

8.30.14 Cougar Robotics Build-A-Better-Bot *Duration 9:00 am - 5:00 pm*

Attendance:

Bo, Kristen, Marcos, Matt, Chris, Aidan, PJ, Coach, Programming Coach Stephen, Mentor Solomon

Tasks:

1. Examine Cougar Robotics shifting gear box
2. Look through Patronum Bots engineering notebook
3. Learn something new

Reflections:

1. Cougars brought their World championship robot from Block Party, Matt and Coach got a chance to see how the drive shifter was constructed. (See details.)
2. Patronum had their award winning engineering notebook out for examination and we each paged through it. (See details.)
3. We came back with new ideas, especially about preventing disconnections. (See details.)



Summary:

We were invited by Cougar Robotics Team #4251 and the Patronumbots Team #5972 to attend a workshop they hosted at East Troy middle school in East Troy Wisconsin. It was our second year attending and we accompanied new a team we are currently planting. While there, we discussed some the new rules included in part 1 of the game manual, as well as chatted about each other's robots and why we chose what we did for our previous season. Afterwards, we stopped at an old style drive-in restaurant and had a fun team dinner!

9.13.14 got robot? Kick Off - Engineering Duration 12:00 pm - 4:30 pm

Attendance:

Bo, Chris, Matthew, Aidan, PJ, Kristen, Marcos, Coach, Mr. Stephen, Mrs. Laker, Mrs. McKellar, Mr. Solomon

Tasks:

1. In-depth team brainstorm session about game

Reflections:

1. We have decided to closely examine everything our team does, i.e. outreach, social media, engineering notebook, judging, game strategy, etc., to see if there are opportunities we're missing and should be improving on. Our goal this year is to return to Worlds. In order to do this we will need to work hard and determine every strategy with that goal in mind. (See categories below.)

Outreach & FIRST support:

- 3 Point Outreach
 - 1) Connect to Government Officials
 - Focus on how Officials can facilitate growth of robot teams from the political side
 - 2) Mentor in the STEM fields through FIRST
 - 3) Implementing FIRST into the 3rd largest school district in the world
 - (Chicago school district)
- We need to get a new sponsor for FIRST on same level of Rockwell Collins (Considering Boeing)
- Another outreach idea centers around the need for FTC volunteers in Illinois. A possible way to recruit new volunteers is to arrange robot demonstrations with a number of engineering companies--informing them about the program and our team and possibly interesting them in supporting IL FIRST either financially or through registering through the VIMs system as volunteers for IL FTC events.
-Chris

Social Media:

- RoboTalk! (A Weekly web-series we will be hosting that will be posted on our youtube channel which will feature tips and tricks, game updates, and FIRST news).
 - Survey watchers to discover how we can better service viewers.
 - Every other week live stream a question and answer section were whole team answers.
- Website/Social Media Polls
- All the Promotional Videos

Social media outlets we have and purposes:

1. Youtube
 - For Promote video, Sponsorship videos, and RoboTalk!
 2. Facebook
 - For general social purposes. (Almost everyone has a facebook)
 3. Tumblr
 - To promote our Robo-Memes and a place to share our teams uniqueness and spread FIRST through numerous blog posts
 4. Website
 - RoboTalk!, FTC and team information, team auto bios etc.
 5. Twitter
 - For quick tournament and event updates.
 6. Instagram
 - A place to share photos of our season in a fun way
- Bo

Notebook:

- Every page is signed by another member at the bottom each page to confirm that another member reviewed the content
 - Need more stats over all, more pictures, more representation of content
 - All team members need to enter more regularly
 - Summary page at beginning of book to help guide to valuable content
 - We identified a need to quantify the hours our team spends doing outreach, mentoring and time spent building the robot and preparing for tournaments.
- KMCK

Judging:

- Find the awards that are valued and stick to those hard, don't forget to work for all award areas but be determined in what we do
 - During judging leave a visual reinforcement to drive in what we want judges to see
- Matthew

Game Strategy:

Autonomous:

- Rolling goal = $20 + 20 + 20 = 60$ pts
- Kickstand = 30 pts
- Ramp = 20 pts

Tele Op:

- 60 cm. rolling goal = Max of 114 pts
- 90 cm. rolling goal = Max of 261 pts

End Game:

- Robot in parking zone at end of match 10 pts
- All Rolling goals ending in parking zone 60 pts
- Robot off the field 30 pts
- MMMs

Details:

1. During our deep discussion/brainstorm session I really felt all of our ideas that we thought of over the summer coming together and being made into a reality and it was an awesome feeling. Coach also gave me permission to use ETC's studio for filming our webshow RoboTalk! which I am really looking forward to working on this season. Chris and Marcos will also co-host with me as well as work the camera and lights, and we will hopefully be releasing videos on a weekly basis. It's gonna be a great season. -Bo



9.16.14 PROTO-STORM!!

Duration 6:00 pm - 8:00 pm

Attendance:

Bo, Chris, Matthew, Aidan, PJ, Kristen, Marcos, Coach, Programming Coach Stephen, Mrs. Laker, Mrs. McKellar, Mr. Solomon

Tasks:

1. Plan ideas for a practice "sparring" robot that we would use as an "opponent" for the rest of the season.
2. Brainstorm ideas for ways of picking up and scoring balls
3. Put the ideas presented into CAD so they can be tested virtually.
4. Brainstorm new ideas for our robot.

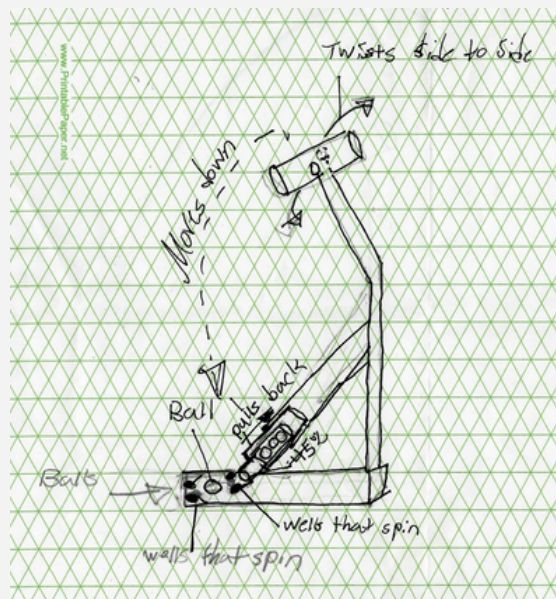
Reflections:

1. Aidan was tasked with developing the sparring bot, a robot which we will use for training during driving practice. (See details.)
2. Matt, Marcos, Kristen, PJ, Coach, and Mr. Stephen spent time generating ideas for ways that our competition robot could pick up balls and deploy them. (See details.)
3. Bo and Chris would work on getting the ideas that are presented into CAD. (See details.)
4. The two major discussion points involved the construction and requirements of the drivetrain, and ball transfer devices. Possible drivetrains included the likes of swerve and holonomic, while the ball mechanisms discussion included inertial kickers, slides, and conveyors. (See details.)

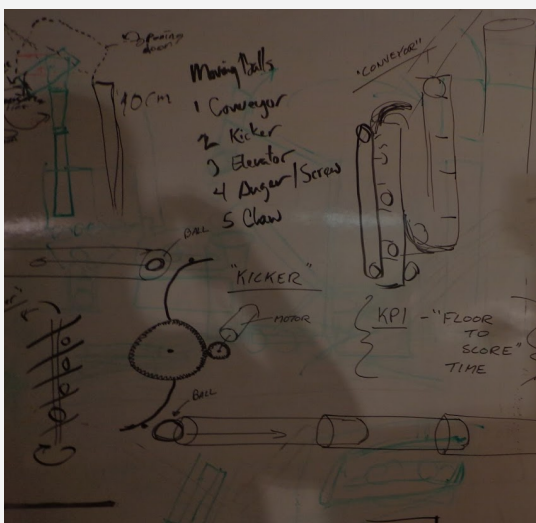


Details:

1. My current idea is to make a sparring bot with a telescoping lift that has a scoop/tube attached at the top. This tube will have a pivot in the middle. There will be a scoop with a zip-tie intake in the front and behind the scoop at the opposite side of the tube will be an opening hatch. In order to pickup balls the lift will lower all the way while the tube moves on its pivot to become parallel with the ground, allowing balls to enter through the zip-tie intake. Once the pipe is full the lift would raise and the pipe would become vertical. To score, the robot would move its lift/tube to roll the balls into a rolling goal we would have attached on the back. This goal would not be released so we could continue scoring easily. --AMP



2. During our brainstorming section for the robot's intake/delivery multiple ideas were presented.
 - a. I thought of a 2 part delivery mechanism.



