public school students as well as below links for past year's information about Charging Champions. We look forward to hearing from you.

Thank you,

Charging Champions

Contact - (enter a team member name)

Email: charging.champions@gmail.com

Website : www.chargingchampions.org

[Google+](#)

[YouTube](#)

[Facebook](#)

[Twitter](#)

2/12/17

Norris Perez
Santiago Elementary
2212 N Baker St, Santa Ana, CA 92706

Dear Mr. Perez ,

Team Charging Champions, affiliated to a non-profit organization is made up of high school students that receive their education in Irvine. We are a member of [FIRST](#) (For Inspiration and Recognition of Science and Technology) Robotics, the world's largest competitive robot organization focused on STEM. Charging Champions will be excited to introduce the Santiago students to STEM by sharing our experience, answering questions about the process of building robots, developing technology, as well as forming and working in teams.

FIRST promotes the STEM related activities of those from grades K through 12, that can help them in their future career. Students will learn the basic skills for mechanical design, electronics, fabrication, software and website design, and technical writing. They will also learn soft skills such as: how to work in teams, make new friends, learn project management, build websites, create audio visuals and raise funds which are all necessary in a work and school environment. Studies have shown that mentoring and early encouragement helps students to establish positive study and work habits, critical thinking skills and helping them acquire new skills, thus augur college readiness.

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Please visit the [FRC](#), [FTC](#), and [FLL](#) websites for more information regarding the local groups for public school students as well as below links for past year's information about Charging Champions. We look forward to hearing from you.

Thank you,

Charging Champions

Contact - Charlie Du

Email: charging.champions@gmail.com

Website : www.chargingchampions.org

[Google+](#)

[YouTube](#)

[Facebook](#)

[Twitter](#)

2/12/17

Kirsten Collins

Orange County Educational Arts Academy

825 N Broadway, Santa Ana, CA 92701

Dear Collins,

Team Charging Champions, affiliated to a non-profit organization is made up of high school students that receive their education in Irvine. We are a member of [FIRST](#) (For Inspiration and Recognition of Science and Technology) Robotics, the world's largest competitive robot organization focused on STEM. Charging Champions will be excited to introduce the OCEAA students to STEM by sharing our experience, answering questions about the process of building robots, developing technology, as well as forming and working in teams.

FIRST promotes the STEM related activities of those from grades K through 12, that can help them in their future career. Students will learn the basic skills for mechanical design, electronics, fabrication, software and website design, and technical writing. They will also learn soft skills such as: how to work in teams, make new friends, learn project management, build websites, create audio visuals and raise funds which are all necessary in a work and school environment. Studies have shown that mentoring and early encouragement helps students to establish positive study and work habits, critical thinking skills and helping them acquire new skills, thus augur college readiness.

We would like to reach out to students from your school in order to encourage them to build an interest in math and science subjects as they experiment in robotics. We will demonstrate our robots (if it is not being used for competitions) for them to gain a first hand experience. We expect this to be for 30 minutes for each group. We would require an overhead projector and clear floor space if we plan to demonstrate the robot.

Please visit the [FRC](#), [FTC](#), and [FLL](#) websites for more information regarding the local groups for private school students as well as below links for past year's information about Charging Champions. We look forward to hearing from you.

Thank you,

Charging Champions

Contact - Charlie Du

Email: charging.champions@gmail.com

Website : www.chargingchampions.org

[Google+](#)

[YouTube](#)

[Facebook](#)

Twitter

2/12/17

Will Neddersen
Red Hill Elementary
11911 Red Hill Ave, Santa Ana, CA 92705

Dear Mr. Neddersen ,

Team Charging Champions, affiliated to a non-profit organization is made up of high school students that receive their education in Irvine. We are a member of [FIRST](#) (For Inspiration and Recognition of Science and Technology) Robotics, the world's largest competitive robot organization focused on STEM. Charging Champions will be excited to introduce the Red Hill students to STEM by sharing our experience, answering questions about the process of building robots, developing technology, as well as forming and working in teams.

FIRST promotes the STEM related activities of those from grades K through 12, that can help them in their future career. Students will learn the basic skills for mechanical design, electronics, fabrication, software and website design, and technical writing. They will also learn soft skills such as: how to work in teams, make new friends, learn project management, build websites, create audio visuals and raise funds which are all necessary in a work and school environment. Studies have shown that mentoring and early encouragement helps students to establish positive study and work habits, critical thinking skills and helping them acquire new skills, thus augur college readiness.

We would like to reach out to 5th/6th grade students from your school in order to encourage them to build an interest in math and science subjects as they experiment in robotics. We will demonstrate our robots (if it is not being used for competitions) for them to gain a first hand experience. We expect this to be for 30 minutes for each group. We would require an overhead projector and clear floor space if we plan to demonstrate the robot. If you are further interested in this project, we may help set up your team and may be able to help you acquire funding up to 25,000 dollars.

Please visit the [FRC](#), [FTC](#), and [FLL](#) websites for more information regarding the local groups for public school students as well as below links for past year's information about Charging Champions. We look forward to hearing from you.

Thank you,

Charging Champions

Contact - Charlie Du

Email: charging.champions@gmail.com

Website : www.chargingchampions.org

[Google+](#)

[YouTube](#)

[Facebook](#)

[Twitter](#)

2/12/17

Vander Hayden
Pioneer Middle School
2700 Pioneer Rd, Tustin, CA 92782

Dear Ms. Hayden ,

Team Charging Champions, affiliated to a non-profit organization is made up of high school students that receive their education in Irvine. We are a member of [FIRST](#) (For Inspiration and Recognition of Science and Technology) Robotics, the world's largest competitive robot organization focused on STEM. Charging Champions will be excited to introduce the Pioneer school students to STEM by sharing our experience, answering questions about the process of building robots, developing technology, as well as forming and working in teams.

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2/12/17

Brooke Carreras
Peters Canyon
26900 Peters Canyon Rd, Tustin, CA 92782

Dear Mr. Carreras ,

Team Charging Champions, affiliated to a non-profit organization is made up of high school students that receive their education in Irvine. We are a member of [FIRST](#) (For Inspiration and Recognition of Science and Technology) Robotics, the world's largest competitive robot organization focused on STEM. Charging Champions will be excited to introduce the Peters Canyon students to STEM by sharing our experience, answering questions about the process of building robots, developing technology, as well as forming and working in teams.

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Please visit the [FRC](#), [FTC](#), and [FLL](#) websites for more information regarding the local groups for private school students as well as below links for past year's information about Charging Champions. We look forward to hearing from you.

Thank you,

Charging Champions

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2/12/17

John McCombs
Madison Elementary
3635 Madison St, Riverside, CA 92504

Dear Mr. McCombs ,

Team Charging Champions, affiliated to a non-profit organization is made up of high school students that receive their education in Irvine. We are a member of [FIRST](#) (For Inspiration and Recognition of Science and Technology) Robotics, the world's largest competitive robot organization focused on STEM. Charging Champions will be excited to introduce the Madison Elementary students to STEM by sharing our experience, answering questions about the process of building robots, developing technology, as well as forming and working in teams.

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We believe your students would be very excited to see the robot and explaining all about it. We're proud to support our Orange County community and can help set up your school Robotics team and help you acquire grants up to \$25,000 to support your team. Charging

Champions believes in giving back to the community and it will be our honor to volunteer our time and effort.

Please visit the [FRC](#), [FTC](#), and [FLL](#) websites for more information regarding the local groups for public school students as well as below links for past year's information about Charging Champions. We look forward to hearing from you.

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Charging Champions

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[Twitter](#)

2/12/17

Jackie Christy

Barbara Benson Elementary

Dear Ms. Christy,

Team Charging Champions, affiliated to a non-profit organization is made up of high school students that receive their education in Irvine. We are a member of [FIRST](#) (For Inspiration and Recognition of Science and Technology) Robotics, the world's largest competitive robot organization focused on STEM. Charging Champions will be excited to introduce the Barbara Benson students to STEM by sharing our experience, answering questions about the process of building robots, developing technology, as well as forming and working in teams.

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[Twitter](#)

2/12/17

Maggie Burdette
Columbus Tustin Middle School
17952 Beneta Way, Tustin, CA 92780

Dear Ms. Burdette ,

Team Charging Champions, affiliated to a non-profit organization is made up of high school students that receive their education in Irvine. We are a member of [FIRST](#) (For Inspiration and Recognition of Science and Technology) Robotics, the world's largest competitive robot organization focused on STEM. Charging Champions will be excited to introduce the Columbus students to STEM by sharing our experience, answering questions about the process of building robots, developing technology, as well as forming and working in teams.

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Game Element Analysis

Mission Breakdown							
	Missions	pts (All time devoted to complete these missions)	Est. Completion Time	Time for Develop.	Difficulty(Assembly)	Difficulty(1-5) Operating	Points of Notice
(A)1	Hanging Mission	50	10-20 S	3 weeks	4	2	
(A)2	Gear Mission	80	30 S/Gear	3 weeks	3	4	Need sensors & Obstacles
(A)3	Fuel High	24	30 S	3 weeks	4	2	Obstacles
(T)1	Fuel Low	24	30 S	3 weeks	3	3	Obstacles
(T)2	Autonomous: Cross Baseli	5	5 S	1 week	1	1	Lever
(T)3	Autonomous: Rotor	60	15 S	3 weeks	4	4	Parts, debris, and precision
(E)1	Autonomous: Fuel High	7	15S	3 weeks	4	5	Obstacles
(E)2	Autonomous: Fuel Low	3	15 S	3 weeks	4	5	Ratchet and weight

Award List

1. Chairman's Award
2. Creativity Award
3. Digital Animation Award
4. Engineering Inspiration Award
5. Entrepreneurship Award
6. Excellence in Engineering Award
7. Finalist
8. FIRST Dean's List Award
9. Founder's Award
10. Gracious Professionalism Award
11. Highest Rookie Seed Award
12. Imagery Award
13. Industrial Design Award
14. Industrial Safety Award
15. Innovation in Control Award
16. Judges Award
17. Quality Award
18. Rookie All-Star Award
19. Rookie Inspiration Award
20. Safety Animation Award
21. Team Spirit Award
22. Volunteer of the Year Award
23. Winner
24. Woodie Flowers Finalist Award

Awards to focus on
Highest Rookie Seed Award
Finalist
Excellence in Engineering Award
Innovation in Control Award
Creativity Award
Rookie All-Star Award
Judges Award
Rookie Inspiration Award
Engineering Inspiration Award
Entrepreneurship Award
Winner
Woodie Flowers Finalist Award

Robot Build Project Plan					
Tracks	ID	Action Item	Who's in Charge	Status	Notes
General Robot	1	Read all rules	All	Completed	
	2	Finalize wheel design		Completed	
	3	Finalize electronics configuration		Completed	
	4	Catch up with programming and Android Studio		Completed	
	5	Fix cell phone holder		Completed	
	6	End-to-end wiring		Completed	
	7	Test end-to-end tele-op		Completed	
Gear Mission	1	Design idea	Victor, Charlie, Arjun	Completed	
	2	Build Rough draft out of wood	Victor, Charlie, Arjun	Completed	
	3	Test model	Victor, Charlie, Arjun	Completed	
	4	Make adjustments on Cad	AJ	Completed	
	5	Build with metal parts	AJ, Rithik, David C, Chris, Noopur	Completed	
	6	Test Final Product	Arjun, David K, Rudy, Anish, AJ, Arjun	Completed	
Hanging Mission	1	Design idea	Jason, Albert, Nandita	Completed	
	2	Build Rough draft	Jason, Albert, Nandita	Completed	
	3	Test model	Albert, Jason, Arjun, Anish	Completed	
	4	Make adjustments on Cad	AJ, Rithik	Completed	
	5	Build with metal parts	Jason, Albert, Nandita	Completed	
	6	Test Final Product	Jason, Albert, Nandita	Completed	

Project Plan

Week of January 2

- Parts organization
 - Anish N
 - Everyone else
- Other Design (with CAD) Ideas & parts needed to construct subsystem:
 - AJ
 - David
 - Yiming
 - Rithik
- Hanger mission
 - Harvey (help from Rudy)
 - Chris W
 - Aditya
 - Charlie G
 - Pallavi
- Parts suppliers & Identification(identify parts that will be in demand and will take more time to order before season create spreadsheet, columns to be filled out time taken to receive part, expected demand, local options, do we need backups, are they easy to lose, how many backups)
 - Arjun
 - Albert
 - Victor
 - Rudy
 - Noopur
 - Aryan
- Programming & electronics team (Identify sensors and items to order, go ham on sensors)
 - Alex
 - Jason
 - Ganesh
- Decision to be made:
 - Ventura or not?
 - Adding new people?
 - Solidworks vs Autodesk
 - Snack schedule (Madhavi, Sheetal), parents schedule (Gunjan)
 - Kickoff purchasing (Raja)
 - Srini Uncle house setup

Week of January 8

- CAD for the base chassis: start drawing out base chassis, including bumpers for both volumes
 - David

- Rithik
 - AJ
- CAD for hanging mission & prototype:
 - Rudy
 - Charlie D
 - Albert
 - Arjun
- CAD for gear mission & prototype:
 - Arjun
 - AJ
 - Charlie G
 - Victor
 - Anish N
- Programming/Electrical: begin with sensors, camera, etc.
 - Alex
 - Jason
 - Anish N
- Driver Station Setup:
 - Ganesh
 - Jason
- Setting up infrastructure for Srinivasa houses: Srinivasa, Raja, Gunjan, Sandeep
- Creating Field Element Gear Slot: to help
 - Harvey
 - Pallavi
 - Aditya
- Creating Field Element Lift (w/sensor tape): to help
 - Yiming
 - Nandita
- Creating Field Element Hanger: to help
 - Chris
 - Aryan
 - Noopur

January 19-20

- Design/CAD: finalize designs and make prototypes
 - AJ
- Chassis: Bars
 - Aryan
 - Noopur
 - Rithik
 - David
 - Albert
- Chassis: Gearbox

- Charlie G
 - Nandita
 - Harvey
 - Yiming
 - Pallavi
 - Charlie D
- Programming:
 - Ganesh
 - Alex
- Notes:
 - Each time you receive shipment:
 - Note on slack which packages were received from each vendor
 - Go to master list of parts, cross check against list of parts to buy and check off which parts were received

January 21

- Create Prototype of Gear Mission with Pneumatics:
 - Arjun
 - Charlie G
 - Victor
- Gear Drop:
 - Harvey
 - David
- CAD Integration:
 - AJ
- Electrical/Programming:
 - Alex
- Hanging Mission:
 - Jason
 - Albert
- Plexiglass Measuring and Cutting:
 - Rithik
 - Aditya
- Fixing Gearbox:
 - Chris
 - Pallavi
 - Nandita
- Chassis size fix:
 - Noopur
 - David
- Announcements:
 - No eating inside house or garage, eat on driveway, throw trash away there outside

- Remember to sign in
- Things to do:
 - Fix remaining base chassis issues: sizing, wheels, gearbox, stability
 - Chassis Fixes:
 - Chassis size: what options do we have?
 - Cut plexiglass: measure size, use tool to cut
 - Gearbox fixes
 - Wheel securing with chain and stability
 - Stability of chassis
 - Hanging Mission:
 - Create model of hanging mission
 - Continue constructing parts for hanging mission
- Gear mission:
 - Create model of gear mission for proof of design
- Electronics:
 - Start driver station setup
 - Create program for basic chassis drive
 - Attach electronics onto breadboard (depends on plexiglass)
 - Attach breadboard to robot, run the basic drive train for testing
- Gear Drop Construction:
 - Need to construct mechanism to drop off gear

January 22

- Gear Mission (Prototype and Actual):
 - Charlie G
 - Victor
 - Albert
- CAD Integration:
 - AJ
- Electrical/Programming:
 - Alex
- Hanging Mission:
 - Jason
- Chain Fixing & Chassis:
 - Rudy
 - Chris
 - Yiming

January 27

- Gear Mission:
 - Arjun
 - David K
 - Charlie G

- Victor
 - Jason
 - Rudy (CAD)
- Integrating CAD:
 - AJ
 - Rudy
- Programming & Control System Setup:
 - Alex
 - Albert (Pneumatics attach to board)
- Create fully integrated CAD model (Integrating CAD):
- Add gear mission to CAD model with pneumatics, hinges, board to redirect gear
 - Rudy
- Make modifications to base chassis to match current model, add on borders, subsystems, etc.
 - AJ
- Have end-to-end robot running with camera, gear mission, and basic drivetrain running (programming)
- Attach camera to robot
- Program robot to see through camera, control pneumatics on gears, drivetrain running
- Gear Mission:
- Cut out backside metal plate
 - David K
 - Charlie G
- Cut out side borders that can flip in or out & secure with hinges
 - Jason
 - Victor
- Combine metal plate with side borders
 - Jason
 - Victor
- Integration of gear mission on main robot with pneumatic pistons
 - Jason
 - Victor
- Attach backboard and top angled board to funnel gear in
 - David K
 - Charlie G
- Priorities for CAD model:
 - 1. Make sure basic drivetrain is completely updated (size of frame, borders, gearbox, wheels, etc.)
 - 2. Add gear mechanism with pneumatics, hinges, angled board to funnel gear in

January 28

- Replicating Chassis:
 - Yiming

- Chris
- Aditya
- Harvey
- Noopur
- Nandita
- Gear Mission/Hanging:
 - Charlie G
 - Victor
 - David K
 - Arjun
 - Jason
 - Albert
 - David C
- Programming/Electrical:
 - Alex
- CAD Integration:
 - AJ
- Engineering Notes:
 - Charlie D

Action Item	People Responsible	Dates
Finish backup chassis and attach with gear mission	everyone	2/9/17
Finish electronics board and any other minor tune-ups for existing robot	everyone	2/9/17
Start planning for hanging mission	everyone	2/9/17
Begin gear dropping mission for autonomous	everyone	2/9/17
Finish setting up electronics	David K, Albert, Arjun	2/9/17
Redesign pneumatic piston holder	Rudy	2/9/17
Finish electronics setup	Harvey, Alex, Charlie G, Chris	2/9/17
Finish gear setup	Rithik, David C, AJ	2/9/17
Add servo and complete basic joystick functions on code	Alex	2/9/17
Find cost of robot parts	Yiming	2/9/17
Securing battery holder to plexiglass	everyone	2/9/17
Add router to plexiglass	everyone	2/9/17
Drill all holes and attach modules to plexiglass	everyone	2/9/17
Attach flipping plate device	everyone	2/9/17
Secure battery holder	everyone	2/9/17
Finish up wiring between modules	everyone	2/9/17
Test pneumatics, drive, all with program	everyone	2/9/17
Replace screws on gear mission with locknut	Arjun, Victor	2/15/17
Replace side flaps with stronger metal on backup and original robots	Rithik, AJ	2/15/17
Add cloth for borders & write numbers	Harvey	2/15/17
Autonomous planning; strategy, sensors, execution	Alex	2/15/17
Extend axle to support bumper	Albert	2/15/17
Complete wiring and electrical on existing robot; add cameras & sensors, cleaner wiring	Alex	2/15/17
Pneumatics need fixing	Albert	2/15/17
Hanging mission construction; construct gearbox, motor placement, spool control, rope, attachment onto robot	Rudy, Victor	2/15/17
Replace hinges for pneumatics and piston attachments	Everyone	2/15/17
Side flap strengthening (old and new robot)	Rithik, Victor	2/16/17
Fix left side pneumatic piston placement (old robot)	Rithik	2/16/17
Replace pneumatic piston attachments with metal pivots (new robot)	Noopur	2/16/17
Replace CR servos with 180 degree ones (both robots)	Arjun	2/16/17
Finish electronics wiring on existing robot (old robot)	Alex	2/16/17
Add cameras and sensors to both robots (old and new)	Rudy	2/16/17
Finish attach bumpers cloth & write numbers (old and new)	Harvey	2/16/17
Hanging setup and structure with Davits and rope properly tied	Charlie G	2/16/17
Construct gearbox for hanging mission (new robot)	Albert, AJ	2/16/17
Attach CIM motor to hanging mission setup, test only ability to pull itself up (new robot)	Albert	2/16/17
Devise mechanism to get the robot to seek for the rope (old robot)	everyone	2/16/17
Create structure to which gearbox will attach and spool will attach	everyone	2/16/17
Fix pneumatics (old robot)	everyone	2/18/17
Test both robot gear missions, determine which one is more effective	everyone	2/18/17
Accordingly make adjustments on gear missions	everyone	2/18/17
Attach gearbox, sprocket, and chain, and attach to robot. Run sample test without having hooks seek for the rope, just to test if robot can pull itself up with (old robot)	everyone	2/18/17
Finish wiring (both robots)	everyone	2/18/17
Add first camera (old robot)	everyone	2/18/17
Add second camera (new robot)	everyone	2/18/17
Determine where to add sensors (both robots)	everyone	2/18/17
Diagnose problem with sparks on existing robot - will battery change help or is the switch gone? Do we need to buy more switches?	everyone	2/19/17
Fixes to make on teleop code: two-factor authentication on gear drop, driving straight only and backwards only, servo position fix for backup robot	everyone	2/19/17
Autonomous planning: determine overall layout of how robot is going to drive and use of sensors	everyone	2/19/17
Attach first camera on existing robot, second camera location and sensors on both robots	everyone	2/19/17
Match both robots to have gear mission	everyone	2/19/17
Reduce of side plate on new robot	everyone	2/19/17
Attach bumpers onto both robots	everyone	2/19/17
Disconnect pancake cylinders temporarily	everyone	2/19/17
Attach setup to new robot, test out basic hanging capabilities	everyone	2/19/17
Attach ratchet and hooks to test out grabbing and staying up	everyone	2/19/17
Add new hooks onto the rod	everyone	2/20/17

Add snails onto bars	everyone	2/20/17
Figure out a way to extend rod for the motor	everyone	2/20/17
Spacer for versoplanetary gearbox	everyone	2/20/17
Replicate hanging mission	everyone	2/20/17
Reattach bumpers	everyone	2/20/17
Add front plate to protect gear mission	everyone	2/20/17
Check up all things on the new robot and fix up minor issues	everyone	2/20/17
Go through inspection checklist	everyone	2/20/17
Camera and sensors placement	everyone	2/20/17
Any pending electrical connection/router issues	everyone	2/20/17
Add cones to rod with sheet metal or other material	everyone	2/24/17
Secure ratcheting mechanism to bar, test out if robot holds itself up	everyone	2/24/17
Create backups for hanging mission - extra hooks, screws, rods, backup chains, extra sprocket	everyone	2/24/17
Design border to keep balls out of the robot	everyone	2/24/17
Design plexiglass covering to protect electronics	everyone	2/24/17
Place camera such that it can spin around and view any side of the robot	everyone	2/24/17
Disconnect pneumatics tubing from gearbox	everyone	2/24/17
Autonomous - program with sensors	everyone	2/24/17
Driver station setup	everyone	2/24/17
Attach hooks to existing battery cable connectors	everyone	2/24/17
Competition planning - driving, day planning, backups	everyone	2/24/17
Begin compiling engineering notebook	everyone	2/24/17

Following list describes the challenges we faced across various areas:

A. Team: We doubled our team this year with 12 new boys and 3 new girls. Unfortunately the 3 girls couldn't make the team due to other time commitments.

B. Connect/Outreach/Fundraising

- Website development: Creating the content
- Setting up an outreach program, and lack of or slow responses from schools
- Lack of positive funding responses from the companies

C. Robot Build

- Ideas to building solution takes a long time to materialize
- Lack of suppliers for certain parts and poor response on key parts
- Cost of certain way more than substitutes
- Not having local suppliers or substitutes for key items
- Managing inventory of parts and suppliers
- Organizing garage and managing tools and parts to make it easily accessible for next use
- Many iterations before arriving at a final solutions

D. CAD Challenges

- Learning Solidworks was tedious
- While some parts have predefined CAD files, some had to be designed manually which is very tedious
- Making animation was also very hard

E. Electrical Challenges

- Common Errors: FTDI Driver Error, Disconnected Motor Controller
- Issues still persist, but diagnosing has become easier
- Sometimes, the motor controllers disconnected from the motors and only one motor would be spinning

F. Programming

- Learning Programming
- Learning to use Github
- Getting the encoders to work
- Getting input from multiple cameras on the SmartDashboard
- Getting sensor input from the Raspberry Pi

What We Learnt

- Core Values
 - Working as a team
 - Managing Conflicts
 - Respecting others ideas
 - Objective Discussions
- Mechanical
 - Solidworks (CAD)
 - Gears (Spur, Rack and Pinion, Bevel), Sprockets, and Pulleys
 - Center Of Gravity
 - Nuts, Lock Nuts, Rivets
 - Using Tools: Band Saw, Drill Press, Sander and other Power Tools
- Electrical
 - DC Motors, Servos, Encoders, and Reading The Specs
 - Wiring Best Practices: Anderson PowerPoles, Separation of data/Power cables, wire gauges
 - Keep wires away from moving parts, make sure that they are secured either with zip ties or 3D printed wire holders
 - Wiring the system and controlling it programmatically
- Programming
 - Java
 - Eclipse
 - How to iteratively test through different solutions to a possible problem
 - Debugging problems with electrical or control system
 - Github
- Soft skills
 - Making decisions based on the data
 - Analytical Skills
 - Problem Solving Skills
 - Working under pressure
 - Communication Skills
 - Leadership Skills
 - Public Speaking Skills
 - Design, Build, and Test Iterative Methodology
 - Learning from failures
 - Value of hard work

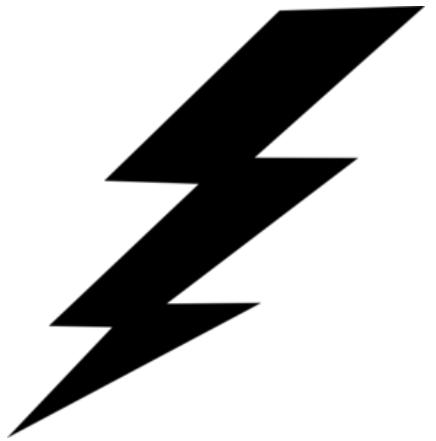
- Finding things to do for certain team members not so good with mechanical or hard skill but the other skills they bring to the table
- Collaboration Tools
 - Slack
 - Google Drive, Google Docs
 - Google Hangouts/Skype
 - Playing soccer on the street with FIRST ball and hanging mission setup as the goal

..... And Having Fun Building Stuff



Business Plan Summary

- Setup Charging Robotics **501(c)(3) non-profit organization**, and received tax exempt status from IRS and State of CA
- Created a **business plan** outlining our costs for the season. We have **estimated** our **total cost** for the season to be **\$38,826**.
- Created **fundraising database** with the list of local and Fortune 500 companies
- Applied to several companies for funding
- We have **successfully raised \$23,000**
- We have **received in-kind sponsorships** through CAD, Electrical, and Connect mentors from parents, **AMD International Technologies, Universal Wire and Plexi**



Business Plan

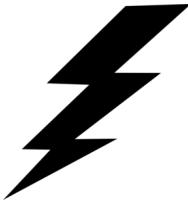


Our Vision: To transform our culture by creating a world where science and technology are celebrated and where young people dream of becoming science and technology leaders.



Our MISSION: To inspire young people to be science and technology leaders, by engaging them in an exciting mentor-based robotics programs that builds science, engineering, and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership.

Team & Program Summary:



FIRST Team, Charging Champions, #6560 was originally founded in 2014 by Raj Neervannan as the Coach, with Raja Kolli as the additional mentor. The initial team of 6 members were all from families in the Irvine that took a great passion for STEM. Since then, we have expanded our team, entered in more FIRST competitions, and have made it to super regionals and world multiple times. As the team has expanded, we have had the ability to embark on even more challenging events to push our limits and test our abilities. This year, the team has formed a non-profit entity and applied for 501(c) 3 status with the intent to accept tax deductible donations to further our limits.

Parents of the team members have also acted as mentors, sometimes supported by other professionals in the field of software, mechanical, hardware, robot build, CAD and marketing. All mentors are successful professionals in STEM fields with average of 20 plus years experience. The mentors take up multiple, active responsibilities of guiding and mentoring ranging from using the tools / machining equipment, reaching out to community, teaching science and engineering concepts, etc. while others provide other motivational and aspirational support to the team. The team meets on regular basis at the coach's home (Garage) for team meetings, robot and field set-up and other activities. In addition, a lot of work is done using conference calls, screenshare and other software based communication, technical and management tools.

FIRST is a global organization with the mission to inspire young people's interest in STEM (science, technology, engineering and math) related careers. *FIRST* enables Mentors to engage and inspire / motivate students with structured, goal oriented accessible and innovative programs while providing them with interpersonal working, project management and other professional skill building capabilities that provides self-confidence and other life skills.

Team SWOT Analysis:

The SWOT Analysis was used to evaluate the **Strengths**, **Weaknesses**, **Opportunities**, and **Threats** to FIRST Team 6560 Charging Champions. SWOT analysis offers the ability to understand the strengths and weaknesses caused by internal factors of the team, while opportunities and threats refer to external factors the team may encounter. SWOT is an internal introspection that provides a good view on how to leverage one's strengths to go pursue the right opportunities, while improving or resolving weaknesses and avoiding Threats.