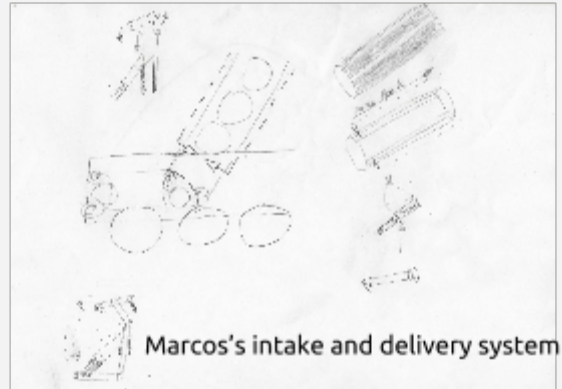
Delivery Mechanism:

My idea entails a pipe and an arm with 2-3 claws mounted at the end. The illustration to the left shows how these components go together. At the bottom is a square frame/base, which the drawer slide is mounted to, on the front. The top of the slide has two straight bars that make up an arm connecting the slide system to a horizontal 'pipe' at the very top. This 'pipe' will be able to hold 5 balls total. Through the slide changing elevation the arm and thus the pipe will move as desired. This mechanism will have 4 preset movement capabilities:

- Pipe end facing ground at 45° from vertical
- Wrist will rotate left/right
- Arm shoulder rotates up/down so that the arm rises
- Pipe end facing ground at 45° from vertical on either side

Intake System:

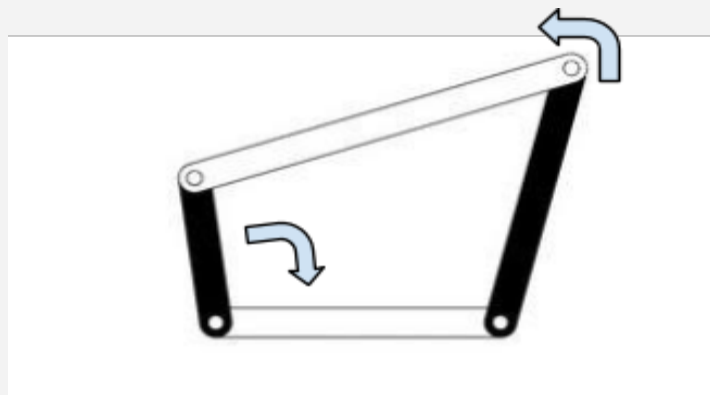
In my design the pipe is connected at 45° to the base. This pipe has three slits in it. Overall there are two pipes: an intake system/pipe, which is smaller, and the delivery system/pipe, which is larger. The downward position will be at a 45 degree angle. When grabbing balls the delivery pipe will interlock with the intake pipe. Once locked the delivery system will retract the attached claws and will connect with the slots in the intake system. Interlocked the delivery system will pull back. When all is done the systems will release and the intake will rise to the delivery positions. -MMMs



- b. While prototyping ideas I developed a closeable scoop to drive up to the balls then close the top half of the scoop bucket to trap a ball. The scoop would be mounted on a longer jointed arm to reach up, then open the upper scoop to drop the balls in the rolling goal. I used Tetrix parts, cardboard, and masking tape to create a prototype to show my idea to the team. -K McK



3. Chris and I worked on making a 4 bar linkage that we could combine with Kristen's pipe and arm idea so the tube could easily be lifted off the floor. We tested out our idea in SolidWorks and it worked quite well! -Bo