	HELPFUL To achieve the objective	HARMFUL To achieve the objective
--	--	--



Internal To the team	Strengths <ul style="list-style-type: none">● Diverse demographics (Age, Gender)● Experienced mentors● Workbench and tools● Experience (FRC, FLL, FTC)● Positive attitude● Team spirit	Weakness <ul style="list-style-type: none">● Delays in non-profit classification is limiting fundraising● Risk of team chemistry disruptions with new team members● Limited mentors on robot build
External To the team	Opportunities <ul style="list-style-type: none">● Geographical vicinity for STEM support with mentors and sponsors● Access to numerous schools and associations for outreach● Thriving business for diverse sponsorship	Threats <ul style="list-style-type: none">● School workload reduces available time for FIRST● Loss of past sponsor● Non-profit status not approved

Team Impact / Outreach:

The Team Impact /Outreach focuses show's how our team has impacted or helped the local, state, national, or international community. STEM outreach is a key component in *FIRST* culture and is part of *FIRST* Team 6560's' identity. The team is well aware of the community and has a deep desire to bring a positive impact. Below is information on our team's STEM outreach plans and how many people the team is affecting -

1. Reaching out to students of age 12 to 16 on the following dates: -
 - a. Boys Scout Troop 622: 20-25 troop members - 12/7/15
 - b. Boys Scout Troop 606: 50 troop members scheduled - 12/14/15
 - c. Woodbridge Tennis Academy: 20 students scheduled - 12/15/15
 - d. Alderwood Elementary School: 150 students scheduled - 12/18/15
 - e. University Park Elementary: 150 students - 1/22/16
 - f. Corona Del Mar High School: Inspired the creation of their FRC team - 1/25/2016
 - g. Irvine Valley College Summer Bridge Programs Robotics - 7/27/2016

We have also reached out to most elementary and middle schools in Tustin, Irvine, and



Santa Ana and will in the near future present to more students to broaden the amount of people inspired.

Team aims to provide the largest community outreach of this kind in Irvine and one of the largest in Orange County. The expected impact from this outreach is inspiring students to participate in FIRST programs or take up STEM courses in their school.

Team Income & Expenditure:

“Team Income” below contains line items of monetary or in-kind donations that FIRST Team 6560 team hopes to receive or fundraise, while “Team Expenditure” contains line items of the costs FIRST Team 6560 will likely incur throughout the year. All income and expenditure line items are estimates. Additional team outreach events can be conducted if additional income is generated to cover their expenditure costs.

Team Budget:	
Team Income:	Cost
Team Members	\$22000.00
Total Income	\$22000.00
Team Expenditure:	
Robot Parts Expenses	\$15,000.00
Engineering Tools & Equipment	\$5,000.00
Regional Registration*	\$10000
Regional Hotel Cost (22 people)	\$4750
Regional Travel Cost (6 cars)	\$776.08
Regional Food Cost (22 people)	\$3300.00
Championships Registration*	\$5000.00
Championships Hotel Cost (22 people)	\$6750.00



Championships Travel Cost (22 people)	\$11000.00
Championships Food Cost (22 people)	\$3300.00
	\$38,826.08 (Without Championships) \$64,876.08 (With Championships)
Total Expenditure:	

*included in the “FIRST Registration” Box

Additional Opportunities for Support: In-Kind Donations

There are many costs associated with running a *FIRST* team. The following specific items will be needed by the team from potential sponsors.

Few examples of In-kind Donations FIRST 6560 can benefit from:

Items:	Number Needed	Single-Item Cost	Final Cost
FTC Kits for Schools	4	\$500	\$2,000.00
Team Trailer	1	\$3,000	\$3,000.00
Bus to Travel to Events	1	\$2,000	\$2,000.00
Robot Material Cost	1	\$3,000	\$3,000.00
Large Rolling Tool Box	1	\$1,000	\$1,000.00
Pit Banners & Sponsor Banners	1	\$1,000	\$1,000.00
Challenge Field Pieces	1	\$500	\$500.00



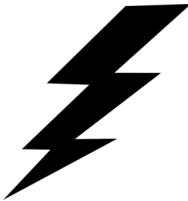
Weekend Food	Build Season	12	\$75	\$900.00
Total				\$13,400.00

Additional Opportunities for Support: Mentors

In addition to in-kind materials, FIRST Team 6560 needs mentor support or training support. Please see the list of Mentor roles that a Sponsor can get involved with the team as a Mentor or take a day to help train the team in a specific area.

Example of Mentor Roles:

Mentor Roles	Role Description
CAD	Teach students on the team how to CAD
Marketing	Assist with team marketing and creating a team business plan
Travel Logistics	Organize the team travel to regional events outside of the local area
Prototyping	Assist with the design of the robot and teach the students how to create basic prototypes
Writing	Assist the Marketing and Award Sub-Teams with team award submissions
Electrical	Show students how to wire, organize an electrical board, and update and check the robot

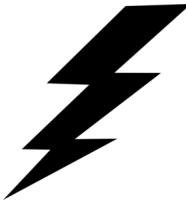


<i>Finance</i>	Help students manage team funds and assist with fundraising
<i>Programming</i>	Work with the students to program the robot for competition
<i>Public Speaking</i>	Teach the students how to speak in front of potential Sponsors and Judges
<i>Engineering Design</i>	Work with the team to pick a strategy, design a robot, and manage robot creation
<i>Mechanical</i>	Help the students build a robot for competition in March
<i>Social Media</i>	Work with students to set up and manage social media sites
<i>Website</i>	Teach students how to build and manage a website
<i>Project Management</i>	Work with students to set time and performance goals to meet deadlines, etc.

Sponsorship Opportunities

FIRST Team 6560 offers many different levels of sponsorship to the sponsor organization. Each level of sponsorship provides many different benefits.

Sponsorship levels for 2017:



1. Champion Sponsor - \$10,000

- Tournaments: Your company will be thanked during FIRST competitions, alliance selections etc., provides you brand visibility at the event(s) visited by several hundred people, some of which is nationally televised
- Banner Display: Logo and name displayed in showcase / pit area with 5 x 3 (or size as allowed by event organizers) banner, provides you brand visibility at the event(s) visited by several hundred people, some of which is nationally televised
- Sponsor Logo Display: Provides you brand visibility at the event(s) visited by several hundred people, some of which is nationally televised
 - On the Robot (6" x 6")
 - Team T-shirt worn by each team member and mentors (3" x 3") on front or side
- Website : Provides you brand visibility globally as teams all over the world reach out to each other to collaborate and communicate
 - Page 1 will have banner and link to sponsorship page. Sponsorship page will have logo and 150 word summary for 1 year
 - Sponsorship page with Title sponsorship year mentioned from year 2 onwards for lifetime
- Social Media: Monthly shout out “Thank You” for the donor for 1 year and mentions every year
- Promotions: Sponsor can arrange for video shoots, follow the team to the events, conduct interviews and use the promotion videos for its marketing needs. Expenses for creation and promotion are not included

2. Diamond Sponsor - \$5,000

- Tournaments: Your company will be thanked during FIRST competitions, alliance selections etc., provides you brand visibility at the event(s) visited by several hundred people, some of which is nationally televised
- Sponsor Logo Display: Provides you brand visibility at the event(s) visited by several hundred people, some of which is nationally televised
 - On the Robot (3" x 3")
 - Team T-shirt worn by each team member and mentors (1.5" x 1.5"). Location TBD
- Website : Provides you brand visibility globally as teams all over the world reach out to each other to collaborate and communicate
 - Sponsorship page will have logo and 150 word summary for 1 year
- Social Media: Monthly shout out “Thank You” for the donor for 1 year

3. Platinum Sponsor - \$1,000

- Sponsor Logo Display: Provides you brand visibility at the event(s) visited by several hundred people, some of which is nationally televised



- On the Robot (2" x 2")
- Team T-shirt worn by each team member and mentors (1" x 1"). Location TBD
- Website : Provides you brand visibility globally as teams all over the world reach out to each other to collaborate and communicate
 - Sponsorship page will have logo linked to sponsor's website for 1 year
- Social Media: Quarterly shout out "Thank You" for the donor for 1 year

4. Gold Sponsor - \$500

- Sponsor Logo Display: Provides you brand visibility at the event(s) visited by several hundred people, some of which is nationally televised
 - On the Robot (1" x 1")
 - Team T-shirt worn by each team member and mentors (1" x 1"). Location TBD
- Website : Provides you brand visibility globally as teams all over the world reach out to each other to collaborate and communicate
 - Sponsorship page will have small logo linked to sponsor's website for 1 year
- Social Media: Shout out "Thank You" for the donor

5. Silver Sponsor - \$250

- Website / Social Media : Provides you brand visibility globally as teams all over the world reach out to each other to collaborate and communicate
 - Website: Sponsorship page will have small logo linked to sponsor's website for 1 year
 - Social Media: Shout out "Thank You" for the donor

6. Bronze Sponsor - \$100

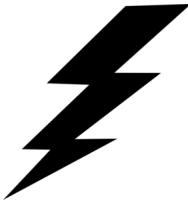
- Website / Social Media : Provides you brand visibility globally as teams all over the world reach out to each other to collaborate and communicate
 - Website: Sponsorship page will have name of person or business mentioned (no logo or links)
 - Social Media: Shout out "Thank You" for the donor

7. Donor - Less than \$100

- Social Media : Provides you brand visibility globally as teams all over the world reach out to each other to collaborate and communicate
 - Social Media: Shout out "Thank You" for the donor

Additional benefits available to Gold plus and higher sponsorship levels -

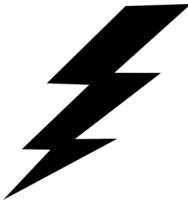
Members of the team can provide one complimentary presentation to any group size of people, providing more information and an optional interactive demonstration with a robot. All cost for hosting the event, travel cost for the team, etc. will be borne by the sponsor. The recording of the event can be used by the sponsor at an additional sponsorship amount to be determined.



Future Team Fundraisers:

Charging Champions has packaged a few unique fundraisers events and activities. These are identified by impact below -

1. Name of Fundraiser: Concessions at events (Scouts, Local Sports Tournaments, City Public Events, Etc.)
 - a. Description: Sell packaged food like popcorn, chips, water, soda, ice cream, etc. to attendees of these events
 - b. Materials needed: Unless donated by corporations or retail / fast food stores, the food and drinks will be purchased at local grocery / big box stores
 - c. Total money expected: \$500 / event
 - d. Total team cost for fundraiser: \$250 / event
 - e. Fundraiser net income: \$250 / event
 - f. Number of students & mentors/parents needed to run the fundraiser: 2 each
2. Name of Fundraiser: Robot Demo Day for hire.
 - a. Description: Local retail stores / malls can hire Charging Champions Robots and team to demo Robot for 1 hour. Objective will be to increase foot traffic of families.
 - b. How will the event be planned and advertised: Charging Champions has identified local business like Irvine Company, Panera Bread, Taco Bell, Local Malls, etc. Retailer will advertise and plan the event in advance, including promoting there
 - c. Materials Needed: Robot, marketing content, Team brochure
 - d. Total money expected: \$500 / event
 - e. Total team cost for fundraiser:\$50 / event
 - f. Fundraiser net income:\$450 / event
 - g. Number of students & mentors/parents needed to run the fundraiser: 2 each
3. Name of Fundraiser: Donate on Digital media (Website, Social Media, Other sites).
 - a. Description: Provide information through website and other sources and enable individuals and corporations to donate online.
 - b. How will the fundraising be planned: Charging Champions has developed basic website and provided payment address. Team plans to enhance to accept donations online. Planning to identify a PCI compliant payment processor to enable online donations.
 - c. Materials Needed: Website, social media, payment processor
 - d. Total money expected: \$1 to \$1000 per donor
 - e. Total team cost for fundraiser:5% of donated amount



- f. Fundraiser net income: Hoping for \$1000 in year 1
- g. Number of students & mentors/parents needed to run the fundraiser: 2 each

Why FIRST TEAM 6560 Charging Champions?

Our community backed team, with very limited resources has managed to move up to the national level even in the rookie year. We stand as an example to how families can support the kids to take an interest in STEM based education via FIRST driver Robot competitions. The kids are motivated to work with the parents, other mentors and with each other's in a respectable, fun environment while learning science, math, marketing, engineering, time management and other basic life skills.

Supporting a community team, positions the Sponsor in a good light by making a positive impact to the community and spreading the message of STEM based initiative at the grassroots level. The team will support the Company's community awareness as described above.

Website: www.chargingchampions.org

Team Email: charging.champions@gmail.com

Facebook: <https://www.facebook.com/chargingchampions>

Twitter: <https://twitter.com/FRCTeamCC>

Google+: <https://plus.google.com/+ChargingChampionsFTCTeam8660>

Tumblr: <http://chargingchampionsstuff.tumblr.com/>

Main Contacts:

Mentor Name: Raj Neervannan

Title: Coach, Charging Champions, FIRST Team 6560

Email: rneervanan@gmail.com

Phone: (949) 415-8128



Team Meeting Information:

Location: 116 Capeberry, Irvine, CA

Dates: Every week on Sunday, Wednesday, Friday and Saturday, plus on some holidays

Times: Weekend / Holidays schedule - 10 a.m. to 6 p.m.; Weekday schedule - 4 p.m. to 8 p.m.

Sponsorship Information:

Checks should be made payable to: Charging Robotics (Non-profit name for Charging Champions), PO Box 54905, Irvine, CA – 92619. **EIN # 47-3562558**

We're a 501(c) 3 organization (Applied status, pending approval by IRS) and all donations are tax deductible once approved by IRS; please contact the team for more information.

(Note: Teams should clearly identify how checks have to be addressed so the money goes directly to the team funds. Teams should also know which donations are tax deductible and what information is needed to process the information properly.)

1. Liberty Engineering Manufacturing Solution
2. Kay Manufacturing
3. Midwest Glass & Mirror
4. Hanson Mold
5. Gaishin Manufacturing
6. Vaniman Manufacturing
7. Southland Fabrication
8. Smith Richards Inc.
9. Isthmus Engineering
10. Helical Robotics
11. CFP Studio Photography
12. Nordson
13. H.G. Fenton
14. PGS Precision Graphic
15. Callaway
16. Electromotive
17. Waag
18. Sinanian
19. Lasergraphics
20. Applied Medical
21. Secure Communication System
22. Innovocommerce
23. Pinnacle Technologies
24. Z Manufacturing
25. MiSUMi
26. Navis Pack and Ship
27. OPUS Solutions
28. Dobrusin
29. Leoness Cellars GHI Industries
30. Freeberg Industrial Fabrication
31. Georgia Tech Research Institute
32. HICA Ventures International
33. LittleField
34. BAE Systems
35. GLIC Technical Arts Inc.
36. LEDCOR Group
37. Swing Innovations
38. Brecflex
39. CBS Scientific
40. NTMA San Diego
41. Signal Hill Petroleum
42. Frasier Aviation
43. Samuel Lawrence Foundation
44. Serrano Systems Inc.
45. Hamrock Inc.
46. Serra Laser
47. Feruxe Inc.
48. Orange County Register
49. Dodge Oil
50. Choices in Learning Foundation
51. NTMA San Diego
52. Los al Dental Implants
53. The Menard Family Foundations
54. Built It Workspace
55. Laef
56. Digital Networks Group
57. Alamitos Eyecare
58. Ganahl Lumber
59. Real Consultants
60. Haynie Designs
61. Maker Place
62. Anocote Powder
63. SCS Energy
64. Mechanix Wear
65. Silver Sewing Machines
66. Orbital ATK
67. Tobolski Watkins Engineering
68. Junior Automation Technologies

STEM-4					
1 WALMART	Supermarket	Yes	Application Pending due to 501(c)3 Verification	http://grnt.walmart.com/apply-for-grants/	
2 EXXON MOBIL	Oil Refining	Yes	Please provide response	http://corporate.exxonmobil.com/en/community/math-and-science	
3 CHEVRON	Oil Refining	Yes	Need to reach someone, check Techbridge Girls info@techbridgegirls.com and Bad Foundation for Partnerships	http://www.chevron.com/corporate/sustainability/community/volunteering/	
4 BERKSHIRE HATHAWAY	Investments	Yes	Application submitted to The Charitable Foundation	http://Thecharitablefoundation.net	
5 APPLE	Technology	No	no		
6 GENERAL MOTORS	Automotive	No	no		
7 PHILLIPS-66	Oil Refining	Yes	http://www.phillips66.com/EN/us/devcommunities/Pages/contributions.aspx - follow up Ganesh	claudia.r.kreisle@phi66.com	
8 GENERAL ELECTRIC	Appliances	Yes	Follow Up Ganesh	http://www.gefoundation.com/about_ge_foundation/how_we_mak_grants/	
9 FORD MOTOR	Automotive	Yes	Follow Up Ganesh	http://www.ford.com/corporate/sponsorships/pages/home.aspx	
10 CVS HEALTH	Drug Stores	Yes		https://www.cvshealth.com/contact	
11 MCKESSON	Pharmaceutical	No	no		
12 AT&T	Technology	Yes		http://about.att.com/contact/ca/home/bossibilities/at-t-aspire/supporting-whats-work.html	
13 XEROX ENERGY	Oil Refining	Yes		http://www.xerox.com/corporate/sponsorships/pages/home.aspx	
14 UNITED HEALTH GROUP	Health Care	No	no		
15 VERIZON	Technology	Yes		http://www.verizon.com/about/communications/diversity/inclusion/diversity/verizon/diversity/diversity_inclusion/diversity_inclusion.html	
16 AMERISOURCE BERGEN	Health Care	No	no		
17 FANNIE MAE	Financials	No	no		
18 COSTCO	Supermarket	Yes		http://www.costco.com/charitable-giving.html	
19 HP	Technology	No (Does not accept unsolicited forms)		http://livingprogresschallenge.hpe.com/rules/	
20 KROGER	Supermarket	Yes		https://www.communitygifts.com/Default.aspx?Select=A-Store=Enabled&ReturnTo=default.aspx	
21 JP MORGAN CHASE	Financials	Yes		https://www.jpmorganchase.com/corporate/Corporate-Responsibility/grant-programs-us.htm	
22 EXPRESS SCRIPTS HOLDING	Health Care	Yes		https://www.express-scripts.com/about/corporate/contact_giving.shtml	
23 BANK OF AMERICA CORP.	Financials	Yes		http://about.bankofamerica.com/en-us/glob/impact/find-grants-sponsorships.html#buih-P1YNJuRjvX	
24 IBM	Technology	No	no		
25 MARATHON PETROLEUM	Oil Refining	No	no		
26 CARDINAL HEALTH	Health Care	No	no		
27 BOEING	Defense	Yes		http://www.boeing.com/company/key-args/advertising-and-brand-sponsorships.page	
28 DELL GROUP	Technology	Yes		http://www.dell.com/us/en/corporate/giving/giving-guidelines.htm	
29 AMAZON	Technology	Yes		amazon-giving.amazon.com	
30 WELLS FARGO	Financials	Yes		http://www.wellsfargo.com/about/diverse/diverse_giving_guidelines	
31 MICROSOFT	Technology	Yes		http://www.microsoft.org/How_We_Work/General_Information/Grantseeker_FAQ	
32 PROCTER&GAMBLE	Consumer Goods	Yes		http://www.pg.com/US/sustainability/social_responsibility/grant_application.shtml	
33 HOME DEPOT	Retailer	Yes		http://www.homedepot.com/suppliers/sponsorship.aspx	
34 ARCHER DANIELS MIDLAND	Food Production	Yes		http://www.adm.com/en-US/company/CommunityGiving/Pages/ApplyingForFunding.aspx	
35 WALGREENS	Drug Stores	Yes		http://www.walgreens.com/corporate_giving_back/contribution.asp	
36 TARGET	Retailer	Yes		http://corporate.target.com/corporate/grants	
37 PHARMAJOHNSON	Pharmaceutical	No	no		http://pharmajohnson.com/corporatesocialresponsibility/corporatefoundation/request-funding.html
38 ANTHONY'S	Health Care	Yes			
39 METLIFE	Insurance	Yes		http://www.metlife.com/mobile/Foundation.aspx?index.html	
40 ALPHABET (GOOGLE)	Technology	Yes		https://www.google.com/intl/ALL/grants	
41 STATE FARM	Insurance	No	no		
42 FREDDIE MAC	Financials	No	no		
43 COMCAST	Technology	Yes		http://corporate.cast.com/csr-values/community-investment/philanthropy/partnership/#according-3	
44 PEPSICO	Food Production	Yes		http://www.pepsico.com/PurposeGlobal/Citizenship	
45 UNITED TECHNOLOGIES	Defense	Yes	we do not affect their employee locations - cannot apply	http://www.utc.com/Corporate-Responsibility/Community/Pages/pgy-For-A-Grant.aspx	
46 AIG	Insurance	No	no		
47 UPS	Logistics	No	no		
48 DOW CHEMICAL	Chemicals	Yes	cannot apply because we do not meet requirements of Local Michigan community - This may change in Feb 2016, so we need to check back again after Feb 2016	http://www.dow.com/michigan/dowgives/	
49 ROBERT KIYOSAKI	Finance	No	no		
50 LOWES	Retailer	Yes		http://responsibility.lowe's.com/apply-for-a-grant/	
51 CONOCOPHILIPS	Oil Refining	no	no		
52 INTEL	Technology	yes	contact at https://www.intel.com/content/www/us/en/company-overview/contact-us.html	http://www.intel.com/content/www/us/en/corporate-responsibility/intel-in-california.html?wkwarg	
53 ENERGY TRANSFER EQUIITY	Pipelines	no	no		
54 CATERPILLAR	Construction	yes	have to apply in January as Caterpillar needs to confirm our 501(c) 3 status	http://www.caterpillar.com/en/company/caterpillar-foundation/request-a-grant.html	
55 PRUDENTIAL FINANCIAL	Financials	yes		http://corporate.prudential.com/media/images/Prudential_Sustainability_Report_2013.pdf	
56 PFIZER	Pharmaceutical	yes		http://www.cybergrants.com/us/cybergrants/our_check_awards	
57 DISNEY	Entertainment	yes		http://video.disney.com/watch/vsa-grants-4601bcffef3c26d52110e	
58 HUMANA	Health Care	no	no		
59 ENTERPRISE PRODUCTS	Pipelines	no	no		
60 CISCO SYSTEMS	Technology	yes	Send application in Feb. 22 to Mar. 4 : http://car.cisco.com/pages/silicon-valley-open-application-process	http://car.cisco.com/pages/community-impact-grants---how-to-apply	
61 SYSCO	Food Production	no	no		
62 INGRAM MICRO	Technology	yes	Send through email: http://www.ingrammicro.com/MD_WASWeb/isplogin/corporate.jsp	http://www.ingrammicro.com/MD_WASWeb/isplogin/corporate.jsp	
63 COCA-COLA	Food Production	no	no		
64 LOCKHEED MARTIN	Defense	yes	call lockheed martin: http://www.cybergrants.com/pls/cybergrants/ae_req_save_registration	http://www.lockheedmartin.com/us/who-we-are/community/philanthropy.html	
65 FEDEX	Logistics	no	no		
66 JOHNSON CONTROLS	Automotive	no	no		
67 PLAINS GP HOLDINGS	Pipeline	no	no		
68 INVEST FUEL SERVICES	Diversified	no	no		
69 CHS	Food Production	no	no		
70 AMERICAN AIRLINES GROUP	Airline	no			
71 MERCK	Pharmaceutical	yes		https://www.merksgupport.com/Charitable/S025xpdpcdkozze53zsymj/Default.aspx?SecurePageID=%20&CategoryID=1&PageID=1&PageTitle=Charitable-Giving-Fundraiser_Ch.aspx%3F2119F202C0D00FA1A00A6CF1B1941742C32F289509AC9C2B7E3088B1C10A4DB767794F502D1043621865C2E656E5	
72 BEST BUY	Retailer	yes	apply in June: https://www.easymatch.com/bestbuygrant/	http://corporate.bestbuy.com/community-grants/	
73 DELTA AIRLINES	Airline	no	no		
74 HONEYWELL INTERNATIONAL	Technology	no	no		
75 HCA HOLDINGS	Health Care	no	no		
76 GOLDMAN SACHS	Financials	no	no		
77 TESORO	Oil Refining	yes	Nandita working on it	http://tescom.com/social-responsibility/tesoro-community-investments/how-to-apply	
78 LIBERTY MUTUAL INSURANCE	Insurance	yes		http://www.libertymutualgroup.com/images/ContentServer?pagename=LGroup/Views/LMGA/44&fe=123994424385	
79 UNION PACIFIC	Railroad	no	no		
80 NEW YORK LIFE INSURANCE	Insurance	no	no		
81 ORACLE	Technology	yes		http://www.oracle.com/application-modern-best-practices/higher-ed/career-project-management/grant-awards-funding-closeout.html	
82 MORGAN STANLEY	Financials	no	no		
83 TYSON FOODS	Food Production	yes		http://www.tysonfoods.com/Way%20%20%20CareGiving%20Pack/Corporate%20Grant%20Funding.aspx	
84 SAFEWAY	Supermarket	no	no		
85 NATIONWIDE	Insurance	no	no		
86 DEERE	Construction	yes	Form given still 2015 version	https://www.deere.com/us_us/corporate/deere_company/news_and_media/press_releases/2015/corporate/2015an18-corporaterelease.page	
87 DUPONT	Chemicals	yes	Form given still 2015 version	http://learn.thefuture.org/grants-fellowships/grants-sponsorships/	
88 AMERICAN EXPRESS	Financials	yes		http://about.americanexpress.com/us/howto.aspx	
89 CIGNA	Health Care	yes		http://www.cigna.com/about-us/corporate-responsibility/cigna-foundation	
90 MONDELEZ INTERNATIONAL	Food Production	no	no		
91 TIAA-CREF	Insurance	no	no		
92 INT'L FCStone	Financials	no	no		
93 MASS. LIFE INSURANCE	Insurance	no	no		
94 DIRECTV	Technology	no	Anish working on this		
95 HALLIBURTON	Oil Refining	yes	Anish working on this	http://halliburton.com/en-US/about-us/community/halliburton-foundation/default.page	
96 21ST CENTURY FOX	Entertainment	no	no		
97 3M	Diversified	yes		http://solutions.3m.com/appsportal/3M/en_US/Community_GivingUS/Home/homeoff	
98 CARDS	Retailer	no	no		
99 GENERAL DYNAMICS	Defense	no	Anish working on this		

info@techbridgegirls.com

Company Name	Status	Company Info				Company Point of Contact				First Contact by Team				Second Contact by Team				Team Thank You Information			Additional Notes				
		Relationship info	Website	Address	Phone	Type of Business	Size	Name	Title	Phone	Email	Date	Type of Contact	Team Rep	Notes	Follow-up Date	Type of Contact	Team Rep	Notes	Follow-up Date	First Thank You Information	Invitation To Closed Event	Invitation To Future Benefit		
Southern California Edison	2014 Team Sponsor	Donated 40 hours of machine time 2014 Silver Sponsor	www.soe.com	1234 University Street	(714) 514-8800 (626) 302-3817	Utility Company	Large	Tami Bui	Principal Advisor, Corp Communication	(714) 514-8800 (626) 302-3817	Tami.Bui@soe.com	XXXXXXX	Phone/E-mail/Voice Mail	Student	Left Voicemail about meeting.	XX/XXXX	XXXXXXX	Phone Person	Student 1	Met Bob. Asked him if he has plans to speak at the team.	XX/XXXX	Date	Date	Date	Plan to follow up with Bob about potential sponsorship next week.
Broadcom	Prospect	Donated Team T-shirts and Swag for 2014 Gold Sponsor	www.broadcom.com	1234 University Street	565-565-5551	Semiconductor		Jane Contact	COO	565-565-5552	jane.contact@exanplusabc.com	XXXXXXX	Phone Call	Student 2	Talked on the phone about coming in to do a demo. She is checking with her office on a date.	XX/XXXX	XXXXXXX	Phone Call	Student 2	Set a time to do a team demo next Tuesday at 4pm.	XX/XXXX	Date	Date	Date	Demo went well. Jane is the team lead. Set up a demo for 2014 about sponsorship levels. Asked if they don't hear back.
Qualcomm	Prospect	No Sponsorship - Try again in 2015	www.example.com	1234 University Street	565-565-5553	Engineering Firm		Jim Contact	Director of Engineering	565-565-5554	jim.contact@exanplusabc.com	XXXXXXX	Voice Mail	Student 3	Left Voicemail explaining who the team is and that the team would like to come in for a demo. They will be dropping off more information about the team this Thursday.	XX/XXXX	XXXXXXX	In-Person	Student 3	Discussed dropping off a different STEM event with members of local business. They suggested XXXXXX, they aren't sure if they can donate this year.	XX/XXXX	Date	Date	Date	Demo went well, the contact is going to their corporate office to talk about it. They are not sure if they can donate this year, but they might be interested in 2015. Follow Up on XXXXXX for a response.
Panera Bread	Prospect	Co-Hosted STEM Event with FIRST	www.example.com	1430 University Street	565-565-5556	STEM Non-Profit		Mary Contact	Volunteer Coordinator	565-565-5557	mary.volunteer@exanplusabc.com	XXXXXXX	Met or Demo at Local Event	Parent 2	Discussed coming to a different STEM event with members of local business. They suggested XXXXXX, they aren't sure if they can donate this year.	XX/XXXX	XXXXXXX	Phone Call	Student 4	Discussed Panera's interest in a local STEM event with members of local business. They suggested XXXXXX, they aren't sure if they can donate this year.	XX/XXXX	Date	Date	Date	Local STEM Event is XXXXXX. On team C level looking for opportunities at next competition.
Blizzard Entertainment	Prospect	No Relationship with FIRST	www.blizzard.com	16215 Alton Park, Irvine, CA 92618		Video Game Company																			
Western Digital	Prospect	Sponsored several FIRST Teams	www.wdc.com	3355 Michelson Drive	(949) 672-2000	Data Storage Company																			
The Irvine Company	Prospect	Sponsors many educational organizations	www.theirvinecompany.com	550 Newport Center Dr.	949.720.2000	Real Estate Business																			
BoatM Mobile	Prospect	Sponsored FIRST through ZTE phones	www.zte.com	9060 Irvine Cr.	(866) 403-7055	Telephone Company																			
Tillys	Prospect	Local Clothing Company	www.tillys.com	10 Whately	(840) 609-5599	Clothing																			
Wahoo's Fish Taco	Prospect	Local Restaurant	www.wahoosfishtaco.com	2855 Pullman Street	949.322.0670	Restaurant																			
Chescon	Prospect	Energy Corporation	www.chescon.com	2800 Stargate Rd.	805-278-1900	Oil Industry																			
haas	Prospect	local manufacturer	www.haas.com	10200 Washington Blvd., City of Industry, CA 92323	310) 244-2332	Makes movies																			
Sony Pictures	Prospect	entertainment inc	www.sonypictures.com	15800 Laguna Canyon Rd.	(949) 789-2300	Makes movies																			
Manuchan	Prospect	local food company	www.manuchan.com	45 Oldset, Irvine	(949) 777-2300	Makes noodles																			
Kia	Prospect	local car company	www.kia.com	17835 Ventura Blvd	855.855.4342	Makes cars																			
The Roddenbury Foundation	Prospect	supported West Torrance Robotics	www.roddenbury.org	6999 Las Colinas E	(972) 444-1000	oil and gas company																			
Exxon Mobil	Prospect	supported West Torrance Robotics	www.exxonmobil.com	1701 E. Edinger	(714) 953-9335	provides "motion systems"																			
Oriental Motors	Prospect	supported West Torrance Robotics	www.oriental-motors.com	2800 Stargate Rd.	Orland, CA 93030	encourages people to make a positive impact by supporting initiatives																			
Gene Haas Foundation	Prospect	One of FTC team top sponsors	www.ghaf.org	http://www.ghaf.org/ourmission.html		http://www.ghaf.org/ourmission.html																			
Argosy Foundation	Prospect																								
Aris	Matching grants?	FLL Sponsor																							
Motorola																									
Boeing	FTC Sponsor	One of FTC Sponsors																							
AMD International vision	Team Sponsor	Team Sponsor		1725 S. Campus Avenue, Ontario, CA 91761	909-955-5300	Planes																			
lumen 21 cause labs																									
Yogurtland at Spectrum	Prospect	Local thriving store	www.yogurtland.com	81 Fortune Drive	Irvine, CA 92618	849-536-5303	Sells frozen yogurt																		
Starbucks	Prospect	local thriving store	www.starbucks.com	N/A	(949) 529-6436	Sells coffee and other drinks and snacks																			
FedEx	Prospect	Local shipping store	www.fedex.com	700 Barranca Pkwy	Irvine, CA 92618	(800) 463-3338	shipping company																		
United Airlines	Prospect	Common FTC Sponsor		https://www.united.com/corporate/contactus/?root=1	Chicago, IL (HQ)	1 (800) 864-6331	airline company																		
We have Central Machinery tools (part of harbor freight)					23910 El Toro Rd, Lake Forest, CA 92630	1 (800) 444-5353	Sells tools for industrial use																		
Harbor Freight	Prospect																								

Company Info						Company Point of Contact				First Contact by Team				Second Contact by Team				Team Thank You Information			Additional Notes				
Company Name	Status	Relationship	Website	Address	Phone	Type of Business	Size	Name	Title	Phone	Email	Date	Type of Contact	Team Rep	Notes	Follow-up Date	Date	Type of Contact	Team Rep	Notes	Follow-up Date	First Thank You	Invitation To Closed Event	Invitation to Team Banquet	

Grant Applications

DirectTV Grant Application:

To Whom It May Concern,

We are the Charging Champions, members in the *FIRST®* Tech (Robotics) Challenge (FTC) program for middle and high schools located in Irvine, CA. **We are writing to you in hope of seeking team funding for this robotics competition.**

Mission Statement: The Corporation/Organization is established and shall be operated exclusively for students who are part of First Team 8660 (aka Charging Champions) to first design, develop and compete in robotics competitions and then provide STEM education outreach to all students in the local community within the meaning of IRA Publication 557 Section 501(c)(3) Organization.

Activities to be funded: Develop custom robot with no commercial components, using machine tools, CAD, software development, multiple prototypes and conduct many trials. Outreach activities share the learning from above with 5th to 10th grade students in local community

Population Served: Our 9 member team will benefit over 2000 students in the local community through our STEM education outreach program in 2016.

Expected Outcome: Develop students to offer them STEM based skills by teaching and encouraging students, while enabling them to develop and successfully execute projects/challenges.

How we will measure success: We will measure success by questions asked, hits on our website and social media, helping others form teams to build robots, helping other teams with technical questions, number of outreach programs in the local community, number of schools impacted.

Additional Information: More information about our team can be found at www.chargingchampions.org. Additional information about the *FIRST* Tech Challenge program can be found at www.usfirst.org/ftc.

We would really appreciate if you can let us know your decision at anish.neervannan@gmail.com. If possible, our team would like to set up a time with you to explain why we are so excited about FTC.

Thank you for taking the time to read this letter.

Sincerely,

The Charging Champions
FTC Team 8660

Edison Grant Application \$1000/\$2500:

Organization Info

1. Organization Name

CHARGING ROBOTICS

2. Legal Name

(As listed in the IRS 501(c)3 determination letter.)

CHARGING ROBOTICS

3. Please provide any other names or acronyms your organization is known by, separated by commas.

CHARGING CHAMPIONS

4. Mailing Address

116 CAPEBERRY

5. City

IRVINE

6. State

CA

7. Zip Code

92603

8. County

Orange

9. Organization Phone Number

(Include area code. No parenthesis, dashes or spaces)

5125875329

10. Email Address

(Please provide an email address that can be used to send updates and/or general inquiries to.)

charging.champions@gmail.com

11. Website Address

www.chargingchampions.org

12. Please provide your organization's mission statement.

The Corporation/Organization is established and shall be operated exclusively for students who are part of First Team 8660 (aka Charging Champions) to design, develop and compete in STEM or robotics competitions within the meaning of IRA Publication 557 Section 501(c)(3) Organization of the Internal Revenue Code of 1986, as amended (the "Code") or the corresponding section of any future federal tax code.

13. Tax ID appearing here is the number you entered at the beginning of the application. It has been verified with the IRS.

473562558

Primary Contact Info

1. Salutation

(Mr., Ms., Mrs., Dr., etc.)

Mr.

2. First Name

SRINIVASA

3. Last Name

LINGINENI

4. Title

TREASURER

5. Email Address

lsrini@yahoo.com

6. Phone Number

(Include area code. No parenthesis, dashes or spaces)

7143359443

7. Phone Extension

8. Business Address

(Please provide physical address. No P.O. boxes.)

116 CAPEBERRY

9. City

IRVINE

10. State

CA

11. Zip Code

92603

12. Executive Director's Name

RAJMOHAN NEERVANNAN

13. Executive Director's Email Address

rneervannan@gmail.com

14. Executive Director's Phone Number

5125875329

Grant Request**1. What is the title of your program/project?**

FIRST Team 8660

2. What is the total grant amount you are requesting from Edison?

(Example \$1,000)

1000/2500

3. What is the annual program budget for this request?

(Example \$1,000)

15000

4. What is your organization's total annual operating budget?

(Example \$1,000)

16275

5. Provide program/project background.

FIRST Team, Charging Champions, #8660 was founded in 2014 by families in the neighborhood, with 6 boys and 2 mentors making up the team. This year, the team has added 3 girls and 1 boy to the team, in addition to 2 mentors with STEM background. All team members have grown up together in elementary and middle schools. Some of the team members were past alumni of FIRST Lego League, a program for younger kids to learn robotics. The team members will gain tremendously, learning hard and soft skills ranging from Hardware and Mechanical Design, Software coding, System integration, Manufacturing / Tooling, CAD Design, Marketing and branding, Community Service, Communication and Leadership skills and improved collaboration skills. Community Service focus includes bringing measurable impact with outreach programs focuses on STEM education. The team has began making impact or helped the local, state, national, or international community. STEM outreach is a key component in FIRST culture and is part of FIRST Team 8660's identity. The team is well aware of the community and have a deep desire to bring a positive impact, creating a detailed business and outreach plan.

FIRST is a global organization with the mission to inspire young people's interest in STEM (science, technology, engineering and math) related careers. FIRST enables Mentors to engage and inspire / motivate students with structured, goal oriented accessible and innovative programs while providing them with interpersonal working, project management and other professional skill building capabilities that provides self-confidence and other life skills.

The Project involves planning, strategy, design and development of fully functional robots aligned to the FIRST Technology Challenge for a given year. Each year's challenge is very different from the previous years. The team members, with guidance from mentors, work on all aspects of the Robot.

6. Provide specific details about your request including goals objectives and target population.

Develop mentors to offer their STEM based skills for teaching and encouraging students, while enabling them to develop and successfully execute projects / challenges. The mentors will be identified all over the world and will use technology to conference call (audio, video, visual) between student and mentors, done on weekly or as needed basis.

Market organization as a champion for STEM based initiatives in the local community, using media, social network and personal communications to create brand, attract funding, and organize partners and students to work with Charging Robotics. This is an ongoing process done on monthly basis by all founders using traditional and digital marketing methods globally.

Engage volunteers to provide their support for range of STEM community based activities. This is an ongoing process to identify volunteers on need basis around events and competitions and will be done by all founders.

Develop STEM based learning models that can be adopted by schools and school districts, local scouts, City and County and other education or career support organizations to leverage the STEM education model using Robotics. This will be done every 3 months (March, June, September and December), led by all founders.

7. List any branding opportunities for Edison.

- Sponsor Logo Display: Provides you brand visibility at the event(s) visited by several hundred people, some of which is nationally televised
 - On the Robot (2" x 2")
 - Website : Provides you brand visibility globally as teams all over the world reach out to each other to collaborate and communicate
 - Sponsorship page will have logo linked to sponsor's website for 1 year
 - Social Media: Quarterly shout out "Thank You" for the donor for 1 year

Budget

1. Program Support:

1000

2. STEM Scholarship Support:

0

3. Sponsorship Amount:

0

4. Board Fees, if applicable:

0

5. Total amount requested:

Amount should equal the total amount requested for funding.

1000

Program Outreach:

1. How many people will be served by this Edison grant?

2000

2. What program area does this grant request target?

Education

3. What Age Group does your request target?

Youth (0-18)

4. Provide the Ethnicity breakdown for this request.

(Please input percentages. Your total selections should add up to 100. Use 0 for n/a.)

AfricanAmerican (%)

10

American Indian/Alaskan Native (%)

0

Asian/Pacific Islander (%)

20

Latino/Hispanic (%)

30

Caucasian (%)

30

5. Provide the Population breakdown for this request.

(Use 0 for n/a.)

Low Income (%)

20

Disabled (%)

5

Female (%)

30

Gay/Lesbian/Transgender (%)

10

Seniors (%)

5

Veterans (%)

3

City Outreach

1. Please select the top 5 cities in which your proposed program outreach and services will be based.

Irvine, Los Angeles, Palmdale, Santa Ana, Tustin

Edwards Grant Application:

EDUCATION PARTNERSHIP AGREEMENT
BETWEEN
THE DEPARTMENT OF THE AIR FORCE,
REPRESENTED BY THE 412 TEST WING AND
CHARGING ROBOTICS

I. Preamble

The United States of America as represented by the Department of the Air Force, Air Force Test Center, 412th Test Wing (412 TW), located at Edwards AFB, CA 93524, and Charging Robotics, 116 Capeberry, Irvine, CA, 92603 (hereinafter referred to as "the Parties") hereby enter into this Education Partnership Agreement (hereinafter referred to as the "Agreement") pursuant to Title 10 United States Code Section 2194. The terms and conditions of this Agreement are set forth as follows.

II. Introduction

The Parties enter this Agreement in recognition of the importance of education to the future and economic well-being of the nation, as well as the importance of 412 TW to the business, industrial and educational institutions in the United States.

As a test center, 412 TW has a responsibility to encourage the study of science, mathematics, and engineering at all levels of education by entering into education partnership agreements with educational institutions in the United States.

Charging Robotics, along with the parents, community, and staff of the Charging Robotics, believes that young people can be taught to be lifetime learners and competent citizens. We are partners in providing our children with an understanding and appreciation of the past and present as well as preparation for the future. We will focus on effective instruction that reflects our local history, concern for the environment and belief in a solid academic curriculum. We will work to ensure a safe and orderly environment, sound fiscal management and a belief that the size of our district enhances rather than limits our possibilities.

Charging Robotics is established as a non-profit organization and shall be operated exclusively for students who are part of First Team 8660 (aka Charging Champions) to first design, develop and compete in robotics competitions and then provide STEM education outreach to all students in the local community

Charging Robotics is focused on serving women, members of minority groups, and other groups of individuals who traditionally are involved in the engineering and science professions in disproportionately low numbers.

III. Objective

The objective of this agreement is to enhance the education of students in the local area and to encourage the development of critical thinking to support the needs of future STEM careers to the benefit of California, the Air Force and the nation.

IV. Authority

Pursuant to the Education Partnership Act, Title 10 United States Code 2194, for the purpose of encouraging and enhancing science, mathematics, and engineering education at all levels of education 412 TW is authorized to:

- a. Loan defense laboratory equipment to Charging Robotics.
- b. Donate to Charging Robotics defense laboratory computer equipment, or other scientific equipment, that is: (1) commonly used by educational institutions; (2) surplus to the needs of the 412 TW; and (3) determined by the director to be appropriate for support.
- c. Make 412 TW personnel available to teach science courses or to assist in the development of science courses and material for Charging Robotics.
- d. Involve faculty and students in 412 TW projects.
- e. Cooperate with Charging Robotics in developing a program under which students may be given academic credit for work on 412 TW projects.
- f. Provide academic and career advice and assistance to Charging Robotics students.

V. Patents and Copyrights

Due to the nature of work performed, it is not expected that any patentable or copyrightable material will be developed under this agreement. In the event patentable material is developed under this Agreement, each Party shall separately own any invention made solely by its respective employees under this Agreement. Inventions made jointly by the Parties will be jointly owned by the Parties. Licensing of intellectual property, if any, will be set out in separate agreements. In the event copyrightable material is developed under this Agreement, Charging Robotics shall the copyright in all works created in whole or in part by Charging Robotics and grants in advance to the United States Government a license conveying the right to use, duplicate or disclose such works in any manner, and to have or permit others to do so, for government purposes only.

VI. Specific Obligations

- a. The Charging Robotics shall, if applicable, time permitting and upon written approval:
 - (1) Be responsible for all Charging Robotics faculty, student, and other employee salaries or other compensations and benefits as necessary under this Agreement.
 - (2) Provide workspace and involve students in the use of FIRST FTC, FRC, FLL and other recommended tools or packs like Andymark, PitsCo, Tetrix, Servo City, Modern Robotics, Android Platform, Qualcomm Platform, Other Software, Activity Packs and other tools.
 - (3) Provide workspace and involve students in the use of Android, Qualcom, and other tools.

- (4) Allow for scheduled visits and tours to showcase the program to other, accrediting agencies' representatives, and other interested parties.
- (5) Promote and host tours to Edwards AFB to secondary and primary students with the intent to encourage their pursuit of mathematics, science,
 - and engineering studies.
- (6) Provide to 412 TW, where appropriate and made available through normal operating policies and practices of the organization, to fulfill the partnership definition as specified above, equipment and adequate facilities including access to computing resources, libraries, and visitor user space.
- (7) Work with 412 TW to coordinate activities in the areas of network communications and network resource management.
- (8) Ensure that Charging Robotics faculty, students, and other participating employees abide by all Air Force and 412 TW rules for security, safety, and general conduct.

b. 4 12 TW shall:

- (1) Be responsible for all 412 TW employee salaries or other compensations and benefits as necessary under this Agreement.
- (2) Loan equipment to Charging Robotics as it becomes available for loan and provides equipment that may become available as surplus equipment no longer needed by 412 TW.
- (3) Provide materials as they may become available to enhance the education experience for students of Charging Robotics.
- (4) Provide appropriate instruction to the directors, students, and staff on the proper and safe use of any equipment or materials loaned or provided to Charging Robotics.
- (5) Encourage 412 TW scientists and engineers to provide academic and career advice to participating students.
- (6) Appoint an individual to maintain a list of equipment, and its location, loaned under this agreement.
- (7) The volunteers of the 412 TW will obtain an Installation Records Check (IRC), through the Department of the Air Force, in compliance with AFI 34-249 within the DoDI 1402.5 and also meet Charging Robotics' volunteer requirements.
- (8) Provide opportunities for educational tours and visits to sites and facilities on 412 TW controlled property which enhance the student's educational experience by teaching them about the history and process by which the science of flight and testing developed over time and the technical challenges that were overcome.

- (9) Provide Grants to fund part of the Charging Robotics operations.
- c. Subject to Article X (Liabilities) and Article XIII (Risk of Loss) below, no Party shall be obligated to compensate any other Party for costs incurred by the said other Party in carrying out activities defined by this partnership.
- d. Each of the Parties shall direct its own activities pursuant to this partnership. No Party shall have authority to direct any other's activities.
- e. Any public announcement of this partnership shall be coordinated among the Parties to include, but not limited to, the 412 TW public affairs office. The Charging Robotics shall not use the name of 412 TW, or Government on any product or service that is directly or indirectly related either to this partnership or any assignment that implements this partnership agreement without prior written approval of 412 TW. Similarly, 412 TW shall not use the name of the Charging Robotics on any product or service that is directly or indirectly related to this partnership without prior written approval of the Charging Robotics. By entering into this partnership, no Party directly or indirectly endorses any product or service provided, or to be provided, by any other Party. Neither Party shall in any way imply that this partnership is an endorsement of any such product or service.
- f. Participating Charging Robotics directors, employees, and students under this Agreement will not be required to obtain security clearances. Activity performed under this Agreement will not require access to classified materials, proprietary information in the possession of 412 TW, nor information for which export is restricted by the Arms Control Act (Title 22 United States Code Section 2571 et seq.), the Export Administration Act (Title 22 United States Code Section 2401 et seq.), or the International Traffic in Arms Regulation (22CFR 120-25).
- g. The Parties' obligations under this Agreement are contingent upon and subject to availability of funds.

VII. Value of Contributions

412 TW estimates the value of its contributions to this agreement to be:

- (5) Labor (Scientists, Engineers, Support Personnel)
- (6) Facilities (Tour Transportation, Classrooms, Etc.)
- (7) Supplies and equipment (Grants, Equipment, Etc.)
- (8) Other (various expenses to be used during 5 yr. contract)

TOTAL	\$
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VIII. Benefits

- a. The benefits to the Charging Robotics, its students and the State of California include:
 - (l) In September of 2015 the following board goals were adopted based upon the priorities

of the community. This agreement with the 412 TW will assist the District in meeting them.

- (a) Charging Robotics goal is to build and maintain educational and extracurricular programs that enrich every student's learning experiences. The STEM learning will provide students with the opportunities that the District may wish to choose according to its goals.
 - (b) Charging Champions goal desires that the District will introduce and encourage students to use technology as a tool to enhance and engage student learning. The LEGO EV3s, will require students to use technology to program their robots. The more advanced students will be learning to code as well.
 - (c) Goal desires that every child be allowed to reach their learning potential. Adding a robotics theme to the extra curricular activities will encourage children to be creative, to explore, and self-discover. Much of the school's curriculum today has a narrowed focus on intelligence, where mathematics, writing and reading reign supreme. . Robotics allow students who are more spatial-visual to create with their minds, those more bodily kinesthetic to build with their hands, and the interpersonally intelligent to coordinate with a team,
 - (d) Charging Champions goal desires that all students learn to lead and manage projects. Students should also learn to conduct outreach programs, connect with other teams and the local community, engage in fundraising and business operations, financial management, and use the power of branding and marketing to promote STEM goals in the local community.
 - (e) Charging Champions goal desires to reach more than 2000 students to support advancement of STEM based learning by engaging and presenting to students in the local communities. Outcomes expected are that more students (Girls, minorities) in the local community will engage in STEM based learning. Team members will provide their support for a range of activities and workshops from basics of Robotics, Robot building, CAD, Branding and marketing (Website, Social Media marketing) , project management, events planning and robotics competitions participation. Longer term goal is to develop STEM based learning models that can be adopted by schools and school districts, local scouts, City and County and other education or career support organizations to leverage the STEM education model using Robotics.
- (2) Access to state-of-the-art C4I technologies for research and study, and access to computing equipment and databases dedicated to technology transfer that would not otherwise be available.
- (3) Insight into Air Force and Department of Defense future information system technology and computational needs.
- (4) A forum for participants to exchange ideas and information that may lead to teaming

arrangements or other formal agreements for pursuing competitive research projects and grants.

(5) Opportunities for further collaboration between the Charging Robotics and 412 TW on various technology transfer projects that will strengthen overall United States competitiveness as well as improve economic development through the application of 412 TW technologies to commercial industrial problems.

(6) Improved educational relevance to academic programs as a result of closer interaction with AFRL/IF personnel and research projects based upon practical, "real world" problems and needs.

b. The benefits to 412 TW and the Air Force include:

(1) Promoting the education of future scientists and engineers.

(2) Goodwill.

(3) The 412 TW will be able to fill vacancies in its STEM workforce by eventually hiring professionals who benefited from the AF sponsored STEM program throughout their education and training. The culture and environment of the Antelope Valley will be home to these professionals and they will not

be asked to make a large transition when coming here from faraway places. This should improve retention and return on investment in training and career broadening activities as well.

(4) The State of California will greatly benefit by improving the number of professional members of the workforce who will earn better pay and pay more taxes than unskilled labor. In addition, companies, large and small, will be motivated to establish and maintain facilities in California in order to take advantage of the local skilled workforce.

(5) Enhancing 412 TW scientists, engineers and managers as a result of conducting research in conjunction with academic and practicing professionals who work in Information Science & Technology.

IX. Partnership Administration

The administration of this Agreement and the coordination of specific activities which comprise this program will be the joint responsibility of the designated program managers from 412 TW and the Charging Robotics.

The 412 TW STEM Coordinator will serve as the partnership Program Manager on 412 TW. The 412 TW Coordinator will work with the program manager for Charging Robotics to identify, select, and prioritize the activities in which the Parties engage pursuant to this Agreement and will ensure that program activities meet the statutory and regulatory requirements of the Federal Government and the Department of the Air Force.

Charging Robotics POC, a Director, will serve as the partnership program manager on behalf of the Charging Robotics. He will work with the program manager for 412 TW to identify, select, and prioritize activities in which the Parties engage pursuant to this Agreement, and will ensure that program activities meet the statutory and regulatory requirements of the Charging Robotics.

Loan (or donation) of all equipment from 412 TW to Charging Robotics shall be documented on an Equipment Loan (or Donation) Form and appended to this Agreement.

X. Liabilities

As between the Parties, each Party acknowledges that it will be responsible for their respective claims for damages arising from personal injury or damage to persons or property to the extent they result from negligence of its employees, agents, instructors, or students.

XI. Force Majeure

No Party shall be liable for any unforeseeable event beyond its reasonable control not caused by the fault or negligence of such Party, which causes such Party to be unable to perform its obligations under this Agreement (and which it has been unable to overcome by the exercise of due diligence), including, but not limited to, flood, drought, earthquake, storm, fire, pestilence, lightning and other natural catastrophes, epidemic, war, riot, civic disturbance or disobedience, strikes, labor disputes, or failure, threat of failure, or sabotage, or any order or injunction made by a court or public agency. In the event of the occurrence of such a force majeure event, the Party unable to perform shall promptly notify the other Party. It shall further use its best efforts to resume performance as quickly as possible and shall suspend performance only for such period of time as is necessary as a result of the force majeure event.

XII. Deliverables

There are no specific deliverables agreed upon at this time. Note all donation equipment shall require a report documenting that such equipment has been used to enhance student learning experiences and/or aspirations.

XIII. Risk of Loss

The Charging Robotics shall return all government-owned equipment loaned under this Agreement to 412 TW in good working order, normal wear and tear excepted, at the end of the time period(s) for loan or 30 days prior to end of this agreement, whichever comes first. While in the care or possession of the Charging Robotics, the equipment shall be covered by the Charging Robotics insurance program. Any modifications or repairs to the government-owned equipment that the Charging Robotics may find necessary to make shall be performed only after receiving written approval of the 412 TW. Any such repair or modification shall be at the expense of the Charging Robotics and shall not affect the title of 412 TW to said hardware and software.

XIV. Period of Agreement

The term of this Agreement is for a period of 60 months, commencing on the date of the last signature affixed below. Any Party may terminate this Agreement earlier upon delivery of written notice at least thirty (30) days in advance. Termination of this Agreement by any Party

for any reason shall not affect the rights and obligation of the Parties accrued prior to the effective date of termination of this Agreement. If any Party requests modification of this Agreement, including extension of this Agreement, the Parties shall, upon reasonable notice of the proposed modification by the Party desiring the change, confer in good faith to determine the feasibility of such modification. Modifications shall not be effective until a written amendment is signed by duly authorized representatives of the Parties. If either Party terminates this Agreement, it shall not be liable for any costs resulting from or related to the termination, including but not limited to, consequential damages or any other costs experienced by third parties including participating organization, or their students.

XV. Signatures

IN WITNESS WHEREOF, the Palties have caused this Agreement to be executed in duplicate.

Charging Robotics
412 TW Vice Commander

Intel Grant

April 3, 2016

To Whom It May Concern:

FIRST Tech Challenge Team 8660, the Charging Champions, is seeking \$5000 in funding (Grant, sponsorship or donation) from Intel for it's FTC robotics program. These funds will be used for robotics materials, competition cost, and for conducting community outreach events. The funding can also be used for travel cost (if approved by Intel) for Charging Champions team members to attend and compete at FTC World Championship. This season, 4000 FTC teams that competed worldwide and Charging Champions is very proud to be FTC world championship.

The Charging Champions are a local community based *FIRST* Tech Challenge Team from Irvine, California, consisting a team of 9 middle and high school students. The team is committed in applying STEM and other skills to tackle engineering challenges with robust design and development of FTC challenge robot. The team also uses its leadership and soft skills along with it's robot to inspire elementary, middle, and high school students in the Orange County, CA. Charging Champions has a goal to reach 2000 students, motivating them to acquire new technical and soft skills, generate interest in STEM and providing a foundation for future STEM learning through robotics in Orange County. The 3 girls at Charging Champions are also leading the effort to inspire other girls to consider technology careers.

These funds are being supplemented with in kind support from the local community, including parent mentors. This funding will provide the team a foundation, helping them build a long term sustainability plan based on it's success. Attached is summary of team's business plan with budget, fundraising plans, sponsorship packages and the team's web and social media sites. Charging Champions is a 501(c)3 certified non profit and has received grants from 2 large corporates till date, providing it with some seed funding. The team would be happy to follow your application process and also share it's detailed business plan.

FIRST Team, Charging Champions, #8660 was founded in 2014 by families in the neighborhood, with 6 boys and 2 mentors making up the team. This year, the team has added 3 girls and 1 boy to the team, in addition to 2 mentors with STEM background. Some of the team members were past alumni of *FIRST* Lego League, a program for younger kids to learn robotics. The team members will gain tremendously, learning hard and soft skills ranging from Hardware and Mechanical Design, Software coding, System integration, Manufacturing / Tooling, CAD Design, Marketing and branding, Community Service, Communication and Leadership skills and improved collaboration skills. Community Service focus includes bringing measurable impact with outreach programs focuses on STEM education. The team has begun making impact or helped the local, state, national, or international community. STEM outreach is a key component in *FIRST* culture and is part of *FIRST* Team 8660's identity.

The team is well aware of the community and have a deep desire to bring a positive impact, creating a detailed business and outreach plan. *FIRST* is a global organization with the mission to inspire young people's interest in STEM (science, technology, engineering and math) related careers. *FIRST* enables Mentors to engage and inspire / motivate students with structured, goal oriented accessible and innovative programs while providing them with interpersonal working, project management and other professional skill building capabilities that provides self-confidence and other life skills.

The Project involves planning, strategy, design and development of fully functional robots aligned to the FIRST Technology Challenge for a given year. Each year's challenge is very different from the previous years. The team members, with guidance from mentors, work on all aspects of the Robot. With the money they receive, the team plans to:

- Develop programs for team members to mentor their STEM based skills and encourage students, while enabling them to develop and successfully execute projects / challenges.
- Position the team as a champion for STEM based learning initiatives, using multimedia, social network and personal communications to create brand, attract funding, and organize partners and students to work with Charging Robotics. This is an ongoing process done on monthly basis by all founders using traditional and digital marketing methods.
- Engage volunteers to provide their support for range of STEM community based activities. This is an ongoing process to identify volunteers on need basis around events and competitions and will be done by all founders.
- Develop STEM based learning models that can be adopted by schools and school districts, local scouts, City and County and other education or career support organizations to leverage the STEM education model using Robotics. This will be done every 3 months (March, June, September and December).

For sponsorship opportunities, Charging Champions can offer the following options:

- Sponsor Logo Display: Provides you brand visibility at the event(s) visited by several hundred people, some of which is nationally televised
 - On the Robot (2" x 2")
- Website : Provides you brand visibility globally as teams all over the world reach out to each other to collaborate and communicate
- Sponsorship page will have logo linked to sponsor's website for 1 year
- Social Media: Quarterly shout out "Thank You" for the donor for 1 year

The team truly hopes you would consider them for a grant and fund our team.

Sincerely,

Noopur Siroya
Charging Champions
www.chargingchampions.org

Merck Grant

April 17, 2016

To Whom It May Concern:

FIRST Tech Challenge Team 8660, the Charging Champions, is seeking funds from Merck & Co., Inc. for team support including robotics materials and funds for community outreach events.

We are requesting \$5,000.

The Charging Champions are a local *FIRST* Tech Challenge Team from Irvine, California, committed in applying STEM and Soft skills to tackle engineering problems, as well as inspire students in the Orange County area, in the form of elementary school, high school, Scout troop, and Sports academies outreach events. These

We plan to use the grant amount of \$5000 to encourage approximately 10 students in the team, as well as two thousand local students, to learn new skills, generate interest in STEM and providing a foundation for future STEM learning through robotics in Orange County. These funds will be supplemented with in kind support from the local community, including parent mentors. This funding will provide us a foundation in the first year, helping us build a long term sustainability plan on it's success. We believe the cost from the second year and succeeding years will be far lower. We are confident that we will be able to continue this program for many years. To achieve that, we plan to acquire active mentoring and financial support from parents, IPSF (local non-profit for schools in Irvine) and approach several corporate sponsors that support us today. A detailed breakdown of our proposed use of funds is enclosed in the attached document.