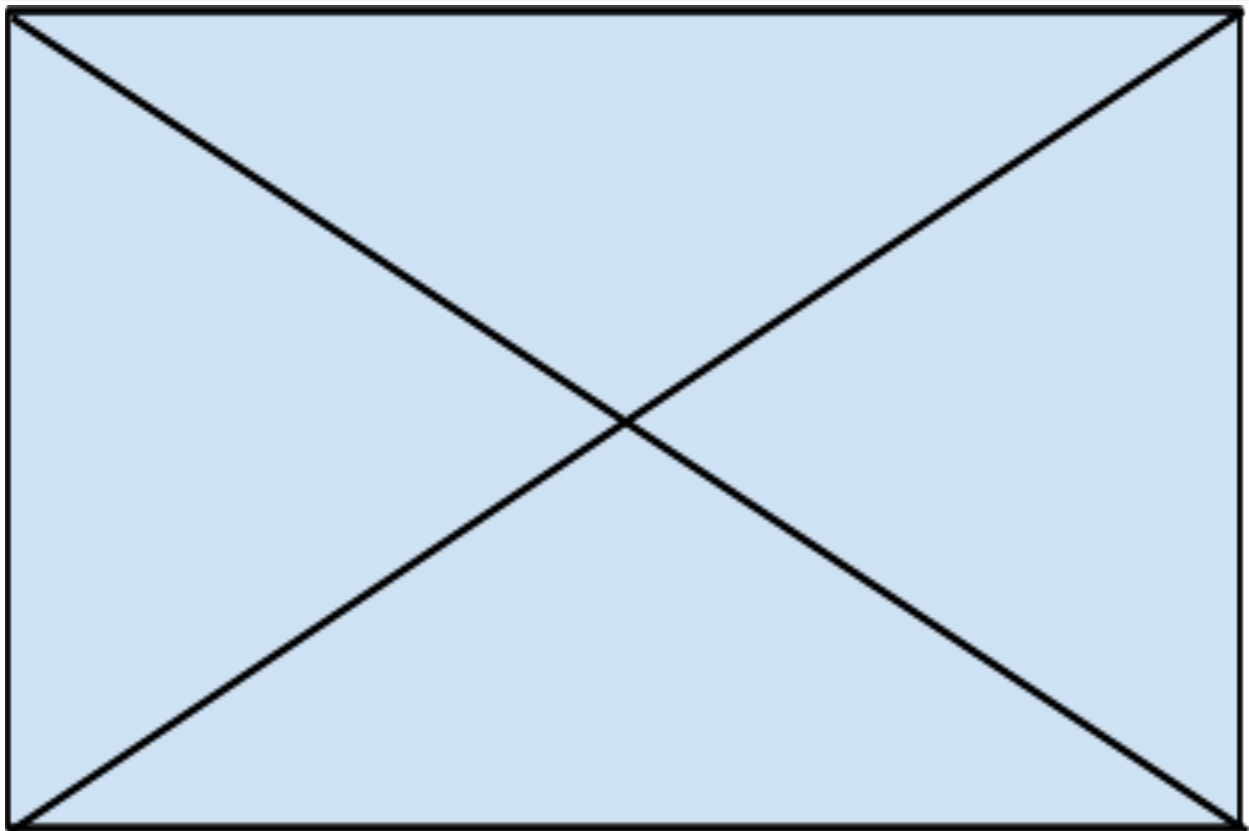


4. During the discussion with the team it became readily apparent that some form of omnidirectional drive train would be advantageous for our scoring ability. This drive would allow us diagonal and horizontal movement across the field. Having already implemented a functioning holonomic drive on our Ring It Up robot, we plan on using it as a platform in pursuit of testing holonomic drive platforms in general. Some capabilities we need to test include:
 - driving uphill, pushing, and autonomous accuracy

As per mission operandi, the inability for mecanum wheels to effectively move diagonal eliminates them as a drive platform, leaving us with the more exotic options to explore.

Among the more interesting discussed drive platforms are spindle and swerve. Swerve drive as a platform may offer us a significant boon to both autonomous accuracy and defensive driving, allowing us to essentially lock in a direction and go.

Methods of powertrain were discussed. The two most viable options for swerve at the moment seem to be a short length of speedometer cable between the motor and the wheel, and 22.5° bevel gears, with one pair integrated into the drive wheel. - Matthew



09.20.14 ROBO-PREP

Duration 12:00 pm - 4:30 pm

Attendance:

Bo, Chris, Matthew, Aidan, PJ, Kristen, Marcos, Coach, Mr. Stephen, Mrs. Laker, Mrs. McKellar, Mr. Solomon

Tasks:

1. Get our 2012-13 robot "Bessie" operational for demoing, and to test holonomic wheels on the ramp
2. Get our 2013-14 season robot "The Black Pearl" operational for SMTA outreach, and for testing on the ramp
3. Prototype more ideas!

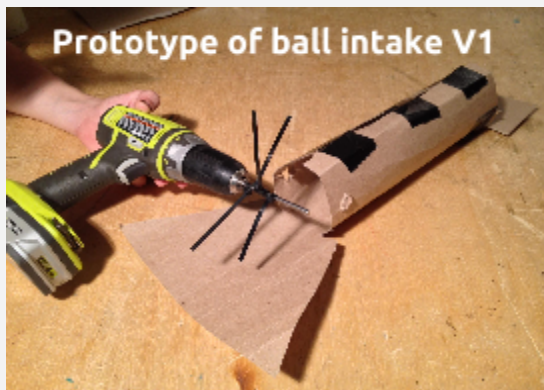
Reflections:

1. We replaced Bessie's brick and downloaded the appropriate TeleOp program. We were curious to test the effectiveness of a holonomic drive on this year's field so we drove Bessie up and down the ramp to watch how it performed. It worked reasonably well until the 12 volt battery got low and de-energized. This resulted in Bessie sliding down the ramp. -Bo
2. Our 2013-14 robot was not in good condition. To start with, the set screws on the lift were loose so we tightened them with an allen wrench and checked most of the other screws and tightened as needed. -AMP
3. We had a few ideas strike up today, and we made several prototypes. We also explored ways to advance a prototype we had previously created. (See details.)