Sincerely,

Ganesh Kolli
Charging Champions
FIRST Team #8660
www.chargingchampions.org

PTC Silver Grant**PTC Community Engagement**

- Organized and led a PTC Workshop for other FIRST teams
- Submitted a PTC Software Tutorial to the PTC Community
- Other (Provide details below)

Is your team engaged in spreading the word about PTC and what it offers to FIRST teams throughout the FIRST community, if so, please tell us how.

Other Community Engagement Promoting PTC

Our team has not engaged last year (our first year in PTC), since we had not used PTC's products effectively. We are very keen to learn and use PTC products this year. Our team goals are to build community outreach and we plan to share our experience and learnings about PTC software products with other teams and aspiring students this year.

Please select all the software tools your team currently uses:

- PTC Creo
- Autodesk
- Solidworks

PTC Software Usage:

If you used any PTC software last year, please summarize how you used it and whether it helped your team. If you attempted to use the software and were unable, please summarize your challenges, and how you addressed them.

It was very exciting to reach Super regionals last year as a rookie team, but we also realized what we could have done better in our design and development process. We had downloaded PTC Creo but did not effectively use the PTC software as our team was making ad-hoc design and tooling. Our mentor (from last year) also had limited PTC product capabilities. We addressed some of our needs by taking help from Autodesk and Solidworks from our mentors, but most of the designs were done manually and fabricated. Learning from other teams, we recognize the need for good s/w tools that can take us from design to planning to tooling and manufacturing process, giving us all the help we can get to build a better robot.

Please summarize how you plan to use PTC software in the current season. Are you going to try anything new? or utilize different functions within the software?

We plan to use PTC Creo software to do our CADs as part of our design and fabrication process. We've a new mentor who has experience in PTC Creo and will be guiding us through the process. We also plan to attend Robotalk webinars, with multiple team members signing up in individual and team capacity to learn from the webinars. We plan to create sample / simple CAD files and seek feedback from our mentors, followed by CAD design for our robots' components in the next few weeks. We plan to follow train the trainer model and build PTC Creo skills across multiple team members, given the short timeline before we start the qualifying round.

PTC Software Training and Robotalk Webinars:

What efforts have you made or will you make to get your team up to speed on PTC software?

A couple of team members have now been mentored from a PTC Creo expert and we have began practicing CAD designs, taking what we learnt as a rookie team last year. Our strategy this year would be

to conceptualize our design and develop CAD drawings, running models and coming up with Bill of Materials before the tooling / manufacturing process. This requires the use of good software tools and our team will certainly benefit from PTC's software tools. We plan to participate in webinars (Rototalk) and have a training calendar lined up for our team members. 10 out of the 11 team members plan to go through the Robotalk and will get hands-on training from the Mentor and our team PTC Creo expert. We also plan to download PTC Windchill as we would like to learn the product lifecycle management process in engineering design and manufacturing.

Did you attend the Robotalk webinars last year or listen to the recordings? If so, what topics would you like covered this season?

Two of our team members attended the PTC Creo webinar last year and found it useful for CAD. As the team did not use PTC Creo effectively last year, we look forward to Robotalk webinars this year.

Are there any other reasons we should consider in sponsoring your team?

Learning from our rookie days last year at FTC, our team is better prepared with clear goals, directions and more mentors to support and guide the team. We've doubled our team to 12 members this year, including 3 girls (two of them are keen on CAD) to bring a different perspective this year. We see FTC as not just a competition but as an opportunity to learn, share and acquire team building skills. We plan to use several software products to improve productivity like Googlegroups, Slack, PTC Creo, Android tools, Screen share Conferencing like Skype, etc. We're excited about this opportunity to use PTC products and can benefit immensely from PTC's sponsorship. We plan to leverage these funds in the development of our Robot and share the PTC brand / our skills on PTC tools with FTC members and community at large.

Walmart Grant

Organization Mission:

The Corporation/Organization is established and shall be operated exclusively for students who are part of First Team 8660 (aka Charging Champions) to design, develop and compete in STEM or robotics competitions within the meaning of IRA Publication 557 Section 501(c)(3) Organization of the Internal Revenue Code of 1986, as amended (the "Code") or the corresponding section of any future federal tax code.

Goals:

Develop students to offer them STEM based skills by teaching and encouraging students, while enabling them to develop and successfully execute projects / challenges. The First Team 8660 members (Students from grade 7 to 10) have and continue to support advancement of STEM based learning by engaging and presenting to students in the local communities. Charging Champions (Charging Robotics team) goals are to be a champion for STEM based initiatives in the local community for students to engage in STEM based learning. Team members provide their support for a range of activities and workshops from basics of Robotics, Robot building, CAD, Branding and marketing (Website, Social Media marketing), project management, events planning and Robotics competitions. We're also developing STEM based learning models that can be adopted by schools and school districts, local scouts, City and County and other education or career support organizations to leverage the STEM education model using Robotics.

Current Activity:

FIRST Team #8660 (Charging Champions), was founded in 2014 by families in the neighborhood, with 6 boys and 2 mentors making up the team. This year, the team has added 3 girls and 1 boy to the team, in addition to 2 mentors with STEM background. Some of the team members were past alumni of FIRST Lego League, a program for younger kids to learn robotics. The team members continue to gain tremendously, learning hard and soft skills ranging from Hardware and Mechanical Design, Software coding, System integration, Manufacturing / Tooling, CAD Design, Marketing and branding, Community Service, Communication and Leadership skills and improved collaboration skills. Community service focus includes bringing measurable impact with outreach programs that focuses on STEM education in the local communities. The team is well aware of the community and have a deep desire to bring a positive impact, with the help of a detailed business and outreach plan. Charging Champions is part of FIRST, a global organization with the mission to inspire young people's interest in STEM (science, technology, engineering and math) related careers. FIRST enables Mentors to engage and inspire / motivate students with structured, goal oriented accessible and innovative programs while providing them with interpersonal working, project management and other professional skill building capabilities that provides self-confidence and other life skills.

Current programs - This year FIRST Challenge is called RES-Q and a new robot is being designed and developed. Charging Champions' initial robot version is being demonstrated, highlighting its various challenges to design and develop. Charging Champions team has completed and lined up several outreach programs to promote STEM with the current robot like 3 large events, 2 boys and 1 girls scout troop, 2 elementary and 2 middle schools and local sports academies. Team is in discussion with Orange County Science and Engineering Fair and other events.

Program Description:

Our proposed program has several categories -

1. Robot - developing the custom robot with no commercial components, using local tools, CAD design, software development, multiple prototypes and hundreds of trials
2. Outreach - use the learning from above to share with students in local community like scout troops, elementary and middle schools, after school programs, sports academies, local community based learning programs. Outreach will also include soft skills, online presence, leadership building, interpersonal skills, etc.
3. Inspire students by creating video and presentation material to share with the student community and help them develop their skills
4. Motivate the local students to set up their own teams to develop similar robots and mentor them to successfully build their own STEM mentoring programs

Charging Champions is part of FIRST's robotics program. FIRST is a global organization with the mission to inspire young people's interest in STEM (science, technology, engineering and math) related careers. FIRST enables Mentors to engage and inspire / motivate students with structured, goal oriented accessible and innovative programs while providing them with interpersonal working, project management and other professional skill building capabilities that provides self-confidence and other life skills.

Charging Champions' initial robot version is being demonstrated, highlighting its various challenges to design and develop. Charging Champions team has completed and lined up several outreach programs to promote STEM with the current robot like 3 large events, 2 boys and 1 girls scout troop, 2 elementary and 2 middle schools and local sports academies. Team is in discussion with Orange County Science and Engineering Fair and other events.

Program Relevancy:

Our community backed team, with very limited resources has managed to move up to the national level even in the rookie year. We stand as an example to how families can support the kids to take an interest in STEM based education via FIRST driver Robot competitions. The kids are motivated to work with the parents, other mentors and with each other's in a respectable, fun environment while learning science, math, marketing, engineering, time management and other basic life skills.

Supporting a community team, positions the Sponsor in a good light by making a positive impact to the community and spreading the message of STEM based initiative at the grassroots level. The team will support the Company's community awareness as described above.

The local community in Orange County (Irvine and other cities) have high population density with large student population. Interest of students to engage in STEM education has been limited, especially with girl students. Charging Champions would like to increase awareness, motivate and inspire all students, especially girls to engage in STEM careers. Showing how the team members (7th to 10th grade students) can come together, engage in problem solving, planning, design and innovation, and learn new skills, all the while having fun, being mentored and giving them opportunity to try a new domain of interest.

Review Your Application

Please review your proposal information. If you are not ready to submit your proposal at this time, click the "Save Only" button. The proposal will then be available to edit from the Welcome page. Clicking the

Submit button will immediately send the application to the Walmart Foundation and you will then be unable to perform further editing.

Contact Information

*First Name	Raj
*Last Name	Neervannan
*Contact Title	President
*Address	116 Capeberry
*City	Irvine
*State	California
*Zip	92603
*Telephone	5125875329
*E-mail Address	charging.champions@gmail.com
*Contact Type	Executive Director

Organization Information

*Legal Name	CHARGING ROBOTICS
*Payee Name	Charging Robotics
*Organization Address	116 Capeberry
*Organization City	Irvine
*Organization State	California
*Organization Zip	92603
*Telephone	5125875329
Fax	
Organization's Website Address	www.chargingchampions.org
*Organization Mission	The Corporation/Organization is established and shall be operated exclusively for students who are part of First Team 8660 (aka Charging Champions) to design, develop and compete in STEM or

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1986, as amended (the "Code") or the corresponding section of any
future federal tax code.

Goals:

Develop students to offer them STEM based skills by teaching and encouraging students, while enabling them to develop and successfully execute projects / challenges. The First Team 8660 members (Students from grade 7 to 10) have and continue to support advancement of STEM based learning by engaging and presenting to students in the local communities. Charging Champions (Charging Robotics team) goals are to be a champion for STEM based initiatives in the local community for students to engage in STEM based learning. Team members provide their support for a range of activities and workshops from basics of Robotics, Robot building, CAD, Branding and marketing (Website, Social Media marketing), project management, events planning and Robotics competitions. We're also developing STEM based learning models that can be adopted by schools and school districts, local scouts, City and County and other education or career support organizations to leverage the STEM education model using Robotics.

***Current Activity** FIRST Team #8660 (Charging Champions), was founded in 2014 by families in the neighborhood, with 6 boys and 2 mentors making up the team. This year, the team has added 3 girls and 1 boy to the team, in addition to 2 mentors with STEM background. Some of the team members were past alumni of FIRST Lego League, a program for younger kids to learn robotics. The team members continue to gain tremendously, learning hard and soft skills ranging from Hardware and Mechanical Design, Software coding, System integration, Manufacturing / Tooling, CAD Design, Marketing and branding, Community Service, Communication and Leadership skills and improved collaboration skills. Community service focus includes bringing measurable impact with outreach programs that focuses on STEM education in the local communities. The team is well aware of the community and have a deep desire to bring a positive impact, with the help of a detailed business and outreach plan. Charging Champions is part of FIRST, a global organization with the mission to inspire young people's interest in STEM (science, technology, engineering and math) related careers. FIRST enables Mentors to engage and inspire / motivate students with structured, goal oriented accessible and innovative programs while providing them with interpersonal working, project management and other professional skill building capabilities that provides self-confidence and other life skills.

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***Organization's Facebook Site** <https://www.facebook.com/people/Charging-Champions/100007031656515>

***Organization's Twitter Handle** <https://twitter.com/ftcteamcc>

Request History

***Previous Funding Requests - All Locations** N/A

***Previous Funding - All Locations** N/A

***Previous Funding - This Location** No

Previous Funding Date - This Location

Area of Focus

***Primary Focus Category** Strengthening Local Communities

***Primary Subcategory** ----Education

Sam's Club Additional Category Youth Entrepreneurship Education

Community Served

***Area Served** Orange County
LA County

Riverside County

Imperial county

San Bernardino County

*People Served	2000
*Gender (number)	1,200.00 Male 800.00 Female 0.00 Unknown/Unreported 2,000.00 Total
*Age Group (number)	0.00 Unknown/Unreported ages 1,200.00 Children (0-12) 800.00 Youth (13-18) 0.00 Adults (19-24) 0.00 Adults (25-55) 0.00 Mature (56+) 2,000.00 Total
*Ethnic Background (number)	200.00 African American or Black 0.00 American Indian or Alaskan Native 600.00 Asian and Pacific American Islander 400.00 Hispanic or Latino 200.00 Multi-ethnic 600.00 White 0.00 Unknown/Unreported 2,000.00 Total

Program Information

*Grant Type	Local Community Contribution
*Requested Grant Amount	\$2,500.00
*Project Title	WMT 5644 Application
*Program Description	<p>Our proposed program has several categories -</p> <ol style="list-style-type: none"> 1. Robot - developing the custom robot with no commercial components, using local tools, CAD design, software development, multiple prototypes and hundreds of trials 2. Outreach - use the learning from above to share with students in local community like scout troops, elementary and middle schools, after school programs, sports academies, local community based learning programs. Outreach will also include soft skills, online presence, leadership building, interpersonal skills, etc.

3. Inspire students by creating video and presentation material to share with the student community and help them develop their skills
4. Motivate the local students to set up their own teams to develop similar robots and mentor them to successfully build their own STEM mentoring programs

Charging Champions is part of FIRST's robotics program. FIRST is a global organization with the mission to inspire young people's interest in STEM (science, technology, engineering and math) related careers. FIRST enables Mentors to engage and inspire / motivate students with structured, goal oriented accessible and innovative programs while providing them with interpersonal working, project management and other professional skill building capabilities that provides self-confidence and other life skills.

Charging Champions' initial robot version is being demonstrated, highlighting its various challenges to design and develop. Charging Champions team has completed and lined up several outreach programs to promote STEM with the current robot like 3 large events, 2 boys and 1 girls scout troop, 2 elementary and 2 middle schools and local sports academies. Team is in discussion with Orange County Science and Engineering Fair and other events.

***Fund Use**

FTC kits for Schools - \$2,000.00

Robot Material Cost - \$4,200.00

Large Rolling Tool Box and other tools - \$1,000.00

Pit Banners & Sponsor Banners - \$1,000.00

Travel / food cost for team - \$500.00 to \$5000 based on number of events and locations

***Program Relevancy**

Our community backed team, with very limited resources has managed to move up to the national level even in the rookie year. We stand as an example to how families can support the kids to take an interest in STEM based education via FIRST driver Robot competitions. The kids are motivated to work with the parents, other mentors and with each other's in a respectable, fun environment while learning science, math, marketing, engineering, time management and other basic life skills.

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The local community in Orange County (Irvine and other cities) have high population density with large student population. Interest of students to engage in STEM education has been limited, especially with girl students. Charging Champions would like to increase awareness, motivate and inspire all students, especially girls to engage in STEM careers. Showing how the team members (7th to 10th grade students) can come together, engage in problem solving, planning, design and innovation, and learn new skills, all the while having fun, being mentored and giving them opportunity to try a new domain of interest.

Agreement

***Acknowledgement of Terms
and Conditions**

AGREE

Abbott Grant

What Program does your team participate in?

FRC

What is your current team status?

Rookie

What is your team's location?

Please provide the city and state that your team is based in.

Irvine, CA

Has your team been supported by Abbott Fund in the past?

No

Coach's First Name:

Rajmohan

Coach's Last Name:

Neervannan

Email Address:

rneervannan@gmail.com

Phone Number:

(512) 587 - 5329

Team Information:

Team Email: charging.champions@gmail.com

Team Number:

Please note: your team must be registered and hold at least a temporary team number prior to applying for this grant. For directions on registering your team please visit our website

www.firstinspires.org

#201700662

School or Organization Name:

Please name the School or Organization that your team is associated with.

Charging Robotics (Non Profit)

Address 1:

116 CAPEBERRY

City:

Irvine

State/Province:

CA

Country:

U.S.A.

Zip Code:

92603

Please select the Abbott Location that is nearest to your team's location.

Please select the location that your team is located closest to within 25 miles.

1700 East St. Andrew Place Santa Ana, CA 92785

Abbott Volunteer Information

N/A

Abbott Mentor/Volunteer Name:

N/A

Position Held at Abbott:

N/A

Email Address:

N/A

Please include a brief narrative as to why you are applying for this grant, and include any special consideration you would like the Abbott Fund to know about when reviewing the application.

Starting as a community based FLL team in 2012 and 2013, we progressed successfully to FTC during 2014-2016 and as a rookie FRC team in 2016. Our past sponsors were SoCal Edison, Rockwell Collins, and AMD International Tech. While we did not reach Worlds in 2014-2015, we bounced back in 2015-2016 with new team members, including 3 girls, and reached the World Championships, thanks to our performance on connect activities, engineering notebook, robot performance and “never give up” champion spirit. We spent over 1000 hours, promoting STEM and FIRST to schools, Boy Scout Troops, and other organizations totaling 300+ students. After this key accomplishment, as a rookie FRC team this year, we are again expanding the team to 25 people. We are looking for funds to pay for robot parts, tools and equipment, competition fees, and other team costs. With the FRC expansion, our community based team needs every bit of help we can get. We request you to please consider our non-profit team for the Abbot grant so that we can continue spreading STEM education by building Robots, in our community, and continue to grow as a team.

Rookie Grant

FIRST® Robotics Competition 2017 Rookie Team Grant Application

Team Information

Please complete the fields below.

FIRST Robotics Competition Team Number

#201700662

Submitter Name

Noopur Siroya

Submitter Relationship to Team

Team Member

Submitter Email

noops2000@gmail.com

Primary School or Organization Name

Charging Robotics

Address 1

116 Capeberry

City / Town

Irvine

State

If located in the US, please select from list. If located outside the US, please select N/A and complete next question.

California

Province / Region

If located outside of the US

N/A

Zip / Postal Code

92603

Country

United States of America

Phone Number

5125875329

Team Facebook page (if applicable)

<https://www.facebook.com/chargingchampions/>

Team Twitter page (if applicable)

<https://twitter.com/ftcteamcc>

Is this a Rookie team? (select one)

yes

Team Makeup**How many team members do you have on your team?**

20

How many male members do you have on your team?

15

How many female members do you have on your team?

5

How many of your team members have participated in FIRST LEGO League?

4

How many of your team members have participated in FIRST Tech Challenge?

8

Is your FIRST Robotics Competition team affiliated with a Title 1 school? (select one)

If you are unsure please visit: <http://nces.ed.gov/globalslocator/>

No

What percentage of young people in your community participate in the reduced/free lunch program?

If you are unsure please visit: <http://datacenter.kidscount.org/locations>

27%

Mentor Information

Does your FIRST Robotics Competition Team have a Mentor? (select one)

Yes

A Mentor is required in order to receive the FIRST Robotics Competition Rookie Grant.

Full Name of Mentor

Raj Neervannan

Mentor Daytime Phone Number

5125875329

Mentor Email Address

rneervannan@gmail.com

Cover Letter

Enter a cover letter including a short biographical statement about your team. Briefly explain why your team needs funding in order to participate as well as what your plan is to raise additional funds. Be sure to note any special considerations about your FRC team that you would like to share.

We started as a community based FLL team in our Coach's garage in 2012 and competed at the local FLL competitions during 2012 and 2013 , reached the regional and won design awards. After 2 years of FLL, we migrated to compete in the FTC. As a rookie FTC team, during the 2014-2015 FTC season, our team reached the super-regionals competition for robot performance. Edison International covered our growth as we were the only team from this location to make it to the Super Regionals. While we did not get to the Worlds that year, we bounced back in the 2015-2016 FTC season, and reached the world championships, thanks to a all around performance on our connect activities, engineering notebook, robot performance and "never say die" champion spirit. We had expanded our team to 9, including 3 girls.

After this key accomplishment, our team decided to take it up a notch and decided to compete in the FRC. As a rookie FRC team this year, we are opening up our recruitment efforts and planning to expand the team to 25 members. We have reached out to many schools in the neighbourhood, including clubs such as "Girls Who Code", and to continue to recruit members that strengthen our team's core values by continuing to spread STEM and build bonds within our communities.

Last year, as a FTC team, we helped out a rookie FRC team, CDM Robotics, that eventually reached the World Championships. We promoted STEM and FIRST Robotics throughout our communities, to schools, Boy Scout Troops, and other various organizations. In total, we have reached out to over 300 students and have put in over 1000 hours into our community, and plan to do more in the

near future. This year, as an FRC team, we are expanding our team and give more kids the opportunity to learn more about STEM by building Robots.

We are looking for funds to pay for robot parts, tools and equipment, competition fees, and any other team costs that arise during the course of the season. Last year, we got funding from Southern California Edison, AMD International, and Rockwell Collins. Our main sponsor, Southern California Edison, provided \$5000 to our team, and other sponsors such as AMD International provided parts or tools to help us build. We reached out to various subject experts to help us troubleshoot some of the problems we were facing. Mr. Dana Wall from Southern California Edison helped us with static issues on our robot. Also, Mr. Martinez and Mr. Cruz from AMD International Technologies helped us with our CAD and manufacturing needs. These funds, along in-kind donations, helped us reach the World Champions.

With the FRC expansion, our community based team needs every bit of help we can get. We are still running the team from our Coach's garage. The success of our community team has created tremendous enthusiasm as we get requests from many students to join our team. We would love to accommodate more. We request you to please consider our non-profit team for the Abbot grant so that we can continue spreading STEM throughout our community, and continue to grow as a team.

Please include a brief narrative as to why you are applying for this grant, and include any special consideration you would like the Abbott Fund to know about when reviewing the application.

We started as a community based FLL team in our Coach's garage in 2012 and won design awards at regionals. Two years later, as a rookie FTC team during the 2014-2015 season, our team reached the super-regionals competition for robot performance. SoCal Edison funded us since we were the only team from Irvine to make it there. While we did not reach Worlds that year, we bounced back in 2015-2016 with new team members, including 3 girls, and reached the World Championships, thanks to our performance on connect activities, engineering notebook, robot performance and "never give up" champion spirit.

Last year, as a FTC team, we helped out a rookie FRC team, CDM Robotics, that reached World Championships. We promoted, over 1000 hours, STEM and FIRST to schools, Boy Scout Troops, and other organizations totalling 300 students. We plan to do more in the near future. This year, as an FRC team, we are expanding our team and give more kids the opportunity to learn more about STEM by building Robots.

After this key accomplishment, our team decided to take it up a notch and compete in the FRC. As a rookie FRC team this year, we are opening up our recruitment efforts and planning to expand the team. We have reached out to many schools in the neighbourhood, including clubs such as "Girls Who Code", and continue to recruit members that strengthen our team's core values by building bonds within our communities and more.

We are looking for funds to pay for robot parts, tools and equipment, competition fees, and other team costs. Last year, we got funding from SoCal Edison, AMD International, and Rockwell Collins. Our main sponsor, SoCal Edison, provided \$5000 to our team, and other sponsors such as AMD International provided in-kind donations. We reached out to various experts for help troubleshooting some of the problems we faced. Mr. Wall from SoCal Edison helped us with static issues on our robot. Also, Mr. Martinez and Mr. Cruz from AMD International helped us with CAD and manufacturing. These donations helped us reach the World Champions.

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accommodate more. We request you to please consider our non-profit team for the Abbot grant so that we can continue spreading STEM throughout our community, and continue to grow as a team.

PARENT SPONSORS

Team Member Name	Company Name
Ravi Joshi, Raj N.	Boeing
Alex, David K., David C., Jason, Noopur, Aditya	Blizzard
Albert, Raj Neervannan, David C	JPL
Raj N. Albert	Ratheon
Pallavi	Qualcomm
Rudy, Yiming	Google
Charlie G., David C, Rudy, Noopur	Disney
David K	Toyota
Rudy, Noopur	Western Digital
Rudy, Noopur	Microsoft
Raj N	Northrup
Raj N	Amgen
Alex	IEEE
Noopur	Edwards Life Sciences
Raj N	Applied Medical
Charlie D, Raj N	Statefarm
Charlie D, Harvey, David K, Rudy	Broadcomm
Noopur	Taco Bell
Pallavi	Kaiser
Rithik	Molina Health Care
Pallavi	City Bank
David C, Raj N	Edison
Alex	Abbott
Alex	Johnson and johnson
Raj N	Wells Fargo
Raj N	Andy Mark
Noopur	Kia
Pallavi	Ganahl
Noopur	Intel
Raj N	Irvine Company

Raj N	Allegan
Raj N	Verizon
Pallavi, Rudy	Apple
Rudy	Acics
Charlie G	Tesla
Charlie D, David C	Space X
Raj N	GE
Raj N	Bank of America
Raj N	Berkshire Hathaway

Sponsors of Other Teams in Southern California

Company	Application, Email, or Phone Number	Who is applying?	Status
Boeing	Application or Email	Ranjya Sasanur	Done
Raytheon	http://www.raytheon.com/responsibility/community/contributi	Yiming	Working
NASA	https://frc-grants.arc.nasa.gov/rcs/directions.php	Charlie Gooding	Deadline Expired
JPL	Application	Charlie Gooding	Dealine Expired
Gene Haas Foundation	Application	Chris	
Qualcomm	(858) 587-1121 (No email on LinkedIn)	Pallavi	Not offering directly
Solidworks	investors(at)3ds.com http://www.solidworks.com/sw/purchase/contactsales		Not offering Sponsorships for our category
Fastenal	(507) 454-5374bod@fastenal.com	Charlie Gooding	Waiting for email response
Google	N/A	Charlie Gooding	Waiting (10 days) for Soup Tech Qualification
Walt Disney Imagineering	N/A	Chris	
Cooler Master	886-2-2225-3517		No Formal Grant Application
Western Digital	408.717.6000	Aditya	
Lexus	1-800-255-3987Application: http://www.lexus.com/contact	Aditya	Check back in June 2017 for challenge / other grant opportunities
iBuyPower	Email		No formal grant application
Art & Image	Application	Noopur	
Whirlpool Corporation	Email, Phone, and Application		
Liberty Engineering Manufacturing Solutions	sales@libsteel.com	Yiming	email sent
Lions International	http://www.lcif.org/EN/apply-for-a-grant/index.php	Aditya	Aditya to apply for Core4 Grant
Kay Manufacturing	info@kaymfg.com		email sent
Vail Rubber Works	Application	Charlie Gooding	Only email available is a sales email???
Midwest Glass & Mirror	Email: greg@midwestglass.com	Yiming	email sent
Hanson Mold	Application (but there is an option to email them as well)	Yiming	email sent
Gaishin Manufacturing	Email: rudy@gaihsinmfg.com	Yiming	email sent
Vanian Manufacturing	Application and Email: Sales@vanianman.com	Yiming	email sent
Skype	this may help: https://sponsorpitch.com/sponsors		No Formal Grant Application
California Business Escrow	Both email and application	Pallavi	no grant application
Southland Fabrication	Email, application, and phone	Yiming	email sent
Smith Richards Inc.	Application	Yiming	email sent
The Brewer Family	https://communityfoundation.brewers.com/index.cfm?fuseaction=home.home	Pallavi	
Isthmus Engineering	Application	Yiming	✉️ ↗️ 📩 ↘️
Helical Robotics	Application but the CEO is found on LinkedIn	Yiming	email sent
CFP Studio Photography	Emails and LinkedIn	Yiming	email sent
Northrop Grumman	(310) 812-4321: Redondo Beach		

Sponsors of Other Teams in Southern California

Nordson	jim.jaye@nordson.com and 440-414-5639	Yiming	email sent
Meziere	800.208.1755		
H.G. Fenton Company	milton@hgfenton.com and 619-400-0120	Yiming	email sent
PGS Precision Graphic Systems	858-695-9500 and info@gopgs.com	Yiming	email sent
LNL Anodizing	(818) 768-9224		
Callaway Real Estate	818.390.7807	Yiming	email sent
Electromotive	703.331.0100	Yiming	email sent
Waag	(818) 989-5008	Yiming	email sent
7-Eleven	http://corp.7-eleven.com/corp/corporate-social-responsibility		
Sinanian	818-996-9666	Yiming	email sent
Bob Smith Toyota	(800) 262-7648	Pallavi	no formal grant application
Recurrent Energy	415-675-1500	Pallavi	no formal grant application
Amgen	https://www.amgen.com/responsibility/grants-and-giving/	Rithik	
Sessa Manufacturing	(805) 644 2284		
Rotary Club of Ventura	https://portal.clubrunner.ca/2868/SingleEmail/Send?Membe	Raj	Sent Email
IEEE Robotics and Automation Study	http://www.ieee-ras.org/conferences-workshops/resources-for-conference		Need to host a conference
StayLinked	Phone and Email		
Lasergraphics	Email, Phone, and Application	Yiming	email sent
Applied Medical	http://www.appliedmedical.com/Contacts/Grants/GrantRequ	Yiming	email sent
Statefarm	https://www.statefarm.com/about-us/community/education-p	Pallavi	the grant application is closed
Western Digital	https://www.wdc.com/about-wd/philanthropy/grants.html	Aditya	
UST Global	Application		
IPA Income Property Advisors	4565 Ruffner St. Suite 107		
Velox CNC	(714) 639-3639		
Secure Communication Systems	714-547-1174	Yiming	email sent
Innovocommerce	949-398-6550	Yiming	email sent
Laser Innovation	tel:(714) 630-3261		
Performance Water Jet	(909)947-8299;mark@performancewaterjet.com;charlie@performancewaterjet.com		
Pinnacle Technologies	(785) 832.8866 sales@pinnaclet.com	Yiming	email sent
Z Manufacturing	1-(800) 643-7265 stevez@zmanufacturinginc.com	Yiming	email sent
MiSUMi	(310) 532-3135	Yiming	email sent
Numatic Engineering	818-768-1200		
Navis Pack and Ship	(800) 344-3528	Yiming	email sent
VXB Ball Bearings	(714) 442-2740		
National Instruments	http://www.ni.com/company/shared-value/community/corporate-giving/		
Coast Aluminum and Architectural	(800) 610-6060		
SLAS	internal contact required		
OPUS Solutions	1-949-387-1010	Yiming	email sent
Dolphin Force Foundations			
Dobrusin	(248) 292-2920	Yiming	email sent
NDEP	(775) 687-4670		
Goodrich Aerostructure	714 573 8800		
Optimist Club of Coronado	Diana Drummetry : (619) 787-9592		
Rotary International	https://my.rotary.org/en/rotary-foundation		
FedEx	http://about.van.fedex.com/social-responsibility/charitable-contributions-guidelines/		