Details:

1. No additional details.
2. No additional details.
3. One of our ideas was a box with a funnel on the top. It used a motor with zip-ties to feed balls into the funnel and then with a linkage it would lift up and dump them out the back using gravity.





Another idea was a tube type intake system that would have moving sides that slide forward and extend.

- a. My original design was one solid pipe that would act as an intake and delivery system. Matthew expanded on my idea making it much more efficient. As you can see below now we have a pipe that breaks into 2 parts. One part that stays towards the bottom of the robot. Well the other move up at 85 degree angle and then deliver the ball. You can see a picture below. --MMMs



Ball tube extends outward holding no more than 5 balls by dropping any small ones we pick up

4. No additional details.

9.23.14 Buildagram

Duration 6:00 pm - 8:30 pm

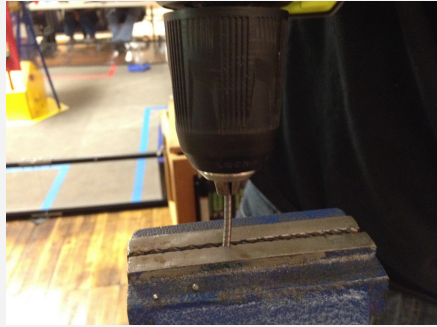

Attendance:

Bo, Chris, Matthew, Aidan, PJ, Kristen, Maros, Coach, Mr. Stephen, Mrs. Laker, Mrs. McKellar, Mr. Solomon

Tasks:

1. Discuss different programming/sensor approaches for different drive trains
2. Start building the sparring bot
3. Test axle strength for custom swerve drive
4. Celebrate our coach's birthday
5. Learning the advanced mates of SolidWorks

Reflections:

1. We talked about what drivetrain we will be using and what sensors we need to use if we used that drivetrain. -KMCK (See more details below)
2. I started the frame and wheels of the sparring bot. We decided on a holonomic drive. This way the programmers could debug/experiment with the drive. Also so they have a robot to test Hitechnic sensors. --AMP
3. We tested the axle strength of the flex shaft in several configurations. The test rig consisted of the bench vice on one end, and the cordless drill set to a clutch of "12". Just putting a length of the cable into the chuck resulted in delamination of the cable, so several tests with the ends either crimped or folded over were conducted. (See details.)
4. Today was our coach's birthday we had lots fun celebrating it and expressing our appreciation of him, mainly through cake. (See details.)
5. I wanted to learn more about SolidWorks so I tasked myself to learn the advanced mates in SolidWorks. I started out by looking at some manuals and decided to go to YouTube and learn there. (See details.)

Details:

1. Our goal is to test and think through different sensor suite of ideas for the range of drives we might use. Part of that is to test out these sensors long before we need to use them, so we might be sure on their capabilities and use.
 1. Holonomic Drive:
 - Challenges: Hard to program for auto
 - Candidate Sensors: gyro, accelerometer, ultrasonic, IR, compass.
 2. Tank Drive:
 - Challenges: Lower mobility
 - Candidate Sensors:

We had time to do more brainstorming about how we are going to do our autonomous. We had many ideas like detecting the IR to determine if it is center goal position 1 or not one and based on that we would drive in a way that we could either get 1 or a single movement that gets center goal 2 and 3 -PJ
2. No further details.
3. The shear strength of the flex axle is unfortunately not as high as I had hoped, however the shear/axial flexing in any length seems to be nigh nonexistent. This may prove useful for a smaller diameter wheel driven by a geared motor.
-Matthew



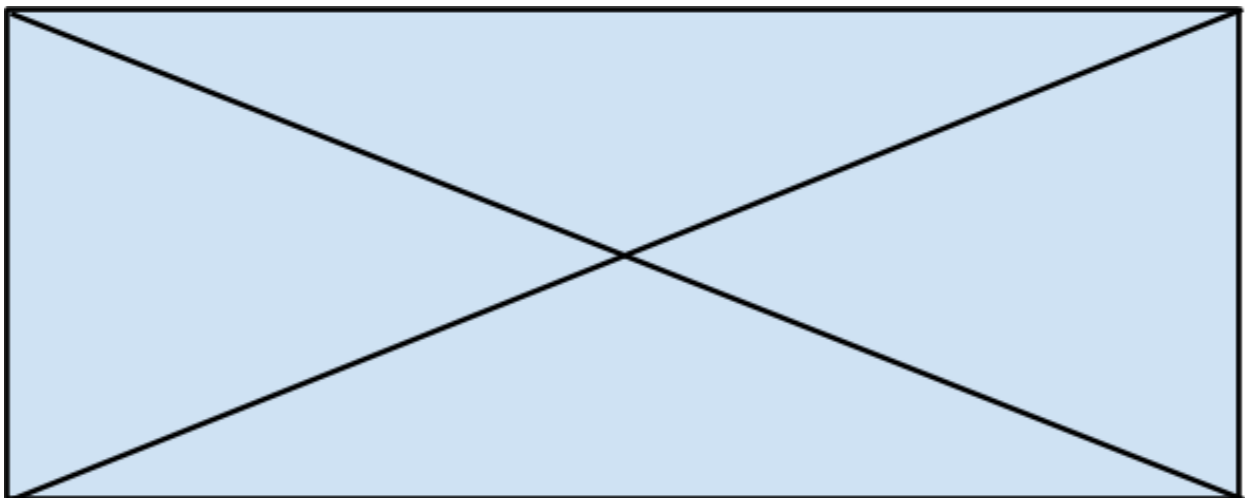
4. We not only had cake but a lot of Mountain Dew, and a lot of fun. Everyone on our team said a word on how much we love our coach and the experiences over the years that we had and are having with him. On our team our coach is not only a coach but a father to us all. He guides us, leads us, protects us, and helps us to grow . Thank you coach for everything :). --MMMs



Coach's Birthday Celebration



5. While watching the video I took a spare monitor we had and put the video on the monitor so I could watch and follow it at the same. After watching the whole video I practiced all the advanced mates to make sure I knew how to do them so I could help someone else if needed. -Chris



9.27.14 Photo Day

Duration 12:00 pm - 4:30 pm

Attendance:

Bo, Chris, Matthew, Aidan, PJ, Kristen, Marcos, Coach, Mr. Stephen, Mrs. Laker, Mrs. McKellar, Mr. Solomon

Tasks:

1. Take team photos
2. Experiment with low temperature brazing rods for possible welding solutions
3. Configure and test our Orion Delta 3D printer for prototyping this season.

Reflections:

1. Mr. Pollard took our team photos for the season including individual and group photos. We then posted some of those photos to our social media sites. (See details.)
2. We bought some low temperature Alumiweld brazing rods to test whether or not we would be able to weld some aluminum pieces to each other for a more robust connection between parts. (See details)
3. We recently purchased an Orion Delta 3D printer in late June and played around with it a little bit in the preseason. Today, we finally moved it over to HQ for prototyping and testing any ideas we come across. (See details.)

Details:

1. Today we had our team go outside to take pictures. It was very warm out and a wonderful day for pictures. It was quite a challenge to take pictures with the bright sun but we had lots of fun having the wonderful picture scenes in downtown Elgin as the background for some of the group pictures. -MMMs

2. Matt, Chris and I spent some time testing out the low temperature brazing rods (750° fahrenheit working temperature) on some scrap pieces of aluminum. We sanded some, and left some raw. Then, took all the material outside for testing. First, we tried a raw scrap piece of 80/20 to another piece of 80/20, and after awhile of heating and melting it failed to fuse together. Then, we tried a sanded piece to another sanded piece and it fused a little bit but the 80/20 is such a good heat sink it wasn't very strong and didn't last very long.

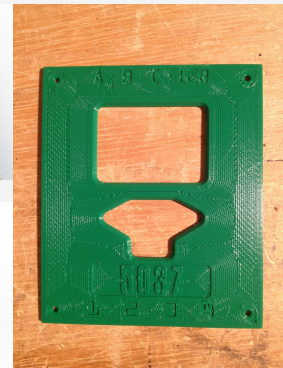
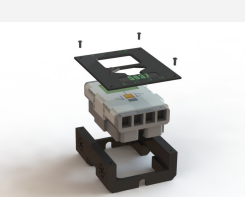
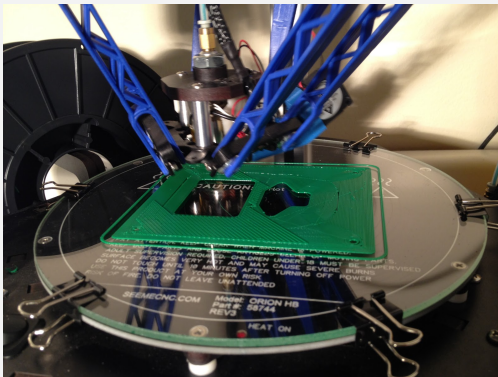