Sponsors of Other Teams in Southern California

SBC	http://www.sebts.edu/files/accounting-services/churchsponsorshipagreement.pdf		
Foreign Office of British Government			
Los Angeles Trade-Tech	(213) 763-7000		
Citi	http://www.citigroup.com/citi/foundation/about/grant-guidelines.htm		
Dremel	1 (800) 437-3635		
StarLink			
Southern California EDISON	http://www.edison.com/home/community/our-funding-priorities.html		
TagMime			
Leonesse CellarsGHI Industries	dflood@melroncorp.com		email sent
Sempra Energy	(619) 696-2000		
Freeberg Industrial Fabrication	(760)737-7614	Yiming	email sent
Society of Women Engineers			
Georgia Tech Research Institute		Yiming	email sent
FIRST California	http://www.cafirst.org/contact/		
HICA Ventures Internations	888-359-3472	Yiming	email sent
the MortgageMall	(951) 302-3995		
LittleField	(855) 469-7275	Yiming	email sent
Abbott Labs	(224) 667-6100		
BAE Systems	323 642 5000	Yiming	email sent
Viasat	760-476-2200		
National Defense Education Program			
Macy's	https://www.macysinc.com/community/		
GLIC Technical Arts Inc.	efung@lwhs.org	Yiming	email sent
Pendarvis Manufacturing	714-992-0950		
LEDCOR Group	858-527-6400	Yiming	email sent
Swing Innovations	johnnyjinkle.inc@gmail.com	Yiming	email sent
Merlin			
Meziere Enterprises	tel:8002081755		
The McSweeney Family	613-384-9986 sales@houseofnames.com		
Brecflex	(650) 390-6400	Yiming	email sent
CBS Scientific	858-755-4959	Yiming	email sent
Kidspark	(408) 213-0970		
NTMA San Diego	(800) 248-6862	Yiming	email sent
Nothing Bundt Cakes			
Signal Hill Petroleum	562-595-6440	Yiming	email sent
Frontier Technologies	310-767-1227		
MakerBot	347 676 3443		
Xerox	https://www.xerox.com/en-us/about/corporate-citizenship/fou	Yiming	Not accepting grant requests at the current time
Aerojet Rocketdyne	202-302-9941		
Fragier Aviation	818.898.1998	Yiming	
JRM Enterprises	(303) 789-0812		
McConnell Montalvo & Assoc.	(818) 223-8537		

Sponsors of Other Teams in Southern California

VICO Tool & Die	818-718-8426		
Jostens		952-830-3300	
ToyBuilder labs	626 808 4010		
West Lancaster Rotary	717.581.8811		
Wells Fargo	https://www.wellsfargo.com/about/corporate-responsibility/corporate-social-issues	Ravi	Applied
ITEA			
Meece Car Audio	(661) 948-2266		
AndyMark			
Health Workforce Initiative			
sublime wedingo			
NXP			
CAT	https://www.cybergrants.com/pls/cybergrants/ao_login.login	Yiming	need an invitation code
Samuel Lawrence foundation	info@samuellawrencefoundation.org	Yiming	email sent
Serrano Systems Inc.	info@serranosystems.com	Yiming	email sent
Leidos	N/A		
DreamWorks Animation SKG	idk		
Hamrock Inc.	(562) 944 0255info@hamrock.com	Yiming	email sent
Will-Mann	714-870-0350		
Serra Laser	714-680-6211	Yiming	email sent
Reliable Sheet Metal Works	714) 738-5891		
Hyundai	(800) 633-5151		
Applied Medical	949.713.8000	Yiming	email sent
Feruxe inc	(800) 633-5151	Yiming	email sent
Mosey's Production Machinists			
Hawaiian Air			
North County Glass			
Orvac Electronics			
Orange County Register		Yiming	email sent
Dodge Oil		Yiming	email sent
Roboterra			
College of the Canyons			
Choices in learning foundations		Yiming	email sent
Palmdale Aerospace Acandnmej			
National Defense School Thing			
powdercoat industries			
NTMA San Diego		Yiming	email sent
waterjet west			
3ds systems			
the rinks			
the coiacju-coal compan			
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Boston scientific neuromodulation			
st jude medical			
TE Connectivity			

Sponsors of Other Teams in Southern California

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Albertsons			
The Menard Family Foudations		Yiming	email sent
sprouts			
argosy foundating			
built it workspace		Yiming	email sent
laef		Yiming	email sent
Los Al TV			
Phillips Steels			
Digital Networks Group		Yiming	email sent
Alamitos Eyecare		Yiming	email sent
Ganahl Lumber	No application, (714) 772-5444	David Crampton	left a voice mail, call back Gunjun phone#
Orange County Breeze	562-493-1500, accounting@oc-breeze.com,	David Crampton	
Fine Technology	(760) 274-2370	David Crampton	
Ergon Asphalt & Emulsions	Facility Manager: Hubert Romero, (909)-829-0505	David Crampton	
BitFab Technologies	left a message on thier websight connect form	David Crampton	
rel consuslatnats	562-321-5192, devlinduarte@realconsultantsonline.com	Yiming, David Crampton	email sent
Haynie Designs	1-951-549-3611, craighayne@sbcglobal.net	Yiming, David Crampton	email sent
NOVO Engineerings	(760) 598-6686	Yiming, David Crampton	
Maker Place	619.225.7288, info@makerplace.com	Yiming, David Crampton	email sent
JMI Realty	(858) 350-4800	David Crampton	
ROBO 3D		David Crampton	
Anocote Powder	858 547-5970, AnocotePowder@yahoo.com	Yiming, David Crampton	email sent
CommerceWest		David Crampton	
SCS Energy		Yiming	email sent
DIX Metals			
Mechanix Wear		Yiming	email sent
Silver Seweing Mchines		Yiming	email sent
Enterprise Car Rentla			
germey jimes			
comcast nbcuniversal			
onesource distributers			
orbital atk		Yiming	email sent
pdg consulting			
superior health products			
sherwin williams			

Sponsors of Other Teams in Southern California

Tobolski Watkins Engineering		Yiming	email sent
ECS Waterjet Cutting			
SGV			
Los Angeles County Regional Occupation Program			
Arcadia Unified School District			
Schmitt Contraction			
St. Joseph Public Schools			
Eagle Technologies Group			
TPC			
Junior Automation Technologies			email sent
PhycoTech			
BOSCH			
United States Department of Defense			
Skype			
North County Trade Tech High School			
IBM			
Maintenence Maid Service			
Windward School			
Pettys			
B & B Hardware			
Primo's Donuts			
Bowlero Mar Vista			
National University Academy			
Glendale Community College			
Autodesk			
Disneyland			
The Fosters			
Culver City Industrial Hardware			
M&K Metal Co.			
Culver City Centaurs			
Impresa Aerospace			
Employees Community Fund of the Boeing Company			
Springs Charter Schools			
Booz Allen Hamilton			
D & K			
Nordson/ASYMTEK			
PowerPlus			
SignalHillPetroleum			
Chaminade College Preparatory			

Sponsors of Other Teams in Southern California

NASA Dryden Flight Research Center			
Antelope Valley Fair Association			
IFM Electronic			
A.C. Warnack			
Kearny Alumni Association			
option uno			
Mathnasium			
Futuristics Machine			
Naval Surface Warfare Center			
Spectrum CNC Technologies			
IPI Solutions			
Build It Workspace			
Run Sea Beach			
tianjin			
University of Aeronautics and Astronautics			
Barbara Bry			
Beckman Coulter and Mark Keppel High School			
Ekocycle			
The Beverly Hills Education Foundation			
Burger Lounge			email sent
Jersey Mikes		David Campton	
Studio City Vac & Stew		David Campton	
Muslim American Society		David Campton	
School of Engineering and Computing			
Swardstrom Group	949-573-0260 or 949-302-4883		
Metropolitan Water District	kashford@mwdh2o.com(Ken Ashford)		email sent

Attached is BOM for the WCP 2016 MCC Robot. This is as complete as we can get it
Attached is also a table of improvements and notes. WARNING: The Drivetrain and Intake are very easy to do. The hanger is about 1 week + worth of work

THIS WILL BE UPDATED AS MUCH AS POSSIBLE, WE HIGHLY SUGGEST TEAMS

Drivetrain				
1	Teams should use 3/16 rivets or use bolts to assemble the drivetrain to the frame.			
2	We were able to snap the .25" Bellypan, we suggest teams move to a different material.			
3	Teams should only buy the PTO options if they want to use the drivetrain.			
4	Teams should use a deeper skid angle in order to go over obstacles easily.			
5	Teams will need to be creative and use more brackets to support the frame.			
6	We used #25 chain on our pto, we recommend teams going to #35 chain.			
7	We would recommend adding a tensioner for the #35 chain to ensure it stays tight.			
Intake				
1	We would recommend teams use a little more compression, as the base is very loose.			
2	Teams will need to order a pneumatic cylinder from mcmaster or another source.			
3	Instead of Versawheels teams should use 3.25 Omni Wheels for less weight.			
4	Instead of tapping the holes, teams should use collars to hold the shaft.			
5	Use more bolts or 3/16 Rivets to hold everything together. Repeatedly.			
6	Teams need to beef up the 2x1 joint at the pivot.			
Hanger				
1	WARNING: The Hanger is a serious commitment and work, we think it's worth it.			
2	While we had success with strap, we think teams should try out rope to see what works best.			
3	If teams want to use straps, please use two at the minimum. This will increase reliability.			
4	Teams need to figure out a better way to take care of excess slack from the hanger.			
5	Need a more reliable way to hold the hooks onto the arms. Painters tape is not reliable.			
6	We recommend creating a way to power the arms out and in, either via a motor or a pulley system.			
7	We recommend putting two versaplanetaries to rotate the arms so the robot can swing.			
8	Flange on drums need to be way larger than the current ones.			
9	Solid mounting for the idler drum.			
10	Teams will need to figure out a way to keep the robot hung, either via a motor or a pulley system.			

QTY	Part #	Description	Vendor	Price	Total ->	\$475.36	Received? y/n
2	217-2642	#25 Sprocket w/ Hub - 16T - 1/2" Hex ID	WCP	\$6.99	\$13.98		y
6	217-2737	Clamping Shaft Collar - 1/2" Hex ID	WCP	\$2.99	\$17.94		y
2	217-2762	Tube Axle Stock (3 feet)	WCP	\$11.99	\$23.98		y
2	217-3202	VersaWheel (3.25" Diamond Tread)	WCP	\$5.99	\$11.98		y
2	217-3259	Delrin Washer (1/4") - 1/2" Hex ID - 10 pk	WCP	\$4.99	\$9.98		y
2	217-3432	VersaBlock Kit	WCP	\$24.99	\$49.98		y
2	217-3453	VersaFrame 1" x 2" x 0.10" Pre-Drilled Tube Stock (59" length)	WCP	\$24.99	\$49.98		y
2	217-3548	VersaFrame 90 Degree Gusset (2-pack)	WCP	\$4.99	\$9.98		
12	217-3556	VersaFrame 135 Degree Gusset (2-pack)	WCP	\$4.99	\$59.88		y
1	217-3563	Base VersaPlanetary with 1/2" Hex Output	WCP	\$39.99	\$39.99		y
1	217-2819	VersaPlanetary 5:1 Gear Kit	WCP	\$14.99	\$14.99		y
1	217-2816	VersaPlanetary Ring Gear Add-on Kit		\$9.99	\$9.99		y
6	217-2731	Flanged Bearing - 1/2" Round ID x 1.125" OD	WCP	\$2.99	\$17.94		y
1	217-3875	Flanged Bearing - 1/2" Hex ID x 1.125" OD V2	WCP	\$4.99	\$4.99		y
4	217-4006	Flanged Bearing - 13.75mm (1/2" ThunderHex) x 1.125in x 0.313in	WCP	\$3.99	\$15.96		y
1	217-4017	1/2" ThunderHex Stock (3 feet)	WCP	\$13.99	\$13.99		y
7	217-4045	Colson Performa (1.625" x 0.875", 1/2" Hex bore)	WCP	\$4.99	\$34.93		n
2	217-4155	Plastic Clamping Bearing Block	WCP	\$7.99	\$15.98		y
5	217-4183	VersaFrame Face Bearing Mount (2-pack)	WCP	\$4.99	\$24.95		y
2	217-4238	VersaFrame Corner Gusset	WCP	\$7.99	\$15.98		
1	217-4347	775pro	WCP	\$17.99	\$17.99		y

QTY	Part #	Alt. Source	Alt. Part #	Availability	Description	Vendor	Price	Total	Received?	
2	217-3453			None	VersaFrame 1" x 2" x 0.10" Al Tube Stock, Pre-Drilled (2 faces)	WCP	\$24.99	\$49.98	n	
2	N/A	RMB			MCC - Steel Skid	HomeDepot	\$10.00	\$20.00		
1	N/A			None	MCC - Bellypan (Wood @ 1/4")	HomeDepot	\$15.00	\$15.00		
3	217-4104			None	VersaFrame 1" x 1" x 0.100" Pre-Drilled Tube Stock (59" length)	WCP	\$19.99	\$59.97		
2	217-3433			None	WCP DS - WCD 3 CIM Dual Speed Base Kit	WCP	\$248.99	\$497.98	y	WCP 2 Speed - C
2	217-3419	MySolidWorks			50T Dog Gear	WCP	\$24.99	\$49.98	y	WCP 2 Speed - C
2	217-2703				24T Gear with 3/8" Hex Bore	WCP	\$6.99	\$13.98	y	WCP 2 Speed - C
2	217-2710				44T - 1/2" Hex Gear	WCP	\$11.99	\$23.98	y	WCP 2 Speed - C
2	WCP-0063	McMaster-Carr	5553A41	Yes	3/8" to 1/2" Hex Adapter	WCP	\$5.99	\$11.98		WCP 2 Speed - C
2	217-3636				WCP DS - PTO Add-On Kit	WCP	\$74.99	\$149.98	n	WCP 2 Speed - C
2	217-2778				Pancake Pneumatic Cylinder 3/4" Bore 1/2" Travel	WCP	\$39.99	\$79.98	n	WCP 2 Speed - C
2	217-2907				VEXpro Pneumatic Fitting Kit	WCP	\$9.99	\$19.98	y	WCP 2 Speed - C
2	217-2688				#35 Plate Sprocket - 22T	WCP	\$7.99	\$15.98	y	WCP 2 Speed - C
4	217-3107				11T Gear w/ 12T Center Distance (Steel) with Mounting Hardware	WCP	\$7.99	\$31.96	n	WCP 2 Speed - C
9	217-3432				VersaBlock Kit	WCP	\$24.99	\$224.91	y	
18	217-3875				Flanged Bearing - 1/2" Hex ID x 1.125" OD V2	WCP	\$4.99	\$89.82	y	
16	217-3488				#25 Sprocket w/ Hub - 18T - 1/2" Hex ID	WCP	\$6.99	\$111.84	y	
8	WCP-0047				WCP Diamond: Pneumatic Tire	WCP	\$14.99	\$119.92	y	
8	WCP-0049				WCP Diamond: Pneumatic Rim	WCP	\$29.99	\$239.92		
2	217-4048				Colson Performa (3.5" x 1.25", 1/2" Hex bore)	WCP	\$9.99	\$19.98	n	
1	217-3257				Delrin Washer (1/16") - 1/2" Hex ID - 10 pk	WCP	\$4.99	\$4.99		
8	217-3431				CAM	WCP	\$4.99	\$39.92	n	
6	217-3547				T Gusset	WCP	\$4.99	\$29.94	y	
6	217-3548				90 Degree Gusset	WCP	\$4.99	\$29.94	y	
8	217-3437				VersaChassis Hex shaft	WCP	\$9.99	\$79.92	y	

QTY	Part #	Description	Vendor	Price	Total	\$366.67	Received?
2	217-2592	1/2" Hex VersaHub	WCP	\$7.99	\$15.98		c
2	217-2688	#35 Plate Sprocket - 22T	WCP	\$7.99	\$15.98		c
3	217-2690	32T Plate Sprocket	WCP	\$7.99	\$23.97		c
2	217-2820	VersaPlanetary 10:1 Gear Kit	WCP	14.99	\$29.98		c
2	217-2816	VersaPlanetary Ring Gear Add-on Kit	WCP	\$9.99	\$19.98		c
3	217-3234	VersaHub (1.125" Bearing Pilot 1/4" Thick)	WCP	\$2.99	\$8.97		c
2	217-3432	VersaBlock Kit	WCP	24.99	\$49.98		c
2	217-3453	VersaFrame 1" x 2" x 0.10" Al Tube Stock, Pre-Drilled (2 WCP		\$24.99	\$49.98		c
1	217-3563	Base VersaPlanetary with 1/2" Hex Output	WCP	39.99	\$39.99		Replaced with ne
4	217-4006	Flanged Bearing - 13.75mm (1/2" ThunderHex) x 1.125ii WCP		3.99	\$15.96		c
4	217-4009	VersaHub (1/2" Hex, Plastic)	WCP	\$2.99	\$11.96		c
1	217-4017	1/2" ThunderHex Stock (3 feet)	WCP	\$13.99	\$13.99		c
2	217-4104	VersaFrame 1" x 1" x 0.100" Pre-Drilled Tube Stock (59' WCP		\$19.99	\$39.98		c
2	217-4183	VersaFrame Face Bearing Mount (2-pack)	WCP	\$4.99	\$9.98		c
1	217-4239	VersaFrame VersaPlanetary Side Mount	WCP	\$9.99	\$9.99		c
1	N/A	Hanger Straps (1" Wide)	HomeDepot	\$10.00	\$10.00		
34							

QTY	Part #	Description	Vendor	Price	Total ->	Comment	Type
1	am-3000	Roborio	AndyMark	\$435.00	\$435.00 y	http://www.andymark.com/NI-roboRIO-p/am-3000.htm	Electr.
6	217-8080	Talon SRX	WCP	\$89.99	\$539.94 y	http://www.wcproducts.net/217-8080	Electr.
1	217-4244	PDP	VEX	\$204.99	\$204.99 y	http://www.vexrobotics.com/vexpro/motors-electronics/217-4244.html	Electr.
1	217-4245	VRM	VEX	\$44.99	\$44.99 y	http://www.vexrobotics.com/vexpro/motors-electronics/217-4245.html	Electr.
1	217-4243	PCM	VEX	\$88.99	\$88.99 y	http://www.vexrobotics.com/vexpro/motors-electronics/217-4243.html	Pneum
1	am-2005	Compressor	AndyMark	\$69.00	\$69.00 y	http://www.andymark.com/product-p/am-2005.htm	Pneum
4	am-2649	Air Tanks	AndyMark	\$14.00	\$56.00 y	http://www.andymark.com/product-p/am-2649.htm	Pneum
4	217-3233	SY3140-6LZ	WCP	\$49.99	\$199.96 y	http://www.wcproducts.net/pneumatics	Pneum
1	217-2952	SS5Y3-41-04-N7	WCP	\$44.99	\$44.99 y	http://www.wcproducts.net/pneumatics	Pneum
10	WCP-0029	1/4" Union Tee	WCP	\$1.99	\$19.90 y	http://www.wcproducts.net/pneumatics	Pneum
1	am-2137	Tubing	AndyMark	\$18.00	\$18.00 y	http://www.andymark.com/product-p/am-2137.htm	Pneum

Part #	Description	Vendor	Price	Total ->	\$475.39 Comment
2	#2 Sprocket w/ Hub - 18T - 1/2" Hex ID	WCP	\$8.99	\$17.98	
6	217-2782 Clamping Bearing Block - 1/2" Hex ID	WCP	\$24.99	\$149.94	
2	217-2782 Tube Axle Stock (3 feet)	WCP	\$11.99	\$23.98	
2	217-3020 OTY	WCP	\$9.99	\$11.98	
2	217-3020 Delti Walker (1/4") - 1/2" Hex ID - 10 pk	WCP	\$4.99	\$9.98	
2	217-3020 VersaBuildon Kit	WCP	\$24.99	\$49.98	
2	217-3433 VersaFrame 1" x 2" x 0.10" Pre-Drilled Tube Stock (59" length)	WCP	\$24.99	\$49.98	
2	217-3458 VersaFrame 90 Degree Gusset (2-pack)	WCP	\$4.99	\$9.98	
12	217-3558 VersaFrame 135 Degree Gusset (2-pack)	WCP	\$4.99	\$59.88	
1	217-3682 Ball Joint - 1/2" Hex Input	WCP	\$39.99	\$39.99	
1	217-2819 VersaPlanetary 5:1 Gear Kit	WCP	\$14.99	\$14.99	
1	217-2816 VersaPlanetary Ring Gear Add-on Kit	WCP	\$9.99	\$9.99	
6	217-2731 Flanged Bearing - 1/2" Round ID x 1.125" OD	WCP	\$2.99	\$17.94	
1	217-3678 Flanged Bearing - 1/2" Round ID x 1.125" OD V2	WCP	\$1.99	\$1.99	
1	217-3679 Flanged Bearing - 1/2" Round ID x 1.125" OD V2	WCP	\$3.99	\$3.99	
1	217-4017 1/2" Thunderbox Stock (3 feet)	WCP	\$13.99	\$13.99	
1	217-4017 1/2" Thunderbox Stock (3 feet) - 1/2" Hex Stock	WCP	\$13.99	\$13.99	
2	217-4166 Plastic Clamping Bearing Block	WCP	\$7.99	\$15.98	
5	217-4183 VersaFrame Face Bearing Mount (2-pack)	WCP	\$4.99	\$24.95	
2	217-4238 VersaFrame Corner Gusset	WCP	\$7.99	\$15.98	
1	217-4347 775Pro	WCP	\$17.99	\$17.99	

Qty	Part #	Description	Vendor	Price	Total	\$1,963.89 Comment
2	NIA	MCC - Steel Skid	HomeDepot	\$10.00	\$20.00	
1	NIA	MCC - Bellypan (Wood @ 14")	HomeDepot	\$15.00	\$15.00	
3	217-4154	VersaPan 1" x 1" x 10' Pre-Drilled Tube Stock (50' length)	WCP	\$19.99	\$59.97	
1	217-3423	50ft 1" x 1" x 10' Pre-Drilled Tube Stock Kit	WCP	\$19.99	\$19.99	WCP 2 Speed Can be substituted for WCP Single Speed to save money "Only needed for PTO Heng"
2	217-3419	50ft Dog Gear	WCP	\$24.99	\$49.98	WCP 2 Speed
2	217-2793	24T Gear with 5/8" Hex Bore	WCP	\$4.99	\$9.98	WCP 2 Speed
2	217-4155	44T 1" x 1" x 10' Pre-Drilled	WCP	\$19.99	\$39.98	WCP 2 Speed
1	217-4068	WCP DB - PTO Add-A-Gear	WCP	\$19.99	\$19.99	Can be substituted for WCP Single Speed to save money "Only needed for PTO Heng"
2	217-3638	WCP DB - PTO Add-A-Gear	WCP	\$74.99	\$149.98	WCP 2 Speed
1	217-2007	VEXPRO Pneumatic Fitting Kit	WCP	\$13.99	\$13.99	Can be substituted for WCP Single Speed to save money "Only needed for PTO Heng"
2	217-2088	#30 Plate Sprocket - 22T	WCP	\$7.99	\$15.98	WCP 2 Speed Can be substituted for WCP Single Speed to save money "Only needed for PTO Heng"
2	217-2089	#30 Plate Sprocket - 22T	WCP	\$7.99	\$15.98	WCP 2 Speed Can be substituted for WCP Single Speed to save money "Only needed for PTO Heng"
9	217-3432	Versablock Kit	WCP	\$24.99	\$224.91	
10	217-3639	Hinged Bedplate - 1/2" Hex ID x 1 1/2" OD x 12"	WCP	\$4.99	\$49.94	
16	217-3488	K25 Sprocket w/ Hub - 18T 1/2" Hex ID	WCP	\$6.99	\$111.84	
5	WCP-0049	WCP Dimpled Precision Rim	WCP	\$14.99	\$74.95	
8	WCP-0046	WCP Dimpled Precision Rim	WCP	\$29.99	\$239.92	
2	217-3267	Outer Pinion (13T x 1/2" x 1/2" Face Stock)	WCP	\$19.99	\$39.98	
1	217-3267	Inner Pinion (13T x 1/2" x 1/2" Face Stock)	WCP	\$4.99	\$4.99	
8	217-3431	CAM	WCP	\$4.99	\$39.92	
6	217-3547	T Case	WCP	\$4.99	\$29.94	
5	217-3548	30 Degree Gears	WCP	\$4.99	\$24.95	
1	217-3549	30 Degree Gears	WCP	\$4.99	\$4.99	

QTY	Part #	Description	Vendor	Price	Total	\$366.67	Comment
2	217-2592	1/2" Hex VersaHub	WCP	\$7.99	\$15.98		
2	217-2688	#35 Plate Sprocket - 22T	WCP	\$7.99	\$15.98		
3	217-2690	32T Plate Sprocket	WCP	\$7.99	\$23.97		
2	217-2820	VersaPlanetary 10:1 Gear Kit	WCP	14.99	\$29.98		
2	217-2816	VersaPlanetary Ring Gear Add-on Kit	WCP	\$9.99	\$19.98		
3	217-3234	VersaHub (1.125" Bearing Pilot 1/4" Thick)	WCP	\$2.99	\$8.97		
2	217-3432	VersaBlock Kit	WCP	24.99	\$49.98		
2	217-3453	VersaFrame 1" x 2" x 0.10" Al Tube Stock, Pre-Drilled (2 faces)	WCP	\$24.99	\$49.98		
1	217-3563	Base VersaPlanetary with 1/2" Hex Output	WCP	39.99	\$39.99		
4	217-4006	Flanged Bearing - 13.75mm (1/2" ThunderHex) x 1.125in x 0.313in	WCP	3.99	\$15.96		
4	217-4009	VersaHub (1/2" Hex, Plastic)	WCP	\$2.99	\$11.96		
1	217-4017	1/2" ThunderHex Stock (3 feet)	WCP	\$13.99	\$13.99		
2	217-4104	VersaFrame 1" x 1" x 0.100" Pre-Drilled Tube Stock (59" length)	WCP	\$19.99	\$39.98		
2	217-4183	VersaFrame Face Bearing Mount (2-pack)	WCP	\$4.99	\$9.98		
1	217-4239	VersaFrame VersaPlanetary Side Mount	WCP	\$9.99	\$9.99		
1	N/A	Hanger Straps (1" Wide)	HomeDepot	\$10.00	\$10.00		

QTY	Part #	Description	Vendor	Price	Total ->	\$1,721.76	Comment
1	am-3000	Roborio	AndyMark	\$435.00	\$435.00		http://www.andyn
6	217-8080	Talon SRX	WCP	\$89.99	\$539.94		http://www.wcpro
1	217-4244	PDP	VEX	\$204.99	\$204.99		http://www.vexrol
1	217-4245	VRM	VEX	\$44.99	\$44.99		http://www.vexrol
1	217-4243	PCM	VEX	\$88.99	\$88.99		http://www.vexrol
1	am-2005	Compressor	AndyMark	\$69.00	\$69.00		http://www.andyn
4	am-2649	Air Tanks	AndyMark	\$14.00	\$56.00		http://www.andyn
4	217-3233	SY3140-6LZ	WCP	\$49.99	\$199.96		http://www.wcpro
1	217-2952	SS5Y3-41-04-N7T	WCP	\$44.99	\$44.99		http://www.wcpro
10	WCP-0029	1/4" Union Tee	WCP	\$1.99	\$19.90		http://www.wcpro
1	am-2137	Tubing	AndyMark	\$18.00	\$18.00		http://www.andyn

PO BOX 54905
IRVINE, CA 92603-4226 US

User maharaja.kolli@gmail.com
Ship Date

Description

Description	Qty
CIM Motor	4 ✓
Ship Separately: 0	
#25 Sprocket w/ Hub - 16T - 1/2" Hex ID	2 ✓
Ship Separately: 0	
#35 Plate Sprocket - 22T	2 ✓
Ship Separately: 0	
24T Gear with 3/8" Hex Bore	10
Ship Separately: 0	
44T Gear with 1/2" Hex Bore	10
Ship Separately: 0	
Flanged Bearing - 1/2" Round ID x 1.125" OD	6 ✓
Ship Separately: 0	
Clamping Shaft Collar - 1/2" Hex ID	6 ✓
Ship Separately: 0	
Tube Axle Stock (3 feet)	2 ✓
Ship Separately: 0	
Pancake Pneumatic Cylinder 3/4" Bore 1/2" Travel	10
Ship Separately: 0	
VersaPlanetary Ring Gear Add-on Kit	1 ✓
Ship Separately: 0	
VersaPlanetary 5:1 Gear Kit	1 ✓
Ship Separately: 0	
VEXpro Pneumatic Fitting Kit	2 ✓
Ship Separately: 0	
SMC SS5Y3-41-04-N7T 4 Station Base Mount	1 ✓
Ship Separately: 0	
11T Gear w/ 12T Center Distance (Steel) with Mounting Hardware	4 ✓
Ship Separately: 4	
VersaWheel (3.25" Diamond Tread)	2 ✓
Ship Separately: 0	
SMC SY3140-6LZ Single Solenoid Valve (use with Base Mount)	4 ✓
Ship Separately: 0	
Delrin Washer (1/16") - 1/2" Hex ID - 10 pk	1 ✓
Ship Separately: 0	
Delrin Washer (1/4") - 1/2" Hex ID - 10 pk	2 ✓
Ship Separately: 0	
50T Dog Gear	1 ✓
Ship Separately: 1	
WCP Cam	10
Ship Separately: 8	
VersaBlock Kit	11 ✓
Ship Separately: 0	
WCP DS - WCD 3 CIM Dual Speed Base Kit	2 ✓

217-3437	Ship Separately: 0	
	VersaChassis Hex Shaft	
217-3453	Ship Separately: 1" x 2" x 0.10" Pre-Drilled Tube Stock (59" length)	
217-3488	Ship Separately: 0	
217-3647	#25 Sprocket w/o Hub (2-pack)	
217-3654	VersaFrame 1" Gusset (2-pack)	
217-3656	Ship Separately: 0	
217-3663	VersaFrame 90 Degree Gusset (2-Pack)	
	VersaFrame 135 Degree Gusset (2-Pack)	
	Base VersaPlanetary with 1/2" Hex Output	
	Ship Separately: 0	
217-3636	WCP DS - PRO Add-On Kit	
	Ship Separately: 0	
217-3875	Flanged Bearing: 1/2" Hex ID x 1.125" OD /2	
217-4006	Flanged Bearing: 1/2" ThunderHex (1/2" ThunderHex) x 1.125in x 0.31in	
217-4017	1/2" ThunderHex Stock (3 feet)	
217-4045	Colson Performa 1.0225" x 0.875", 1/2" Hex bore	
217-4048	Ship Separately: Colson Performa (3.5" x 1.25", 1/2" Hex bore)	
217-4104	VersaFrame 1" x 1" x 0.100" Pre-Drilled Tube Stock (59" length)	
217-4135	Plastic Clamping Bearing Block	
217-4183	Ship Separately: 0	
217-4238	VersaFrame Face Bearing Mount (2-pack)	
	Ship Separately: 0	
217-4347	VersaFrame Corner Gusset	
	Ship Separately: 0	
217-8080	775pro	
	Ship Separately: 0	
	Talon SRX	
	Ship Separately: 0	
	Ballast Ballast Order	
	Ship Separately: 0	
WCP-0029	1/4" Union Tee Fitting (Black)	
WCP-0046	6" Pneumatic Wheel Tire: zigzag	
WCP-0050	6" Pneumatic ZigZag Tread Wheel Hub (Aluminum - 1/2" Hex)	
WCP-0063	3/8" Hex to 1/2" Hex Adapter	
	Ship Separately:	

The remaining items will ship once stock arrives. A order has been placed w/ our supplier. - HC

Thanks for your Order - WCP



QTY	Part #	Description	Vendor Link	Price for CVendor - backuplink	Voucher	HighDemand	Easy to Lose (buyUsed in Miss)	Comment			
3	217-2642	#25 Sprocket w/ Hub - 16T - 1/2" Hex	WCP	\$6.99							
10	217-2737	Clamping Shaft Collar - 1/2" Hex ID	WCP	\$2.99							
3	217-2762	Tube Axle Stock (3 feet)	WCP	\$11.99				I doubled the amount of tube axle stocks just to be careful (Don't think we need that much)			
2	217-3202	VersaWheel (3.25" Diamond Tread)	WCP	\$5.99				Changed number of wheels from 2 to 3 just in case (these are intake wheels)			
3	217-3259	Delrin Washer (1/4") - 1/2" Hex ID - 10 p	WCP	\$4.99							
14	217-3432	VersaBlock Kit	WCP	\$24.99							
11	217-3548	VersaFrame 90 Degree Gusset (2-pack)	WCP	\$4.99							
5	217-3556	VersaFrame 135 Degree Gusset (2-pack)	WCP	\$4.99							
2	217-3563	Base VersaPlanetary with 1/2" Hex Outp	WCP	\$39.99							
1	217-2819	VersaPlanetary 5:1 Gear Kit	WCP	\$14.99							
1	217-2816	VersaPlanetary Ring Gear Add-on Kit	WCP	\$9.99							
5	217-2731	Flanged Bearing - 1/2" Round ID x 1.125 WCP		\$2.99							
20	217-3875	Flanged Bearing - 1/2" Hex ID x 1.125" CWCP		\$4.99				BOM states 1 hex bearing, we should order extra just in case			
5	217-4006	Flanged Bearing - 13.75mm (1/2" Thund	WCP	\$3.99							
2	217-4017	1/2" ThunderHex Stock (3 feet)	WCP	\$13.99				I tripled the number of stocks because we ran slightly short			
7	217-4045	Colson Performa (1.625" x 0.875", 1/2" HWCP		\$4.99				Small wheels on the intake			
3	217-4155	Plastic Clamping Bearing Block	WCP	\$7.99							
9	217-4183	VersaFrame Face Bearing Mount (2-pac	WCP	\$4.99							
4	217-4238	VersaFrame Corner Gusset	WCP	\$7.99							
2	217-4347	775pm	WCP	\$17.99				Motors for the wheels on the intake			
10	217-3453	VersaFrame 1" x 2" x 0.10" Al Tube	WCP	\$24.99							
2	N/A	MCC - Steel Skid	HomeDepot	\$10.00							
2	N/A	MCC - Bellypan (Wood (1/4")	HomeDepot	\$15.00							
12	217-4104	VersaFrame 1" x 1" x 0.10" Pre-Drilled	WCP	\$19.99							
2	217-3433	WCPS DS - WCD 3 CIM Dual Speed Base	WCP	\$248.99							
2	217-3419	50T Dog Gear	WCP	\$24.99							
2	217-2703	24T Gear with 3/8" Hex Bore	WCP	\$6.99							
2	217-2710	44T - 1/2" Hex Gear	WCP	\$11.99							
2	WCP-0065/3/8" to 1/2" Hex Adapter		WCP	\$5.99							
2	217-3639	WCPS DS - PTO Add-On Kit	WCP	\$74.99							
2	217-2778	Pancake Pneumatic Cylinder 3/4" Bore 1 WCP		\$39.99							
2	217-2907	VEXpro Pneumatic Fitting Kit	WCP	\$9.99							
2	217-2688	#35 Plate Sprocket - 22T	WCP	\$7.99							
4	217-3107	11T Gear w/ 12T Center Distance (Steel)	WCP	\$7.99							
40	217-3875	Flanged Bearing - 1/2" Hex ID x 1.125" CWCP		\$4.99							
16	217-3488	#25 Sprocket w/ Hub - 18T - 1/2" Hex ID	WCP	\$6.99							
8	WCP-0047	WCPS Diamond: Pneumatic Tire	WCP	\$14.99							
8	WCP-0045	WCPS Diamond: Pneumatic Rim	WCP	\$29.99							
1	217-3257	Delrin Washer (1/16") - 1/2" Hex ID - 10 p	WCP	\$4.99							
10	217-3431	CAM	WCP	\$4.99							
7	217-3547	T Gusset	WCP	\$4.99							
9	217-3437	VersaChassis Hex shaft	WCP	\$9.99							
2	217-2592	1/2" Hex VersaHub	WCP	\$7.99				HUNGR			
2	217-2688	#35 Plate Sprocket - 22T	WCP	\$7.99							
3	217-2690	32T Plate Sprocket	WCP	\$7.99							
2	217-2820	VersaPlanetary 10:1 Gear Kit	WCP	14.99							
2	217-2816	VersaPlanetary Ring Gear Add-on Kit	WCP	\$9.99							
3	217-3234	VersaHub (1.125" Bearing Pilot 1/4" Thick)	WCP	\$2.99							
2	217-3453	VersaFrame 1" x 2" x 0.10" Al Tube Stoc	WCP	\$24.99							
4	217-4006	Flanged Bearing - 13.75mm (1/2" Thunder)	WCP	3.99							
easo217-4009	VersaHub (1/2" Hex, Plastic)		WCP	\$2.99							
4	217-4183	VersaFrame Face Bearing Mount (2-pac	WCP	\$4.99							
2	217-4239	VersaFrame VersaPlanetary Side Mount	WCP	\$9.99							
1	N/A	Hanger Straps (1" Wide)	HomeDepot	\$10.00							
1 am-3000	Roborio	AndyMark	\$435.00								ELECTRO
6	217-8089	Talon SRX	WCP	\$89.99							
1	217-4244	PDP	VEX	\$204.99							
1	217-4245	VRM	VEX	\$44.99							
1	217-4243	PCM	VEX	\$88.99							
1	am-2005	Compressor	AndyMark	\$69.00							
4	am-2644	Air Tanks	AndyMark	\$14.00							
4	217-3233	SY3140-6LZ	WCP	\$49.99							
1	217-2952	SS5Y3-41-04-N7T	WCP	\$44.99							
10	WCP-0025	1/4" Union Tee	WCP	\$1.99							
2	am-2137	Tubing	AndyMark	\$18.00							
We will not need to purchase more if we plan to reuse the ones of MCC robot.											
Note on VersaFrame: We probably will only need the amount of VersaFrame pieces that were listed on the original BOM. However, I still increased the amount of them on this, just to be safe.											
Following list details the Free Vouchers included in Virtual KoP - Value of Item replaces "Price for One" - Shipping Not Included - Expires 4/30/17											
Useful Parts from Manufacturer											
1	Armabot Voucher	Armabot	\$25	Armabot RS7 motor encoders							
1	Automation Direct Voucher	Automation C	\$35	Pneumatics, Electronics, Safety Devices							
1	BishopViscarver Voucher	BishopViscarver	4	Free MadeWell Wheels for Linear Guides							
1	Inventables Voucher	Inventables	\$40	Machining: Plastic, Metal, Wood, Bits, etc							
1	Next Gen Robots Voucher	Next Gen Ro	\$40	1 CIM Cooler Heat Sinks							
1	TE Connectivity Voucher	TE Connectiv	\$25	Heat Shrink Tubing, Crimping Tools, etc.							
1	Autodesk			CAD Software on browser							
1	Onshape										
1	PTC										
1	Solidworks										
Build-A-Button Design Software	Build-A-Button	3 Month Membership	- Useful for Connect								
FRCsim	OSRF	Robot Simulation Software									
Github Organizational Account: Software	Github	unlimited members and repositories									
Mastercam CAD/CAM	Mastercam	Software to Program CNC Machines									
National Instruments' Multisim, Ultiboard NI		Electrical Systems Modelling Software									
RoboRealm Computer Vision and Analys	RoboRealm	For Vision Processing during Competition									
SolidProfessor CAD Library + Online Tr	SolidProfessor	Library of training and resources for CAD									
Tableau's Desktop Professional - Data Vi	Tableau	Helpful for Match Performance/Scouting									
1 Border CleBarn Red Burlap	Michaels	\$4.54	http://www.michaels.com/barn-red-burlap/MD005018S.html?dwvar_MD005018S_color=Red#pr	Bumper							
1 Border CleBlue Burlap	Michaels	\$4.54	http://www.michaels.com/blue-burlap/MD004855S.html?dwvar_MD004855S_color=Blue#pr	Bumper							
VELCRO Brand	Home Depot	\$17.97	http://www.homedepot.com/p/VELCRO-Brand-15-ft-x-3-4-in-Sticky-Back-Tape-90277B/2022619	Bumper							
								Can get smaller amount if you would like to			

CHARGING CHAMPIONS FIRST CHOICE

QTY	Part #	Description	Vendor
2	fc17-023	AM/TI Sensor6PAK	AM/TI
1	fc17-016	AM Battery Tray Kit for AM14U3 Battery Tray Assembly	AM
2	fc17-006	Accelerometer and Gyro Sensor Board	Analog Devices
1	fc17-131	Launchpad Evaluation Kit	TI
2	fc17-048	Microsoft Lifecam HD3000 Camera	GovConnection
2	fc17-129	Green Ring Light	SuperBrightLED
1	fc17-053	RCD HS-322HD Servo	Hitec
1	fc17-072	Victor 888	Innovation First
1	fc17-036	Camera Bracket Kit	ebm papst
1	fc17-050	XBOX 360 Controller, Wired	GovConnection
2	fc17-007	ADIS16448 IMU MXP Breakout Board	Analog Devices
2	fc17-033	AMT103-V Encoder Kit	CUI Inc.
2	fc17-143	Photoelectric Sensor (42JT-F5LET1-A2)	Rockwell
2	fc17-141	Ultrasonic Proximity Sensor and Cable	Rockwell

Part	Alternate Source Researched?	Vendor Name	Link	Cost per Item		Cost Total	Reason for purchase	Requested by	Procurement Status	Comments	Legal in FRC? (Y/N)
				Quantity	Cost						
VersaPlanetary Gearbox: Select a Base VersaPlanetary v2 1:1 with 1/2" Hex Output (217-4973), 100:1 Gear Kit (Will have a VersaPlanetary Ring Gear Add-on Kit and VersaPlanetary 10:1 Gear Kit selected, VersaPlanetary CIM Motor Adaptor (217-4018)	no	vexpro	http://www.vexrobotics.com/versaplanetary.html	\$69.96	1	\$69.96	to translate motor rotation into a shaft to which a sprocket can be attached	Albert Lin	Received		
Aluminum Hex Shaft Stock, 1/2" width, 7075, 3' (am-2291)	no	AndyMark	http://www.andymark.com/product/am-2291.htm	\$12.00	2	\$24.00	for hanging mission rotating axle	Albert Lin	Received		
#25 Sprocket w/ Hub - 22T - 1/2" Hex ID (217-2640)	no	vexpro	http://www.vexrobotics.com/25-sprockets.html	\$6.99	3	\$20.97	for rotating hanging mission axle	Albert Lin	Received		
#25 Roller Chain (10 feet)		vexpro	http://www.vexrobotics.com/roller-chain.html	\$9.99	1	\$9.99	chain	Albert Lin	Received		
Pool Noodles		Walmart, Target		3	2	\$6.00	Bumpers	Arjun	Purchased		
Blue Bumper Material		Andy Mark	http://www.andymark.com/product/am-2676.htm	18	1	\$18.00	Bumper color cover	Rithik	Received		
Red Bumper Material		Andy Mark	http://www.andymark.com/product/am-2675.htm	18	1	\$18.00	Bumper color cover	Rithik	Received		
Hex shafts (Part #217-2753)	Yes; no other vendors sell it	Vexpro	http://www.vexrobotics.com/shaft-stock.html	\$11.99	1	\$11.99	Needed to control arms for gear mission	Arjun	Received		
3M 8830 Scotchlite Reflective Material 2" x 21.5'	Yes, only other sources are sketchy third party vendors	Andy Mark	http://www.andymark.com/product/am-2934.htm	\$30.00	1	\$30.00	Reflective tape that will be used in the actual competition, needed to test vision for the robot	Alex	Received		

80mm Green LED Ring Light		superbrightleds	https://www.superbrightleds.com/moreinfo/led-headlight-accent-lights/led-halo-angel-eye-headlight-accent-lights/49/315/	\$7.95	1	\$7.95	Need more LEDs for vision as one ring will not be sufficient	Alex	Received		
100mm Green LED Ring Light		superbrightleds	https://www.superbrightleds.com/moreinfo/led-headlight-accent-lights/led-halo-angel-eye-headlight-accent-lights/49/315/	\$9.95	1	\$9.95	Need more LEDs for vision as one ring will not be sufficient	Alex	Received		
8" wedgetop wheels	Yes	Andymark	http://www.andymark.com/product/am-0514.htm	\$33.00	4	\$132.00	Need larger wheels for faster robot	Arjun	Received		
8" Omni wheels	Yes	Vexpro	http://www.vexrobotics.com/omni-wheels.html	\$28.99	6	\$173.94	Need omni wheels for faster turning	Arjun	Received		
1/2" Hex Hubs	Yes	Andymark	http://www.andymark.com/500ex-1-2-inch-hex-hub-product/am-2568.htm	\$9.50	4	\$38.00	Need to attach wheels	Arjun	Received		
1/2" Shaft Collars	Yes	Vexpro	http://www.vexrobotics.com/shaft-collars.html	\$2.99	45	\$134.55	Need for prototyping, holding shafts together, etc.	Arjun	Received		
Custom metal arms	Yes	N/A		\$0.00	0	\$0.00	Need for gear	Arjun	N/A		
custom BIMBA cylinders - 3/4" bore, 1.5" stroke, double-acting, no magnet	Yes	Bimba	http://www.bimba.com/FIRST-Form-Open/	\$0.00	2	\$0.00	Need to move gear arm	Arjun	Received		
Pneumatic Fittings (1)	Yes	Andymark	http://www.andymark.com/product/am-2189.htm	\$2.50	4	\$10.00	Need to attach to pneumatic cylinder	Arjun	Received		

Pneumatic Fittings (2)	Yes	Andymark	http://www.andymark.com/product-p/amt-2010.htm	\$2.00	4	\$8.00	Need to attach to pneumatic cylinder	Arjun	Received		
Hinge	Yes	home depot		\$3.13	2	\$6.26	Need to move gear arm	Arjun	Received		
1/2" hex versahubs (Part number 217-4009)	Yes	vexpro	http://www.vexrobotics.com/versahubs.html	\$2.99	8	\$23.92	Need to attach to wheel	Arjun	Received		
Wedge top wheel tread (10ft replacement roll)	Yes	Andymark	http://www.andymark.com/product-p/amt-0522.htm	\$24.00	1	\$24.00	Replacement tread in case original tread breaks or loses its grip	Arjun	Received		
1/2" Hex Hubs	Yes	Andymark	http://www.andymark.com/500hex-1-2-inch-hex-hub-p/amt-2568.htm	\$9.50	4	\$38.00	Extra for Plastic wheels	Arjun	Received		
Microsoft Lifecam HD-3000 Camera (am-3025)	Yes	Microsoft/Amazon	https://www.amazon.com/Microsoft-LifeCam-HD-3000-Webcam-T3H-00011/dp/B008ZVRQAS	\$24.70	4	\$98.80	Need three extra cameras for streaming to DS and second robot, as well as DS camera	Ganesh	Received	Y	
Power Cable for DLink Or OpenMesh Radio	Yes	Andymark	http://www.andymark.com/product-p/amt-3082.htm	\$4	3	\$12.00	Power supply for the robot router	Ganesh	Received	Y	
Saitek J13 Cyborg 3D USB Joystick	yes	Amazon	https://www.amazon.com/gp/offer-listing/B0001WBQ9/ref=dp_olp_use_d_mbc?ie=UTF8&condition=used	\$35	1	\$35.00	for control for robot	ganesh/charlie D			
Talon SRX controller	Yes	vexpro	http://www.vexrobotics.com/217-8080.html	\$89.99	4	\$359.96	Needed to control CIMS	Arjun	Received		
1/2" hex versahubs (Part number 217-4009)	Yes	vexpro	http://www.vexrobotics.com/versahubs.html	\$2.99	10	\$29.90	Need to attach to wheel	Arjun	Received		

8" Omni wheels	Yes	Vexpro	http://www.vexrobotics.com/omni-wheels.html	\$28.99	2	\$57.98 extra	2 needed for practice robot, 4	Arjun	Received		
8" wedgetop wheels	Yes	Andymark	http://www.andymark.com/product-p/am-0514.htm	33	4	132 extra	Bought 2 instead of 4	Arjun	Received		
1/2" Hex Hubs	Yes	Andymark	http://www.andymark.com/500ex-1-2-inch-hex-hub-p/am-2568.htm	9.5	4	38 wheels	Need to attach	Arjun	Received	Ordered 5 instead of 4	
CIM motors	Yes	Andymark	http://www.andymark.com/CIM-Motor-p/am-0255.htm	28	2	56 extra	Need	Arjun	Received		
Union Tees	Yes	Andymark	http://www.andymark.com/product-p/am-2015.htm	\$3.00	4	\$12.00 extra	Need	Arjun	Received	Bought 5 instead of 4	
Other Pneumatic Fittings	Yes	Andymark	http://www.andymark.com/product-p/am-2897.htm	\$9.00	6	\$54.00 extra	Gear	Arjun	Received		
9" Tempered Steel Spring (am-3557)	No	AndyMark	am-3557	\$3.00	2	\$6.00 mission	Gear mission	RajaK	Received		
custom BIMBA cylinders - part # 041.5-DXP	No	Bimba	http://www.bimba.com/Support/Commercial-Support/Price-Delivery/	\$28.00	2	\$56.00	Need to move gear arm	Arjun	Received		
BIMBA brackets - part # D-129	No	Bimba	http://www.bimba.com/Support/Commercial-Support/PPrice-Delivery/	\$4.30	8	\$34.40	Needed to attach piston to robot	Arjun	Received		
360-degree servo (HSR-2645CRH); continuous Rotation	Yes	Servocity	https://www.servocity.com/hsr-2645crh-servo	\$31.99	3	\$95.97	Needed to let go of ramp + extras	Arjun	Received		

3/16" x 1/4" rivets (50-pack)	Yes	Home depot	http://www.homedepot.com/p/Stanley-3-16-in-x-1-4-in-Aluminum-Rivets-50-Pack-PAA64-5B/100657513	\$5.48	8	\$43.84	Need extra	Arjun	Received		
Encoder Cables	No	Andy Mark	http://www.andymark.com/product-p/am-293.htm	5	5	25	Needed for wiring encoder sensors	Alex	Received	Ordered 10	
10-32 1/2inch hex screws	no	Andy Mark	http://www.andymark.com/SHCS-p/am-1178.htm	3	6	3	need for motor system on second robot	Charlie D	Received		
SMC SY3140-6LZ Single Solenoid Valve (use with Base Mount)	No	Vex	http://www.vexrobotics.com/solenoids-and-manifolds.html	49.99	4	199.96	Needed for pneumatic system	Albert Lin	Received		
SMC SS5Y3-41-04-N7T 4 Station Base Mount	No	Vex	http://www.vexrobotics.com/solenoids-and-manifolds.html	44.99	1	44.99	Needed for pneumatic system	Albert Lin	Received		
Fitting, Cross, Brass, 1/8" NPT, 3 F, 1 M (am-2380)	No	Andy Mark	http://www.andymark.com/product-p/am-2380.htm	4	2	8	Needed for pneumatic system	Albert Lin	Received		
Fitting, pneumatic, straight Y, 1/4 press-in (am-2184)	No	Andy Mark	http://www.andymark.com/product-p/am-2184.htm	3	2	6	Needed for pneumatic system	Arjun	Received		
Pneumatic fitting, union tee, 1/4" tube (am-2015)	No	Andy Mark	http://www.andymark.com/product-p/am-2015.htm	3	6	18	Needed for pneumatic system	Arjun	Received		
Pneumatic fitting, straight, 1/4" tube, press-in, 1/4" NPT male (am-2010)	No	Andy Mark	http://www.andymark.com/product-p/am-2010.htm	2	6	12	Needed for pneumatic system	Arjun	Received		
Bracket for Plastic Air Tank (am-2008)	No	Andy Mark	http://www.andymark.com/product-p/am-2008.htm	2	4	8	Needed for pneumatic system	Arjun	Received		

Nason Pressure Switch (am-2006)	No	Andy Mark	http://www.andymark.com/product-p/am-2006.htm	29	1	29	Needed for pneumatic system	Arjun	Received		
Norgren relief valve (am-2002)	No	Andy Mark	http://www.andymark.com/product-p/am-2002.htm	40	1	40	Needed for pneumatic system	Arjun	Received		
Flow Control, In-Line, 1/4" tube, press-in (am-2690)	No	Andy Mark	http://www.andymark.com/product-p/am-2690.htm	6.5	2	13	Needed for pneumatic system	Arjun	Received		
Low Density PTFE Tape Roll, 1/2" x 520" (am-2045)	No	Andy Mark	http://www.andymark.com/product-p/am-2045.htm	1.5	1	1.5	Needed for pneumatic system	Arjun	Received		
20-amp fuses	No	Amazon	https://www.amazon.com/Bussmann-Amp-Mini-Blade-Fuse/dp/B0024JLKZ4	4.1	1	4.1	Needed for second robot	Arjun	Received		
CAN connectors	Yes	Vexpro	http://www.vexrobotics.com/217-4429.html	19.99	1	19.99	Needed for second robot + extra	Arjun	Received		
Adapters for pneumatic cylinders (2449K12)	Yes	Mcmaster carr	https://www.mcmaster.com/#=168a1hw	3.32	2	6.64	Needed to get long cylinder working	Arjun	Received	Aruna to order these	
1755A9 (Adapters for pneumatic cylinder)	Yes	Mcmaster carr	https://www.mcmaster.com/#standard-mounting-brackets/=168a4ps	8.8	4	35.2	Needed to get long cylinder working	Arjun	Received	Aruna to order these	
Anderson Powerpole Connectors	Yes	Amazon	https://www.amazon.com/Anderson-Powerpole-Connectors-Pair-Genuine/dp/B005P9CATU	8.47	2	16.94	Ran out of Powerpoles, needed for extending wires	Alex	Received	Ordered from Powerplex	

18 AWG Wire	No	Amazon	https://www.amazon.com/RGB-SIGHT-Single-Extension-Conducto-r-Lighting/dp/B0154MAECC/ref=sr_1_1?ie=UTF8&qid=1480298395&sr=8-1&keywords=18+AWG+wire	12.99	1	12.99 parts	Alex	Received		
Standard Non-Repairable Round Line Rod Clevis, 1/4-28 rod thread, zinc-plated carbon steel, 1.35" overall length (Part number D-166-3)	Yes	Bimba	http://www.bimba.com/Support/Commercial-Support/Price-Delivery/	\$4.85	4	\$19.40 mission	Arjun	Ordered	Ordered from Provoast Automation Controls	
Part number D-13498-A	Yes	Bimba	http://www.bimba.com/Support/Commercial-Support/Price-Delivery/	\$4.75	4	\$19.00 mission	Arjun	Ordered	Ordered from Provoast Automation Controls	
SMC SY3140-6LZ Single Solenoid Valve (use with Base Mount)	No	Vex	http://www.vexrobotics.com/sole-noids-and-manifolds.html	49.99	1	49.99 pneumatic system	Arjun	Received		
1/2" Shaft Collars	Yes	Vapro	http://www.vapro.com/shaft-collars.html	\$2.99	8	\$23.92 mission	Arjun	Ordered		
Talon SRX controller	Yes	vapro	http://www.vapro.com/217-8080.html	\$89.99	2	\$179.98 mission	Arjun	Received		
Pneumatic Tubing	No	Vex	http://www.vexrobotics.com/pneumatics.html	\$4.95	1	\$4.95 pneumatic system	Albert	Received		
Single Acting Solenoid	No	Vex	http://www.vapro.com/pneumatics	\$49.99	2	\$99.98 pneumatic system	Albert	Ordered		
Valve	No	Andymark	http://www.andymark.com/product-page-2023.htm	\$7.50	2	\$15.00 pneumatic system	Albert	Received		

Pneumatic fitting, elbow, 1/4" tube, press-in, 1/8" NPT male (am-2039)	No	Andymark	http://www.andymark.com/product-p/am-2039.htm	\$2.50	4	\$10.00	Pneumatic system	Albert	Received		
Fitting, pneumatic, elbow, 1/4" tube press-in, 1/4" NPT male (am-2189)	No	Andymark	http://www.andymark.com/product-p/am-2189.htm	\$2.50	4	\$10.00	Pneumatic system	Albert	Received		
48" Servo Cables from ServoCity for PWM to Servo connections	No	Amazon	ServoCity	\$7.00	4	\$28.00	Needed for servos	Alex	Received		
CIM motors	Yes	Andymark	http://www.andymark.com/CIM-Motor-p/am-0255.htm	\$28.00	2	56.00	Backup robot	Arjun	Recieved		
Clamping Shaft Collar - 1/2" Hex ID (217-2737)	Yes	VexPro	http://www.vexrobotics.com/shaft-collars.html	\$2.99	8	\$23.92	Backup robot & extras	Anish N	Recieved		
WCP cams (part # 217-3431)	Yes	VexPro	http://www.vexrobotics.com/217-3431.html	\$4.99	6	\$29.94	Needed for hanging mission	Arjun	Ordered		
#25 plate sprocket (217-2690)	Yes	VexPro	http://www.vexrobotics.com/25-sprockets.html	\$7.99	4	\$31.96	Needed for hanging mission	Anish N	Ordered		
VersaHub (1/2" Hex) (217-2592)	Yes	VexPro	http://www.vexrobotics.com/versahubs.html	\$8.99	4	\$35.96	Needed for hanging mission	Anish N	Ordered		
80mm Green LED Ring Light		superbrightleds	https://www.superbrightleds.com/more_info/led-headlight-accent-lights/led-halo-angel-eye-headlight-accent-lights/49/315/	\$7.95	1	\$7.95	Need more LEDs for vision as one ring will not be sufficient	Rudraksha			
100mm Green LED Ring Light		superbrightleds	https://www.superbrightleds.com/more_info/led-headlight-accent-lights/led-halo-angel-eye-headlight-accent-lights/49/315/	\$9.95	1	\$9.95	Need more LEDs for vision as one ring will not be sufficient	Rudraksha			

60mm Green LED Ring Light		superbrightleds	https://www.superbrightleds.com/moreinfo/led-headlight-accent-lights/led-halo-angel-eye-headlight-accent-lights/49/315/	\$4.95	1	\$4.95	Need more LEDs for vision as one ring will not be sufficient	Rudraksha			
CIM motor adaptor	Yes	Vexpro	http://www.vexrobotics.com/217-4018.html	\$4.99	2	\$9.98	Needed for hanging mission	Arjun	Received		
1/2" Hex Stock 3ft (Part number 217-2753)	Yes	Vexpro	http://www.vexrobotics.com/vexprom/hardware/shaft-stock.html	\$11.99	2	\$23.98	Needed for hanging mission	Arjun	Ordered		
Snails (WCP Cams)	Yes	Vexpro	http://www.vexrobotics.com/217-3431.html	\$4.99	4	\$19.96	Extras, needed for hanging mission	Arjun	Ordered		
Versaplanetary 5:1 Ring gear adaptor	Yes	Vexpro	http://www.vexrobotics.com/217-2819.html	\$14.99	1	\$14.99	Needed for extra gearbox	Arjun	Ordered		
180 degree servos (Part number 32645S00)	Yes	Servocity	https://www.servocity.com/hs-645mg-servo#258=24&259=25	\$29.99	3	\$89.97	Needed for gear mission and camera + extras	Arjun	Ordered		
24" servo extension cables	Yes	Servocity		\$4.95	4	\$19.80	Needed for gear mission and camera + extras	Arjun	Ordered		