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Next, we tried fusing a scrap piece of sanded aluminum channel to another aluminum channel and it was actually a surprising result. They fused quite nicely after awhile of heating and although it wasn't the best weld we could have done. It held together for a little while until we exerted about 5 pounds of force upon it and the weld broke. We are going to hopefully experiment with these more to see if we can get better results. -Bo



3. Matt and I spent some time configuring the printer's settings so we could get high quality and clean parts from the printer. Once we had what we liked we then uploaded the settings to google drive as well as the team flashdrive so we could distribute them to any computer that would be printing and so we could always have the settings in case something went wrong. Finally we printed a part of an assembly I worked on over the summer in SolidWorks. It is an NXT case that would hold the NXT firmly but yet all the buttons, batteries, and ports were still easily accessible. We printed the top half and were pretty happy with the end result. -Bo



9.30.14 Strategizing

Duration 6:00 pm - 8:00 pm

Attendance:

Bo, Chris, Matthew, Aidan, Kristen, Marcos, Coach, Mrs. Laker, Mrs. McKellar, Mr. Solomon

Tasks:

1. Have an in depth review of the game and rules and decide what we want to accomplish
2. Decide what drive system we want to use this season
3. Determining what strategy our team should take during Autonomous

Reflections:

1. We discussed and wrote what we thought we would be expecting at our future competitions and input that information into a percentage table. (See details)
2. After much discussion we finally decided on a tank drive for our robot. We talked about all the different drive systems including holonomic, swerve, and crab drive but we decided that we would rather spend our time working on reliable scoring devices rather than a cool drive system. -Bo
3. Our team spent time determining a priority list in which what autonomous missions we should determine as a high priority. (See details.)

Details:

1. The percentage equals the amount of teams we believe are going to attempt that particular scenario.

Autonomous	90% - Easy	75% - Med.	20% - Hard	10%> - V Hard
20 pts. - Drive off ramp	X			
30 pts. - Kickstand		X		
60 pts. - Center goal				X
90 pts. - Ball in each goal				X
60 pts. - Goals in parking zone			X	

Defense		X	X	
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2. No additional details.

3. The way we broke this down was in 3 questions:

- **What are the criticals?**

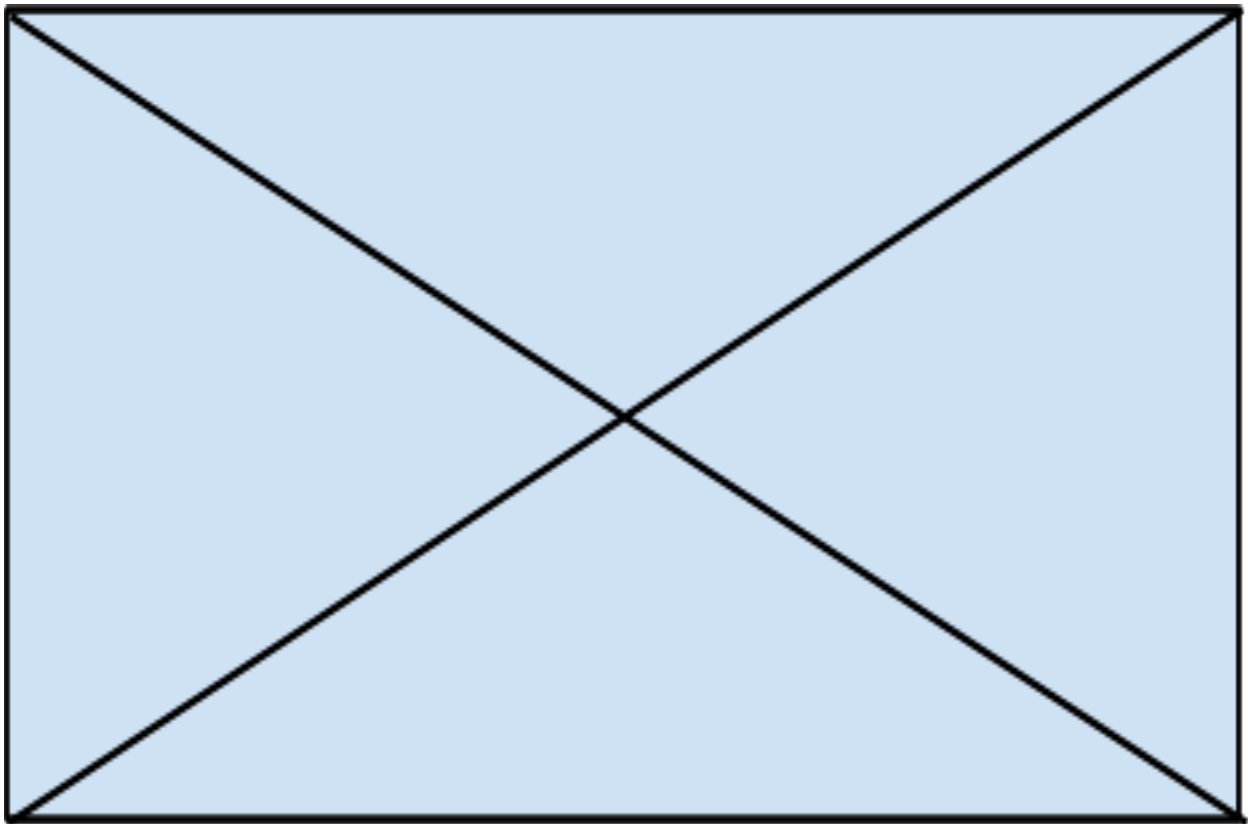
In this question we are asking ourselves what missions do we need to have to even participate in Autonomous. Those are (Drive off the ramp) (deliver a ball into a rolling goal) (Return to parking zone).