Mission	QTY	Part #	Description	Vendor	Vendor Link	Price	Total >	Alternate Vendor	Alternate Vendor Link	Alternate Price	Receive Total	Easy to d?	Comments
Pneumatics	1	217-4243	PCM	VEX	http://www.vexrobotics.com/expro/motors-electronics/217-4243.html	\$88.99							
Electronics	1	217-4245	VRM	VEX	http://www.vexrobotics.com/expro/motors-electronics/217-4245.html	\$44.99							
Hanging	2	217-2592	1/2" Hex VersaHub	WCP	http://www.wcproducts.net/sprocket.aspx?25-sprockets2	\$7.99							
Intake	6	217-2642	#25 Sprocket w/ Hub - 16T - 1/2"	WCP	http://www.vexrobotics.com/expro/sprockets.html	\$6.99	\$41.94						
Drivetrain	2	217-2688	#30 Plate Sprocket - 22T	WCP	http://www.vexrobotics.com/expro/sprockets.html	\$7.99	\$15.98						
Hanging	3	217-2690	32T Plate Sprocket	WCP	http://www.vexrobotics.com/expro/sprockets.html	\$7.99							
Drivetrain	2	217-2703	24T Gear with 3/8" Hex Bore	WCP	http://www.vexrobotics.com/expro/hex-bore.html	\$6.99	\$13.98						
Drivetrain	2	217-2710	44T - 1/2" Hex Gear Flanged Bearing - 1/2" Round ID x 1.125" OD	WCP	http://www.wcproducts.net/bearings.html	\$11.99	\$23.98						
Intake	6	217-2731	Clamping Shaft Collar - 1/2" Hex ID	WCP	http://www.vexrobotics.com/shaft-collars.html	\$2.99	\$17.94						
Intake	6	217-2737	1/2" OD Round Tube Axle Stock (3 feet)	WCP	http://www.vexrobotics.com/shaft-stock.html	\$11.99	\$23.98						
Drivetrain	2	217-2778	Pancake Pneumatic Cylinder 3/4" Bore 1/2"	WCP	http://www.vexrobotics.com/wcpds.html	\$39.99	\$79.98						
Intake	1	217-2816	VersaPlateetary Ring Gear Add-on	WCP	http://www.vexrobotics.com/217-2816.html	\$9.99	\$9.99						
Hanging	2	217-2816	VersaPlateetary 5: 1 Gear Kit	WCP	http://www.vexrobotics.com/217-2819.html	\$9.99							
Intake	1	217-2819	VersaPlateetary 10:1 Gear Kit	WCP	http://www.vexrobotics.com/217-2819.html	\$14.99	\$14.99						
Hanging	2	217-2820	VEpro Pneumatic Fitting Kit	WCP	http://www.vexrobotics.com/217-2820.html	14.99							
Drivetrain	2	217-2907	SS5Y3-41-04-N7	WCP	http://www.wcproducts.net/pneumatics.html	\$9.99	\$19.98						
Pneumatic	1	217-2952	11T Gear w/ 1/2" Center Distance (Steel) with Mounting Hardware	WCP	http://www.vexrobotics.com/217-3107.html	\$7.99	\$31.96						
Drivetrain	4	217-3107	VersaWheel DT (3.25")	WCP	http://www.wcproducts.net/versawheel.html	\$5.99	\$11.98						
Intake	2	217-3202	SY3140-6LZ	WCP	http://www.vexrobotics.com/versahub.html	\$49.99							
Pneumatic	4	217-3233	VersaHub b (1.25" Bearing Pilot 1/4") Thick	WCP	http://www.vexrobotics.com/details.aspx?item=vexpro.html	\$2.99							
Hanging	3	217-3234	Delrin Washer (1/4") - 1/2" Hex ID - 10 pk	WCP	http://www.wcproducts.net/delrin-washers.html	\$4.99	\$4.99						
Drivetrain	1	217-3257	Delrin Washer (1/4") - 1/2" Hex ID - 10 pk	WCP	http://www.wcproducts.net/delrin-washers.html	\$4.99	\$4.99						
Intake	2	217-3258	501 Dog Gear with 0.5000" Bearing	WCP	http://www.vexrobotics.com/hiffer-gears.html	\$24.99	\$49.98						
Drivetrain	2	217-3419	3431	WCP	http://www.vexrobotics.com/217-3431.html	\$4.99	\$39.92						
Drivetrain	8	217-3431	VersaBlock Kit	WCP	http://www.vexrobotics.com/versablock.html	\$24.99	\$224.91						
Intake	2	217-3432	VersaBlock Kit	WCP	http://www.vexrobotics.com/versablock.html	\$24.99	\$49.98						
Drivetrain	9	217-3432	VersaBlock Kit	WCP	http://www.vexrobotics.com/versablock.html	\$24.99	\$224.91						
Hanging	2	217-3432	WCP DS - WCD 3 CM Dual Speed	WCP	http://www.wcproducts.net/wcd3.html	24.99							
Drivetrain	2	217-3433	VersaChassis Hex Shaft Kit	WCP	http://www.vexrobotics.com/chassis-hex-shaft.html	\$248.99	\$497.98						
Drivetrain	8	217-3437	VersaChassis Hex Shaft	WCP	http://www.vexrobotics.com/chassis-hex-shaft.html	\$9.99	\$79.92						

Mission	QTY	Part #	Description	Vendor Link	Price	Total >	Alternate e Vendor Link	Alternate ive Vendor Price	Alternate e Total >	Receive d? y/n	Easy to Lose?	Comments
Intake	2	217-3453	VersaFrame 1" x 2" x 0.10" Pre-Drilled Tube Stock (50" length)	http://www.verrobotics.com/versafamestock.html	\$24.99	\$49.98						
Drivetrain	2	217-3453	VersaFrame 1" x 2" x 0.10" Al Tube Stock, Pre-Drilled (2 faces)	http://www.verrobotics.com/versafamestock.html	\$24.99	\$49.98						
Hanging	2	217-3453	#25 Sprocket w/ Hub - 18T - 1/2"	http://www.verrobotics.com/25sprockets.html	\$24.99							
Drivetrain	16	217-3488	Hex ID	WCP	\$6.99	\$111.84						
Drivetrain	6	217-3547	T Gusset	WCP	\$4.99	\$29.94						
Intake	2	217-3548	VersaFrame 90 Degree Gusset (2-pack)	http://www.verrobotics.com/versafamegussetsandmounts.html	\$4.99	\$9.98						
Drivetrain	6	217-3548	90 Degree Gusset	WCP	\$4.99	\$29.94						
Intake	12	217-3556	VersaFrame 135 Degree Gusset (2-pack)	http://www.verrobotics.com/versafamegussetsandmounts.html	\$4.99	\$59.88						
Hanging	1	217-3563	Output WCP DS - PTO Add-On Kit	WCP	39.99							
Drivetrain	2	217-3636	Flanged Bearing - 1/2" Hex ID x 1.125"	http://www.verrobotics.com/bearing.shtml	\$74.99	\$149.98						
Intake	1	217-3875	OD V2	WCP	\$4.99	\$4.99						
Drivetrain	18	217-3875	Flanged Bearing - 1/2" Hex ID x 1.125"	http://www.verrobotics.com/bearing.shtml	\$4.99	\$89.82						
Intake	4	217-4006	0.313in Flanged Bearing - 13.75mm (1/2" Thunder Hex) x 1.125in x 0.313in	WCP	\$3.99	\$15.96						
Hanging	4	217-4006	0.313in VersaHub (1/2" Hex, Plastic)	WCP	3.99							
Hanging	4	217-4009	1/2" Thunder Hex Stock (3 feet)	http://www.verrobotics.com/thunderhexstock.html	\$2.99							
Intake	1	217-4017	1/2" Thunder Hex Stock (3 feet)	WCP	\$13.99	\$13.99						
Hanging	1	217-4017	Colson Performa (1.625" x 0.875", 1/2" Hex bore)	http://www.verrobotics.com/colsonperforma.html	\$13.99							
Intake	7	217-4045	Colson Performa (3.5" x 1.25", 1/2" Hex bore)	http://www.wcpproducts.net/catalogsearch/result/?q=colson%20performa	\$4.99	\$34.93						
Drivetrain	2	217-4048	VersaFrame 1" x 1" x 0.100" Pre-Drilled Tube Stock (50" length)	http://www.wcpproducts.net/217-4048.html	\$9.99	\$19.98						
Drivetrain	3	217-4104	VersaFrame 1" x 1" x 0.100" Pre-Drilled Tube Stock (50" length)	http://www.wcpproducts.net/217-4104.html	\$19.99	\$59.97						
Hanging	2	217-4104	Plastic Clamping Bearing Block	http://www.verrobotics.com/4156.html	\$19.99							
Intake	2	217-4155	VersaFrame Face Bearing Mount (2-pack)	http://www.verrobotics.com/versafamegussetsandmounts.html	\$7.99	\$15.98						
Intake	5	217-4183	VersaFrame Face Bearing Mount (2-pack)	http://www.verrobotics.com/versafamegussetsandmounts.html	\$4.99	\$24.95						
Hanging	2	217-4183	VersaFrame Face Bearing Mount (2-pack)	WCP	\$4.99	\$4.99						

Mission	QTY	Part #	Description	Vendor Link	Price	Total >	Alternate Vendor	Alternate Vendor Link	Alternate Price	Received	Easy to d?	Lose?	Comments
Intake	2	217-4238	VersaFrame Corner Gusset VersaFrame VersaPlatetary Side Mount	WCP http://www.vexrobotics.com/versaframegussetsandmounts.html	\$7.99	\$15.98							
Hanging		1 217-4239		WCP http://www.vexrobotics.com/expro/mounts/electronics/217-4239.html	\$9.99								
Electronics		1 217-4244	PDP	VEX http://www.vexrobotics.com/217-4244.html	\$204.99								
Intake	1	217-4347	775pro Base VersaPlatetary with 1/2" Hex	WCP http://www.vexrobotics.com/versaplatetary.html	\$17.99	\$17.99							
Intake	1	217-4973	Output	WCP http://www.wcpproducts.net/217-4973.html	\$39.99	\$39.99							
Electronics		6 217-8080	Talon SRX	WCP http://www.andymark.com/product-pam-2005.html	\$89.99								
Pneumatics		1 am-2005	Compre... Pneumat... ic fitting, straight, 1/4" tube, press-in, 1/4" NPT male (am-2005)	AndyM... ark http://www.andymark.com/product-pam-2005.html	\$69.00								
Pneumatic		am-2010	Pneumat... ic fitting, straight, 1/4" tube, press-in, 1/8" NPT male (am-2010)	AndyM... ark http://www.andymark.com/product-pam-2010.html	\$2.00								
Pneumatic		am-2011	Pneumat... ic fitting, straight, 1/4" tube, press-in, 1/8" NPT male (am-2011)	AndyM... ark http://www.andymark.com/product-pam-2011.html									
Pneumatic		1 am-2137	Tubing	AndyM... ark http://www.andymark.com/product-pam-2137.html	\$18.00								
Pneumatic		4 am-2649	Air Tanks	AndyM... ark http://www.andymark.com/product-pam-2649.html	\$14.00								
Electronics		1 am-3000	Robotic MCC - Skid	AndyM... ark http://www.andymark.com/product-pam-3000.html	\$435.00								
Drivetrain	N/A			HomeDepot http://www.homedepot.com/p/MCC-Skid/10029	\$10.00	\$0.00							
Drivetrain	N/A		MCC - Bellypan (Wood @ 1/4")	HomeDepot http://www.homedepot.com/p/Bellypan-Wood-1-4-/10029	\$15.00	\$0.00							
Hanging	N/A		Hanger Straps (1" Wide)	HomeDepot http://www.homedepot.com/p/Hanger-Straps-1-Wide/10029	\$10.00								
Pneumatic		WCP-10029	1/4" Union Tee	WCP http://www.wcpproducts.net/pneumatics	\$1.99								
Drivetrain	8	WCP-0047	WCP Diamond Pneumatic Tire	WCP http://www.wcpproducts.net/pneumatic-tire-wheels	\$14.99	\$119.92							
Drivetrain	8	WCP-0049	Pneumatic Rim	WCP http://www.wcpproducts.net/pneumatic-rim-wheels	\$29.99	\$239.92							
Drivetrain	2	WCP-0063	8mm to 1/2" Hex Adapter	WCP http://www.vexrobotics.com/versahardware2/17-3256.html	\$5.99	\$11.98							
FIRST Choice	2 fc17-023	AK	AM/TI Sensor6P	AM/TI http://www.amti.com/sensor6p	FREE	FREE							
FIRST Choice			AM Battery Tray Kit for AM14U3 Battery Tray										
FIRST Choice	1 fc17-016		Assembly AM		FREE	FREE							
FIRST Choice	2 fc17-006		Launchpad Evaluation Kit	Analog Devices http://www.analog.com/evaluonkits	FREE	FREE							
FIRST Choice	1 fc17-131		Microsoft Lifecam HD3000 Camera	TI http://www.ti.com/lifecamhd3000	FREE	FREE							
FIRST Choice	2 fc17-048		Green Ring Light	SuperBrightLED http://www.superbrightleds.com/greenringlight.html	FREE	FREE							
FIRST Choice	2 fc17-129		RCD HS- 322H2										
FIRST Choice	1 fc17-051		Hive-Victor Innovative 888		FREE	FREE							
FIRST Choice	1 fc17-072		Camera Bracket Kit	ebm papst http://www.ebm-papst.com/en/camera-bracket-kit.html	FREE	FREE							
FIRST Choice	1 fc17-030		XBOX 360 GovCo Controller Wired		FREE	FREE							
FIRST Choice	1 fc17-050		ADIS16448 IMU MPU Breakout Board	GovCo http://www.govco.com/wired-mpu-breakout-board.html	FREE	FREE							
FIRST Choice	2 fc17-007		AMT103-V Encoder Kit	Analog Devices http://www.analog.com/amt103v-encoder-kit	FREE	FREE							
FIRST Choice	2 fc17-033		Mobileelec tric Sensor (42JT- F5LE1- A2)	CUI Inc. http://www.cui.com/mobileelectric-sensor-42jt-f5le1-a2	FREE	FREE							
FIRST Choice	2 fc17-143			Rockwell http://www.rockwellautomation.com/mobileelectric-sensor-42jt-f5le1-a2	FREE	FREE							

Mission	QTY	Part #	Description	Vendor Link	Vendor Price	Total >	Alternate Vendor	Alternate Vendor Link	Alternate Vendor Price	Alternate Total Price	Receive d? y/n	Easy to Lose?	Comments	
FIRST Choice	2	fc17-141	Ultrasonic Proximity Sensor and Cable	Rockwell	FREE	FREE								
Voucher	1			http://www.firstinspires.org/sites/default/files/uploads/resource_library/frcc/game-and-seasons-info/kits-of-parts/2017/										
Voucher	1		ArmaBot Voucher - \$25	ArmaBot	http://www.firstinspires.org/resource-library/frc2017/armabot-voucher.pdf							ArmaBot RS7 motor encoders		
Voucher	1		Automation Direct Voucher - \$35	Automation Direct	http://www.automation-direct.com/voucher-instructions	7QBP-VP6Z-SJ2M-9TWM						Pneumatics, Electronics, Safety Devices		
Voucher	1		BishopW SecanCar Voucher	BishopW SecanCar Voucher	http://www2.bwc.com/firstvouchcher							4 Free MadeWell Wheels for Linear Guides	Redeemable on Jan 7 from 10-12AM EST	
Voucher	1		Inventables Voucher - \$40	Inventables	User your Team's code in the Team Registration System. Shipping not included.	HBL3-4GTP-F2E6						Machining: Plastic, Metal, Wood, Bits, etc		
Voucher	1		Next Gen Robots Voucher - \$40	Next Gen Robots	http://www.firstinspires.org/sites/default/files/resource-library/frcc/game-and-seasons-info/kits-of-parts/2017/	XUQQQJNUV						1 CIM Cooler Heat Sinks		
Voucher	1		TE Connectivity Voucher - \$25	TE Connectivity	http://www.firstinspires.org/sites/default/files/resource-library/frcc/game-and-seasons-info/kits-of-parts/2017/							Heat Shrink Tubing, Crimping Tools, etc.		
Voucher	1		Onshape PTC Solidworks	Onshape PTC Solidworks								CAD Software on browser		
Voucher	1		Build-A-Button Design Software	Build-A-Button	https://www.americanbottomachine.com/images/First2017-robot.pdf							3 Month Membership - Useful for Connect Robot Simulation Software		
Voucher			FRCSim Github Organization Account: Software Hosting and Repos	OSRF Github	https://github.com/							unlimited members and repositories		
Voucher			Mastercam CAD/CAM	Mastercam	http://events.r20.constantcontact.com/register/event?ekey=ceidka#07edetpx0f&llt=1481555981592							Software to Program CNC Machines		
Voucher			National Instruments' Multisim, Ultisim, and Statechart Module NI	NI	http://forums.ni.com/t5/FIRS-1-Robotics-Competition/Multisim-Ultisim-and-Statechart-Module/tip-3533182							Electrical Systems Modelling Software		
Voucher			RoboRealm Computer Vision and Analysis for FRC Teams	RoboRealm	http://www.roborealm.com/FRC2017/	KMTL-NSWK-3QQB-EZAN						For Vision Processing during Competition		
Voucher			SolidProfessor CAD Library + Online Training Resources	SolidProfessor	https://solidprofessor.com/training/							Library of training and resources for CAD		
Voucher			Tableau's Desktop Professional - Data Visualization	Tableau	http://www.tableau.com/first-robotics	TDV-110C-1B60-1137-34E0						Helpful for Match Performance/Scouting		
			Question and Answer System Auth Code			11f75e								

Parts to buy for gears	QTY	Link	Part #	Price	Total	Procurement Status
1/2" hex shaft collars	16	http://www.vexrobotics.com/shaft-collars.html	217-2737	\$2.99	\$47.84	Ordered
Custom metal arms	0	N/A	N/A	\$0.00	\$0.00	No Vendor, not ordered
custom BIMBA cylinders - 3/4" bore, 1" stroke,	2		N/A	\$0.00	\$0.00	No Vendor, not ordered
Pneumatic Fittings (1)	4	http://www.andymark.com/product-p/am-2189.htm	N/A	\$2.50	\$10.00	Ordered
Pneumatic Fittings (2)	4	http://www.andymark.com/product-p/am-2010.htm	N/A	\$2.00	\$8.00	Ordered
Hinge	2	http://www.homedepot.com/p/Everbilt-3-1-2-in-x-1-4-in-Radius-Satin-Nickel-Door-Hinge-14985/20255807	N/A	\$3.13	\$6.26	Local store, not ordered
		^				

Parts	Link	Price	QTY	Total Price
8" wedgetop wheels	http://www.andymark.com/product-p/am-0514.htm	\$33.00	4	\$132.00
8" Omni wheels	http://www.vexrobotics.com/omni-wheels.html	\$28.99	6	\$173.94
1/2" Hex Hubs	http://www.andymark.com/500ex-1-2-inch-hex-hub-p/am-2568.htm	\$9.50	4	\$38.00
1/2" Shaft Collars	http://www.vexrobotics.com/shaft-collars.html	\$2.99	24	\$71.76



Raja Kolli <maharaja.kolli@gmail.com>

VEX Robotics: Invoice and Order Confirmation: # 11189623

1 message

VEX Robotics <noreply.vex@innovationfirst.com>
To: Raja Kolli <maharaja.kolli@gmail.com>

Thu, Jan 5, 2017 at 10:54 AM



Hello Raja Kolli,

Thank you for your order from VEX Robotics. Once your package ships we will send an email with a link to track your order. You can check the status of your order by [logging into your account](#). If you have any questions about your order please contact us at sales@vexrobotics.com or call us at [\(903\) 453-0802](tel:(903)453-0802) Monday-Friday, 8am - 5pm Central. For technical support, please contact us at support@vexrobotics.com or call us at [\(903\) 453-0802](tel:(903)453-0802) Monday-Friday, 8am - 5pm Central.

An invoice has been attached to this e-mail in PDF format and an order confirmation can be found below. Thank you again for your business.

Your Order #11189623 (placed on January 5, 2017)

Billing Information:

Raja Kolli
PO BOX 54905
Irvine, California, 92619
United States
T: [8587756084](tel:8587756084)
F: [8587756084](tel:8587756084)

Payment Method:

Credit Card Type: Visa
Credit Card Number: xxxx-1620
Expiration Date: 09/2020

Shipping Information:

Raja Kolli
110, Weathervane
Irvine, California, 92603
United States
T: [8587756084](tel:8587756084)
F: [8587756084](tel:8587756084)

Shipping Method:

UPS - UPS Ground

Item	Sku	Qty	Subtotal
VersaFrame 1" x 2" x 0.10" Pre-Drilled Tube Stock (59" length)	217-3453	6	\$149.94
VersaFrame 1" x 1" x 0.100" Pre-Drilled Tube Stock (59" length)	217-4104	6	\$119.94
VersaBlock Kit	217-3432	10	\$249.90
Flanged Bearing - 0.500in (Hex) x 1.125in x 0.313in v2	217-3875	45	\$224.55
#25 Sprocket w/ Hub - 18t - 1/2" Hex ID	217-3488	25	\$174.75
Colson Performa (3.5" x 1.25", 1/2" Hex bore)	217-4048	10	\$99.90
1/16" Acetal Spacer - 1/2" Hex (10-pack)	217-3257	3	\$14.97
50t Dog Gear with 0.500in Bearing	217-3419	4	\$99.96
24t Gear with 3/8" Hex Bore	217-2703	6	\$41.94
44t Gear with 1/2" Hex Bore	217-2710	6	\$71.94
WCP DS - PTO Add-On Kit	217-3636	2	\$149.98
Pancake Pneumatic Cylinder, 3/4" Bore, 1/2" Travel	217-2778	2	\$79.98
VEXpro Ball Shifter Pneumatic Fitting Kit	217-2907	4	\$39.96
#35 Plate Sprocket - 22t	217-2688	5	\$39.95
11t CIM Gear w/ 12t Center Distance (Steel) with Mounting Hardware	217-3107	6	\$47.94
WCP DS Gearbox		2	\$497.98
Base Options			
1 x WCP DS - 3 CIM West Coast Drive Version Base Kit \$248.99	217-3433		
VersaFrame Corner Gusset	217-4238	2	\$15.98
VersaFrame 1" Wide VersaPlanetary Parallel Mount	217-4178	2	\$19.98
VersaFrame 2" Wide VersaPlanetary Parallel Mount	217-4179	2	\$19.98
VersaFrame 30 Degree Gusset (2-pack)	217-3555	2	\$9.98
VersaFrame 45 Degree Gusset (2-pack)	217-3552	2	\$9.98
VersaFrame 60 Degree Gusset (2-pack)	217-3551	2	\$9.98
VersaFrame 90 Degree Gusset (2-pack)	217-3548	2	\$9.98
VersaFrame 120 Degree Gusset (2-pack)	217-4181	2	\$9.98
VersaFrame 135 Degree Gusset (2-pack)	217-3556	2	\$9.98
VersaFrame 150 Degree Gusset (2-pack)	217-4180	2	\$9.98
VersaFrame Plus Gusset (2-pack)	217-3550	2	\$9.98
VersaFrame End Bearing Mount (2-pack)	217-3554	2	\$9.98
VersaFrame Face Bearing Mount (2-pack)	217-4183	2	\$9.98
VersaFrame Side Bearing Mount (2-pack)	217-3553	2	\$9.98
VersaFrame T Gusset (2-pack)	217-3547	2	\$9.98
VersaFrame VersaPlanetary Face Mount (2-pack)	217-3627	2	\$9.98
VersaFrame VersaPlanetary Side Mount	217-4239	2	\$19.98

Item	Sku	Qty	Subtotal
VersaChassis Gusset (8-pack)	217-3557	1	\$19.99
VersaFrame 2" x 2" x 0.090" Angle (59" length)	217-4110	3	\$74.97
VersaFrame Linear Motion Gusset Kit	217-4399	2	\$15.98
VersaFrame Roller Chain Mount (2-pack)	217-4400	2	\$5.98
#25 Heavy Duty Master Link	217-2998	15	\$37.35
#25 Heavy Duty Half Link	217-4774	15	\$37.35
775pro	217-4347	3	\$53.97
Talon SRX Encoder Breakout Board	217-4398	1	\$9.99
Talon SRX Data Cable (4-pack)	217-4358	1	\$14.99
Talon SRX	217-8080	1	\$89.99
Talon SRX Analog Breakout Board	217-4401	1	\$11.99
1/2" ThunderHex Stock (3 feet)	217-4017	2	\$27.98
Flanged Bearing - 13.75mm (1/2" ThunderHex) x 1.125" x 0.313"	217-4006	15	\$59.85
Radial Bearing - 13.75mm (1/2" ThunderHex) x 1.125in x 0.313in	217-4270	15	\$59.85
VersaPlanetary Integrated Encoder	217-5046	1	\$49.99
SRX Mag Encoder	217-5049	1	\$39.99
Coupler 8-32 x 0.500" (25-pack)	275-1000	1	\$2.95
Coupler 8-32 x 1.000" (25-pack)	275-1001	1	\$4.95
Star Drive Coupler 8-32 x 0.500" (25-pack)	276-4989	1	\$1.99
Star Drive Coupler 8-32 x 1.000" (25-pack)	276-4988	1	\$2.99
Star Drive Coupler 8-32 x 1.000" (25-pack)	276-4988	1	\$2.99
		Subtotal	\$2,935.32
		Shipping & Handling	\$96.23
		Grand Total	\$3,031.55

Thank you again,
VEX Robotics

 **Invoice_11189623.pdf**
22K

Measurements	For What Structure	Link	Quantity	Price Per Unit	Total Price
3.5in x 1.5in x 60in	Hanging Mission Structure	Home Depot	1		
3.5in x 1.5in x 58.5in	Hanging Mission Structure	Home Depot	2		
3.5in x 1.5in x 28in	Hanging Mission Structure	Home Depot	2		
12in x 12in x 0.5in	Hanging Mission Structure	Home Depot	6		
43in x 3.75in x 0.5in	Hanging Mission Structure	Home Depot	4		
Diameter 10in	Hanging Mission Structure	Home Depot	1		

	Transaction Date	Type	Amount	Item Description	Vendor	Comments	Category	Receipt Uploaded	Reimbursement Group	Transaction Month
Raja Kolli	11/07/2016	Expense	3388.94	MCC Chassis Parts	West Coast Products	Chassis Parts - Mechanical	Parts	Yes	2016-11	2016-11
Raja Kolli	11/08/2016	Expense	1106.22	MCC Chassis Electronics	Andy Mark	Batteries, Controllers etc.,	Parts	Yes	2016-11	2016-11
Raja Kolli	11/11/2016	Expense	5.38	Gloves	Home Depot	Gloves for tools use	Tools	Yes	2016-11	2016-11
Raja Kolli	11/11/2016	Expense	26.31	Rivets, screws etc..	Orchard Supply Hardware	Rivets etc.,	Parts	Yes	2016-11	2016-11
Raja Kolli	11/11/2016	Expense	141.00	Rolling organizer	Harbor Freight	Rolling Organizer	Tools	Yes	2016-11	2016-11
Raja Kolli	11/12/2016	Expense	240.76	Rolling toolbox etc.,	Harbor Freight	Rolling toolbox, sander/saw supplies	Tools	Yes	2016-11	2016-11
Raja Kolli	11/17/2016	Expense	2000.00	FRC Team Registration	FIRST	Registration \$6000 - Grant \$4000 = \$2000	Fees	Yes	2016-11	2016-11
Raja Kolli	11/18/2016	Expense	9.77	Plywood	Home Depot	3x3 Plywood for mounting electronics	Parts	Yes	2016-11	2016-11
Raja Kolli	11/19/2016	Expense	32.11	Pnuematic Air Hoses	Home Depot	Air Hoses for compressor	Parts	Yes	2016-11	2016-11
Raja Kolli	11/19/2016	Expense	65.23	Cordless Screwdriver etc.,	Home Depot	Cordless screwdriver, bits, rivets etc.,	Parts	Yes	2016-11	2016-11
Raja Kolli	11/19/2016	Expense	12.18	6-12 gauge Crimping Tool	Home Depot	Crimping Tool	Tools	Yes	2016-11	2016-11
Raja Kolli	11/19/2016	Expense	13.52	Machine Screws	Orchard Supply Hardware	10-32 and 4-40 machine screws	Parts	Yes	2016-11	2016-11
Raja Kolli	11/19/2016	Expense	15.59	WAGO TB Tool	Amazon	Electrical Terminating Block Tool	Tools	Yes	2016-11	2016-11
Raja Kolli	11/19/2016	Expense	13.81	First Aid Kit	Harbor Freight	First Aid Kit	Office Supplies	Yes	2016-11	2016-11
Gunjan Siroya	11/12/2016	Expense	69.66	Supplies for Team Meetings	Smart & Final	Plates, Napkins, cups, etc.	Office Supplies	Yes	2016-11	2016-11
Raja Kolli	11/20/2016	Expense	835.32	Pneumatics and Electronics	Andy Mark	Pneumatics and Electronics missing from MCC BOM	Parts	Yes	2016-11	2016-11
Raja Kolli	11/20/2016	Expense	11.31	40Amp fuses	PepBoys	Fuses for PDM	Parts	Yes	2016-11	2016-11
Raja Kolli	11/20/2016	Expense	15.18	40Amp fuses	AutoZone	Fuses for PDM	Parts	Yes	2016-11	2016-11
Raja Kolli	11/28/2016	Expense	389.09	Hanging Mission Parts	Vex Robotics	Hanging Mission Parts	Parts	Yes	2016-12	2016-11
Raja Kolli	11/28/2016	Expense	116.02	Misc electrical	Amazon	Ferrules, Cables etc.,	Parts	Yes	2016-12	2016-11
Raja Kolli	11/28/2016	Expense	9.93	Misc electrical	Home Depot	Ring connectors	Parts	Yes	2016-12	2016-11
Raja Kolli	11/29/2016	Expense	42.40	CIM Gear	Vex Robotics	12T CIM Gear replacement for 11T CIM gear	Parts	Yes	2016-12	2016-11
Raja Kolli	12/05/2016	Expense	52.46	CAN Connectors	CTR Electronics	CAN Connectors	Parts	Yes	2016-12	2016-12
Raja Kolli	12/05/2016	Expense	149.20	Pancake and chains	Vex Robotics	Chains and pancake gears	Parts	Yes	2016-12	2016-12
Raja Kolli	12/05/2016	Expense	327.92	Batteries and Pneumatics	Andy Mark	Extra batteries and Pneumatic cylinders etc	Parts	Yes	2016-12	2016-12
Raja Kolli	12/12/2016	Expense	35.80	Pressure switch	AndyMark	Pressure switch	Parts	Yes	2016-12	2016-12
Raja Kolli	12/12/2016	Expense	196.00	Gussets etc.,	Vex	Gussets etc.,	Parts	Yes	2016-12	2016-12
Raja Kolli	12/12/2016	Expense	42.90	Bearings	WCP	Bearings	Parts	Yes	2016-12	2016-12
Raj Neervannan	12/04/2016	Expense	90.65		Harbor Freight		Parts	Yes	2016-12	2016-12
Raj Neervannan	12/10/2016	Expense	36.13		Harbor Freight		Parts	Yes	2016-12	2016-12
Raj Neervannan	12/10/2016	Expense	59.73		Home Depot		Tools	Yes	2016-12	2016-12
Raja Kolli	12/11/2016	Expense	2.79	Screws	Orchard Supply Hardware	Screws	Parts	Yes	2016-12	2016-12
Raja Kolli	12/11/2016	Expense	44.36	Rivet Gun, Rivets etc.,	Orchard Supply Hardware	Rivet Gun, Rivets etc.,	Tools	Yes	2016-12	2016-12
Raja Kolli	12/13/2016	Expense	21.79	Shipping for AM FirstChoice	AndyMark FirstChoicre	FRC \$750 credits used to purchase sensors/camera etc	Parts	Yes	2016-12	2016-12
Raja Kolli	12/16/2016	Expense	21.56	Roller Chain	Amazon	Chain breaker tool	Tools	Yes	2016-12	2016-12
Raja Kolli	12/15/2016	Expense	27.00	Label Maker	Staples	Label Maker and Scissors	Tools	Yes	2016-12	2016-12
Raja Kolli	12/18/2016	Expense	28.84	Screws and batteries	Orchard Supply Hardware	Machine Screws and batteries	Parts	Yes	2016-12	2016-12
Raja Kolli	12/15/2016	Expense	25.56	Washers and containers	Orchard Supply Hardware	Washers and containers	Parts	Yes	2016-12	2016-12
Srini Lingineni	12/17/2016	Expense	7.28	Punch bits	Harbor Freight		Tools	Yes	2016-12	2016-12
Raja Kolli	12/30/2016	Expense	-252.00	Credit from WCP	WCP	Tires	Parts	No	2016-12	2016-12
Gunjan Siroya	12/18/2016	Expense	2.18	Female Adapter SXT	Orchard Supply Hardware		Parts	Yes	2016-12	2016-12
Gunjan Siroya	12/18/2016	Expense	19.25	Channel, Cable Stop, Spacers	Orchard Supply Hardware		Parts	Yes	2016-12	2016-12
Gunjan Siroya	12/18/2016	Expense	-4.67	Cable Stop return	Orchard Supply Hardware		Parts	Yes	2016-12	2016-12
Raja Kolli	12/26/2016	Expense	21.54	Organizers	Home Depot	Organizers	Tools	Yes	2017-01	2016-12
Raja Kolli	01/05/2017	Expense	3031.55	MCC Drive train	Vex	MCC Drive train and extra parts	Parts	Yes	2017-01	2017-01
Raj Neervannan	01/08/2017	Expense	172.32	Bench Drill and other items	Harbor Freight		Tools	Yes	2017-01	2017-01
Raja Kolli	01/08/2017	Expense	15.07	Label maker ribbon	Staples	Ribbon	Office Supplies	Yes	2017-01	2017-01
Raja Kolli	01/08/2017	Expense	147.60	Saw and Sander	Harbor Freight		Tools	Yes	2017-01	2017-01
Raja Kolli	01/08/2017	Expense	137.91	workbench	Harbor Freight		Tools	Yes	2017-01	2017-01
Srini Lingineni	01/08/2017	Expense	106.17	Bolts,Washers,Lumber,etc	Home Depot		Parts	Yes	2017-01	2017-01
Srini Lingineni	01/10/2017	Expense	44.68	Circular Saw, Blade	Harbor Freight		Tools	Yes	2017-01	2017-01
Raja Kolli	01/15/2017	Expense	296.40	Parts for season	AndyMark	Omni wheels, pneumatics etc.,	Parts	Yes	2017-01	2017-01
Raja Kolli	01/15/2017	Expense	459.03	Parts for season	Vex	Gears etc.,	Parts	Yes	2017-01	2017-01
Raja Kolli	01/15/2017	Expense	86.80	LED Rings	Super Bright LEDs		Parts	Yes	2017-01	2017-01
Srini Lingineni	01/15/2017	Expense	13.74	Dust mask, Gloves, rafter	Harbor Freight		Tools	Yes	2017-01	2017-01

	Transaction Date	Type	Amount	Item Description	Vendor	Comments	Category	Receipt Uploaded	Reimbursement Group	Transaction Month
Raja Kolli	01/18/2017	Expense	20.83	Shipping for FirstChoice Round 2	AndyMark	Rope, BatteryCharger etc., (shipping cost only)	Parts	Yes	2017-01	2017-01
Srini Lingineni	01/20/2017	Expense	42.56	Masks, Basket	Orchard Supply Hardware	Masks, Basket	Office Supplies	Yes	2017-02	2017-01
Raj Neervannan	01/21/2017	Expense	75.79	hinges, screws, organizers	Home Depot	Hinges, screws etc	Parts	Yes	2017-02	2017-01
Raja Kolli	01/21/2017	Expense	10.97	Machine screws	Ace Hardware	Screws	Parts	Yes	2017-02	2017-01
Gunjan Siroya	01/23/2017	Expense	154.76	Bungee Cord, Hook, Rivet Kit, Sheet	Orchard Supply Hardware	Bungee Cord, Hook, Rivet Kit, Sheet	Parts	Yes	2017-02	2017-01
Gunjan Siroya	01/23/2017	Expense	-84.02	Returned 2 Sheets	Orchard Supply Hardware	Refund for returned Sheets	Parts	yes	2017-02	2017-01
Raj Neervannan	01/23/2017	Expense	110.75	Linear Solenoid, pivot brackets	McMaster Carr	solenoid and brackers	Parts	Yes	2017-02	2017-01
Raj Neervannan	01/25/2017	Expense	462.19	Talon SRX, VersaHub and Omni	Vex Robotics	Talon SRX, VersaHub and Omni wheels	Parts	Yes	2017-02	2017-01
Raja Kolli	01/25/2017	Expense	29.52	Rivets	HomeDepot	Rivets	Parts	Yes	2017-02	2017-01
Raja Kolli	01/25/2017	Expense	239.48	Wheels, CIMS, Hubs etc.,	AndyMark	Wheels, CIMS, Hubs etc.,	Parts	Yes	2017-02	2017-01
Raja Kolli	01/25/2017	Expense	109.86	Pneumatic Cylinders	Bimba	Pneumatics stuff	Parts	Yes	2017-02	2017-01
Raj Neervannan	01/26/2017	Expense	102.96	Continuous Rotation Servo	ServoCity	servo	Parts	Yes	2017-02	2017-01
Raja Kolli	01/26/2017	Expense	4000.00	Ventura Registration	FIRST	Second regional registration	Fees	Yes	2017-02	2017-01
Gunjan Siroya	01/28/2017	Expense	16.74	Forks and Cups	Smart & Final	Supplies for Team	Office Supplies	Yes	2017-02	2017-01
Raj Neervannan	01/28/2017	Expense	43.59	HoleSaw, Anchor, Screws	Harbor Freight		Tools	Yes	2017-02	2017-01
Srini Lingineni	01/28/2017	Expense	39.56	Rivets, Hinges, Spring	Home Depot	Rivets, Hinges, Springs	Parts	Yes	2017-02	2017-01
Gunjan Siroya	01/29/2017	Expense	7.52	Reamer and Drill Bits	Harbor Freight	Reamer and Drill Bits	Tools	Yes	2017-02	2017-01
Raja Kolli	01/31/2017	Expense	65.34	Encoder Cables	AndyMark	Encoder Cables for motors	Parts	yes	2017-02	2017-01
Gunjan Siroya	02/03/2017	Expense	38.73	Dinner for Team Members (Vegetarian)	Subway		Meals	Yes	2017-02	2017-02
Raj Neervannan	02/03/2017	Expense	-106.42	refund for solenoid	McMaster Carr	refund for 2 linear solenoids and 1 pivot bracket	Parts	yes	2017-02	2017-02
Gunjan Siroya	02/04/2017	Expense	42.99	Noodles for Bumper	Ace Hardware	10 Noodles	Parts	yes	2017-02	2017-02
Gunjan Siroya	02/04/2017	Expense	3.56	Washers	Ace Hardware	30 Washers of ID-0.5 Inch	Parts	yes	2017-02	2017-02
Raj Neervannan	02/04/2017	Expense	163.73	Bandsaw, blade etc	Harbor Freight		Tools	Yes	2017-02	2017-02
Raj Neervannan	02/04/2017	Expense	150.84	Pneumatic fittings, pressure switch	Anymark	Pneumatics	Parts	Yes	2017-02	2017-02
Raj Neervannan	02/04/2017	Expense	265.10	Solenoid valve, station base mount	Vex		Parts	Yes	2017-02	2017-02
Raja Kolli	02/04/2017	Expense	39.64	Wood etc..	Home Depot	Wood, hinges, duct tape	Parts	Yes	2017-02	2017-02
Raja Kolli	02/04/2017	Expense	7.05	Electrical Ring Connectors	Home Depot	Electrical ring connectors	Parts	Yes	2017-02	2017-02
Raja Kolli	02/04/2017	Expense	-77.57	Miter saw refund	Harbor Freight	Returned miter saw	Tools	Yes	2017-02	2017-02
Raja Kolli	02/05/2017	Expense	12.90	Hinges	Ace		Parts	Yes	2017-02	2017-02
Raja Kolli	02/05/2017	Expense	5.23	20A fuses	Amazon		Parts	Yes	2017-02	2017-02
Raja Kolli	02/06/2017	Expense	30.43	CAN connectors	Vex		Parts	Yes	2017-02	2017-02
Raj Neervannan	02/06/2017	Expense	41.84	clevis rod, brackets	McMaster Carr		Parts	Yes	2017-02	2017-02
Raja Kolli	02/06/2017	Expense	28.17	Anderson Powerpoles	Powerewerx		Parts	Yes		
Raja Kolli	02/06/2017	Expense	12.99	18 Gauge wire	Amazon		Parts	Yes		
Raj Neervannan	02/11/2017	Expense	419.12	Team Tshirts (Qty: 57)	BlueCotton.com	Team Tshirts	Office Supplies	Yes		
Srini Lingineni	02/12/2017	Expense	24.72	Flexible bit, hinges, plywood	HomeDepot		Tools	Yes		
Raj Neervannan	02/13/2017	Expense	35.55	Rod Clevis	Provoast	Bimba Rod Clevis	Parts	Yes		
Raj Neervannan	02/13/2017	Expense	48.78	Bimba brackets	Bimba	Pivot bracket	Parts			
Raja Kolli	02/13/2017	Expense	320.08	Solenoids and talons	Vex Robotics		Parts	Yes		
Raja Kolli	02/13/2017	Expense	107.93	CIM Motors etc.,	AndyMark	CIM Motors	Parts	Yes		
Raja Kolli	02/13/2017	Expense	34.95	Servo cables	ServoCity	Cables	Parts	Yes		
Raja Kolli	02/17/2017	Expense	132.22	Shaft Collars	Vex Robotics	Shaft Collars etc.,	Parts	Yes		
Ravi Joshi	02/18/2017	Expense	42.15	Cloth, Needle, Velcro,	Jo-Ann	Cover for Bumpers	Parts	Yes		
Srini Lingineni	02/18/2017	Expense	22.9	Rivets, screws, staples, bolts, nuts	Home Depot		Parts	Yes		
Raja Kolli	02/19/2017	Expense	31.99	Racheting wrench	Home Depot		Parts	Yes		
Gunjan Siroya	02/20/2017	Expense	15.49	Stencils	Michaels	Numbers for Bumpers	Parts	Yes		
Raja Kolli	02/20/2017	Expense	3.87	Lashing Strap	Harbor Freight		Parts	Yes		
Raja Kolli	02/20/2017	Expense	31.71	Turn Buckles	Home Depot		Parts	Yes		
Raja Kolli	02/20/2017	Expense	5.09	Machine screws	Home Depot		Parts	Yes		
Gunjan Siroya	02/21/2017	Expense	13.15	Carriage Bolt	Orchard Supply Hardware	Bolts for Rope climbing mission	Parts	Yes		
Raja Kolli	02/23/2017	Expense	23.6	CIM Adapters	West Coast Products	CIM Adapters	Parts	Yes		
Raj Neervannan	02/24/2017	Expense	14.46	Acetone, funnel	Home Depot		Parts	Yes		
Raj Neervannan	02/24/2017	Expense	64.59		Harbor Freight	Bins, Ratchet, Vise	Parts	Yes		
Srini Lingineni	02/25/2017	Expense	16.38	Screws, tie-down	Home Depot	Screws, rope	Parts	Yes		
Raja Kolli	02/26/2017	Expense	70.18	Shafts etc.,	Vex Robotics	Shafts, Cams etc.,	Parts	Yes		
Raja Kolli	02/27/2017	Expense	116.76	Servos	ServoCity	Servos and cables	Parts	Yes		
Gunjan Siroya	03/05/2017	Expense	-10.33	Stencils	Michaels	Return- Numbers for Bumpers	Parts	Yes		

	Transaction Date	Type	Amount	Item Description	Vendor	Comments	Category	Receipt Uploaded	Reimbursement Group	Transaction Month
Gunjan Siroya	03/05/2017	Expense	8.6	Needle, Thread	Jo-Ann	To prepare Rope for Robot Climb	Parts	Yes		
Ravi Joshi	03/05/2017	Expense	23.59	Rachet Wrench, Tie Down	Home Depot		Parts	Yes		
Ravi Joshi	03/05/2017	Expense	13.98	Rachet Wrench	Home Depot		Parts	Yes		
Raj Neervannan	03/11/2017	Expense	38.53	Rope	West Marine		Parts	Yes		
Raj Neervannan	03/11/2017	Expense	30.5	Rivetting Gun, rivets	Home Depot		Tools	Yes		
Sub-Total (since last reimbursement)			\$1,741.70							
Total			\$21,835.42							

					Approx Total:
217-3453	100" of Tube Axle Stock	\$49.98	Hub for Omniwheels (8)	23.92	
	4 Omni-Wheels	\$115.96	~120 Rivets	13.15	\$1,913.10
	2 Wedgetop Wheels	\$66.66	~20 Screws	5	
	#25 Chains	\$9.99	~20 Nuts	5	
	Two Gearbox	\$248.99	#25 Sprockets	27.96	
	Hex Hub for Wedgetop Wheels	in the KOP	1/2" Hex Bearing (8, 3 in KoP)	24.95	
	Hex Shaft (2 feet)	11.99	L-Bracket	19.96	
	Plexiglass (~569.2875 sq in)	28	Actobotics Bars (42 in)	28.43	
	Shaft Collars (14)	41.86	Washer (24)	0.5	
	4 CIM Motors	\$111.96	Hinges (6)	18.78	
	VersaBlock Kits (4)	99.96	Pool Noodles (3)	6	
	SuperBrightLEDS (3)	27.85			
	Sheet Metal (~352.22875 sq in)	21	RoboRIO	KoP	
	Velcro		Router	KoP	
	Snails	in the VersaB Kit	Pneumatic Control Module	KoP	
			Batteries	KoP	
	Compressor	KoP	6 Motor Controllers	539.94	
	Pneumatic Tubing	KoP	Voltage Regulator Module	KoP	
	Air Tank	KoP	Power Distribution Panel	KoP	
	Pneumatic Fittings (20)	~100 because pneumatic fittings a	Servo Block (1)	31.99	
	Pressure Gauge	KoP	Anderson Powerpoles (30)	38.97	
	Relief Valve	KoP	CAN Cables (3 ft)	5.50 (for 10 ft)	
	Pressure Regulator	KoP	18 gauge Cables (3 ft)	KoP	
	Air Cylinders (2)	Virtual KoP	6 gauge Cables (1 ft)	KoP	
	Pneumatic Solenoid	44.99	Cameras (2)	49.4	
	Solenoid Mounts	199.96			

	Fees	Meals	Office Supplies	Parts	Tools	Grand Total
2016-11	\$2,000.00		\$83.47	\$6,061.35	\$414.91	\$8,559.73
2016-12				\$774.80	\$181.47	\$956.27
2017-01	\$4,000.00		\$74.37	\$5,317.94	\$567.36	\$9,959.67
2017-02		\$38.73		\$493.16	\$86.16	\$618.05
Grand Total	\$6,000.00	\$38.73	\$157.84	\$12,647.25	\$1,249.90	\$20,093.72

Date of this notice: 03-30-2015

Employer Identification Number:
47-3562558

Form: SS-4

Number of this notice: CP 575 E

CHARGING ROBOTICS
116 CAPEBERRY
IRVINE, CA 92603

For assistance you may call us at:
1-800-829-4933

IF YOU WRITE, ATTACH THE
STUB AT THE END OF THIS NOTICE.

WE ASSIGNED YOU AN EMPLOYER IDENTIFICATION NUMBER

Thank you for applying for an Employer Identification Number (EIN). We assigned you EIN 47-3562558. This EIN will identify you, your business accounts, tax returns, and documents, even if you have no employees. Please keep this notice in your permanent records.

When filing tax documents, payments, and related correspondence, it's very important that you use your EIN along with your complete name and address exactly as shown above. Any variation may cause a delay in processing, result in incorrect information in your account, or even cause you to be assigned more than one EIN. If the information shown above isn't correct, please send us the correction using the attached tear-off stub.

Annual filing requirements

Most organizations with an EIN have an annual filing requirement, even if they engage in minimal or no activity.

A. If you are tax exempt, you may be required to file one of the following returns or notices:

Form 990, Return of Organization Exempt From Income Tax
Form 990-EZ, Short Form Return of Organization Exempt From Income Tax
Form 990-PF, Return of Private Foundation
Form 990-N, e-Postcard (available online only)

Additionally, you may be required to file your annual return electronically.

If an organization required to file a Form 990, Form 990-PF, Form 990-EZ, or Form 990-N does not do so for three consecutive years, its tax-exempt status is automatically revoked as of the due date of the third return or notice.

Please refer to www.irs.gov/990filing for the most current information on your filing requirements.

B. If you are not tax-exempt, you may be required to file one of the following returns:

Form 1120, U.S. Corporation Income Tax Return
Form 1041, U.S. Income Tax Return for Estates and Trusts
Form 1065, U.S. Return of Partnership Income

Please refer to Publication 1635, Understanding Your EIN, for more information about which forms you may be required to file.

Applying for Tax-Exempt Status

Receiving an EIN from the IRS is not the same thing as receiving IRS recognition of tax-exempt status. To apply for formal recognition of tax-exempt status, most organizations will need to complete either Form 1023, *Application for Recognition Under Section 501(c)(3) of the Internal Revenue Code*, or Form 1024, *Application for Recognition of Exemption Under Section 501(a)*. Submit the completed form, all applicable attachments, and the required user fee to:

Internal Revenue Service
PO Box 12192
Covington, KY 41012-0192

Publication 557, *Tax Exempt Status for Your Organization*, has details on the application process as well as information on returns you may need to file.

Additional information

To obtain tax forms and publications, including those referenced in this notice, visit our Web site at www.irs.gov. If you don't have access to the Internet, call 1-800-829-3676 (TTY/TDD 1-800-829-4059) or visit your local IRS office.

IMPORTANT REMINDERS:

- * Keep a copy of this notice in your permanent records. **This notice is issued only one time and the IRS will not be able to generate a duplicate copy for you.** You may give a copy of this document to anyone asking for proof of your EIN.
- * Use this EIN and your name exactly as they appear at the top of this notice on all your federal tax forms.
- * Refer to this EIN on your tax-related correspondence and documents.
- * Provide future officers of your organization with a copy of this notice.

If you have questions about your EIN, you can contact us using the phone number or address shown at the top of this notice. If you write, please tear off the stub at the bottom of this notice and send it along with your letter. If you don't need to write us, please don't complete and return this stub.

Your name control associated with this EIN is CHAR. You will need to provide this information, along with your EIN, if you file your returns electronically.

Thank you for your cooperation.

(IRS USE ONLY) 575E

03-30-2015 CHAR O 9999999999 SS-4

Keep this part for your records.

CP 575 E (Rev. 7-2007)

Return this part with any correspondence
so we may identify your account. Please
correct any errors in your name or address.

CP 575 E

9999999999

Your Telephone Number Best Time to Call DATE OF THIS NOTICE: 03-30-2015
() - _____ EMPLOYER IDENTIFICATION NUMBER: 47-3562558

FORM: SS-4 NOBOD

INTERNAL REVENUE SERVICE
CINCINNATI OH 45999-0023
[REDACTED]

CHARGING ROBOTICS
116 CAPEBERRY
IRVINE, CA 92603

INTERNAL REVENUE SERVICE
P. O. BOX 2508
CINCINNATI, OH 45201

DEPARTMENT OF THE TREASURY

Date: DEC 03 2015

CHARGING ROBOTICS
116 CAPEBERRY
IRVINE, CA 92603-4221

Employer Identification Number:
47-3562558
DLN:
26053735001115
Contact Person:
CUSTOMER SERVICE ID# 31954
Contact Telephone Number:
(877) 829-5500
Accounting Period Ending:
December 31
Public Charity Status:
170(b)(1)(A)(vi)
Form 990/990-EZ/990-N Required:
Yes
Effective Date of Exemption:
March 18, 2015
Contribution Deductibility:
Yes
Addendum Applies:
No

Dear Applicant:

We're pleased to tell you we determined you're exempt from federal income tax under Internal Revenue Code (IRC) Section 501(c)(3). Donors can deduct contributions they make to you under IRC Section 170. You're also qualified to receive tax deductible bequests, devises, transfers or gifts under Section 2055, 2106, or 2522. This letter could help resolve questions on your exempt status. Please keep it for your records.

Organizations exempt under IRC Section 501(c)(3) are further classified as either public charities or private foundations. We determined you're a public charity under the IRC Section listed at the top of this letter.

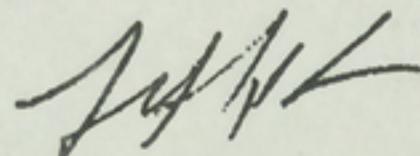
If we indicated at the top of this letter that you're required to file Form 990/990-EZ/990-N, our records show you're required to file an annual information return (Form 990 or Form 990-EZ) or electronic notice (Form 990-N, the e-Postcard). If you don't file a required return or notice for three consecutive years, your exempt status will be automatically revoked.

If we indicated at the top of this letter that an addendum applies, the enclosed addendum is an integral part of this letter.

For important information about your responsibilities as a tax-exempt organization, go to www.irs.gov/charities. Enter "4221-PC" in the search bar to view Publication 4221-PC, Compliance Guide for 501(c)(3) Public Charities, which describes your recordkeeping, reporting, and disclosure requirements.

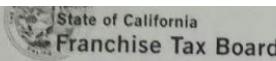
CHARGING ROBOTICS

Sincerely,



Jeffrey I. Cooper
Director, Exempt Organizations
Rulings and Agreements

Letter 5436



PO Box 1286
Rancho Cordova CA 95741-1286

CHARGING ROBOTICS
ATTN: RAJMOHAN NEERVANNAN
116 CAPEBERRY
IRVINE CA 92603

Date: 03.03.16
Case: 30820599824619523
Case Unit: 30820599824619526
In reply refer to: 760:TS:F120

Regarding	: Tax-Exempt Status
Organization's Name	: CHARGING ROBOTICS
CCN	: 3767990
Purpose	: Educational/Scientific
R&TC §	: 23701d
Form of Organization	: Incorporated
Accounting Period Ending	: 12/31
Tax-Exempt Status Effective	: 03/18/2015

Exempt Determination Letter

We have determined the organization is tax-exempt from California franchise or income tax as stated in the above Revenue and Taxation Code (R&TC) section (§).

To retain tax-exempt status, the organization must be organized and operating for nonprofit purposes within the provisions of the above R&TC section. An inactive organization is not entitled to tax-exempt status.

We have based our decision on the information submitted and the assumption that the organization's present operations will continue unchanged or conform to those proposed in the organization's application. In order for us to determine any affect on the tax-exempt status, the organization must immediately report to us any change in:

- Operation
- Character
- Purpose
- Name
- Address

Our determination may no longer be applicable, if these changes occur:

- Material facts or circumstances relating to the organization application.
- Relevant statutory, administrative, or judicial case law.
- Federal interpretation of federal law in cases where our decision was based on such interpretation.

It is the organization's responsibility to be aware of these changes should they occur. This paragraph constitutes written advice, other than a chief counsel ruling, within the meaning of R&TC §21012(a)(2).

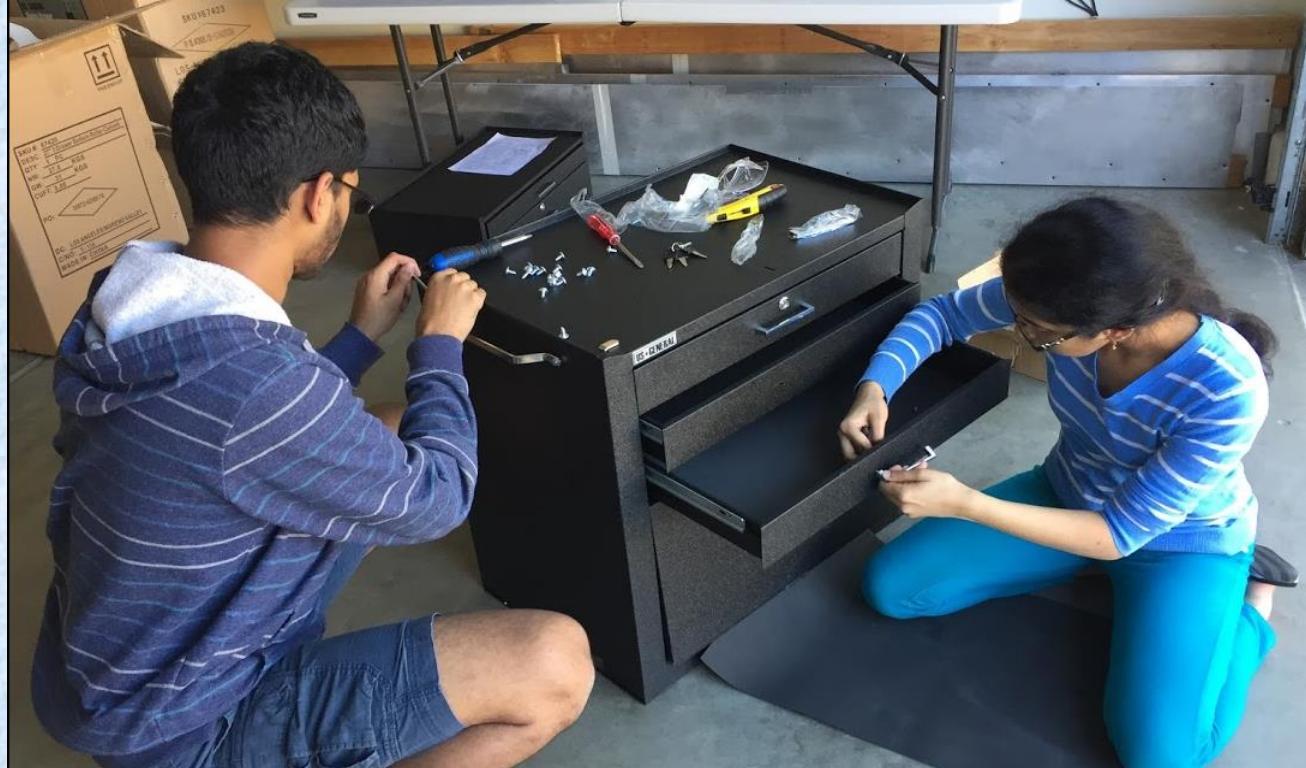
For filing requirements, get Pub. 1068, *Exempt Organizations - Filing Requirements and Filing Fees*. Go to ftb.ca.gov and search for **1068**.

This exemption is for state franchise or income tax purposes only. For information regarding sales tax exemption, contact the State Board of Equalization at 800.400.7115, or go to their website at boe.ca.gov.

Theresa L. Schock
Telephone: 916.845.4171
Fax: 916.843.0932

Charging Champions

Staying Safe Through the Years



Ganesh and Pallavi assembling the tool storage box (above). Tools are labeled and sorted by type and system (i.e. Hex Keyes or Pneumatics tools). Power Tool Table (right). Power Tools have all guards and students must have training before they can use them.



At competitions, long hair is tied back, PPE is worn, and the drive team can lift the robot properly (above).



We make sure we have proper PPE when using tools (below).

Safety FIRST

Training from Mr. Manuel Martinez – A STEM Professional



Mr. Martinez works at AMD International Technologies, using tools like the ones Charging Champions uses and ones that require many more safety precautions. In November, before we started using the power tools, Mr. Martinez visited Charging Champions when all students were present and showed us the proper ways to use tools and the proper PPE (Personal Protective Equipment). Charging Champions has continued to stay safe, everyone watching out for one another.