- **What do we believe most teams will have at our qualifier match?**

Answering this question is quite simple we are assuming most teams will have the missions of what we have determined as critical missions.

- **What are our wants?**

We want to have the ability to score every mission in Autonomous reliably so that our team will not be dependent on our Alliance partner. -MMMs



10.4.14 Sensor Readings

Duration 12:00 pm - 4:30 pm

Attendance:

Chris, Matthew, Marcos, Aidan, PJ, Bo, Kristen, Coach, Mrs. Laker, Mrs. McKellar, Mr. Solomon

Tasks:

1. Take a grid range of different sensor readings on the field. This is to test how well the sensors detect the center goal.
2. CAD up the Ball Intake Device
3. Build sparring bot

Reflections:

1. (See details)
2. After trouble with making the circle for the intake system I asked Matthew for help. He helped me to make what is in the details below. (See details.)
3. I started building the sparring bot out of tetrix channels, I took three tetrix channels and connected them to the base I had already constructed, completing the frame. Then I attached two plates to the mainframe and the back of the robot frame, for adding motors and wheels to the frame.--AMP

Details:

1. PJ and I set up and worked through a test suite recording sensor readings across the field in 12 inch intervals. This was all to determine a base line sensor capability to detect the center goals orientation. We did a total of about 60 tests, one suite of three batches, one of each goal orientation, at far distance, 12-13 inches from back wall. Second suite once again of three batches at close range, 22-23 inches from back wall.

The four sensors in use for the tests/logs are two IR sensors, left(2) and right(1), an ultrasonic, and an EOPD sensor, which required a SMUX to run.



The EOPD proved to be unusable for sensing the robot's environment due to its inability to read distances further away than 5 inches. Even with sensor on far distance mode, the EOPD proved ineffective for such long range purposes. Of our two IR's we are aware that one of them has a tendency towards one side, even still we believe that using the two IR's in conjunction gave us useful data.

We also noticed an IR dead zone directly in front of the center goal when the robot is facing straight at the flat side of the goal. A current strategy idea is that if the robot could not detect the center goal orientation within 48 inches of movement the robot could orbit the center goal for 90 degrees to determine the orientation based on the dead zone. -K McK

After studying the data, we concluded that using the ultrasonic sensor and IR sensors combined would give best results. This is because the ultrasonic and IR sensors give the most accurate and consistent data readings. -PJ

Far Distance: 12-13 inches from wall
1st Goal Orientation

Far Distance: 12-13 inches from wall
2st Goal Orientation

Dist in Feet	Ultrasonic	IR (LEFT)	IR (RIGHT)	EO PD		Dist in Feet	Ultrasonic	IR (LEFT)	IR (RIGHT)	EO PD
1	255	7	7	0		1	255	7	7	0
2	255	7	7	0		2	255	7	6-7	0
3	255	7	7	0		3	255	6	6	0
4	255	6	6	0		4	255	7	6	0
5	255	6	5	0		5	255	6	6	0
6	95	5	5	0		6	255	5	5	0
7	255	5	5	0		7	255	5	5	0
8	255	5	4	0		8	255	5	5	0
9	255	4	3	0		9	255	5	5	0
10	255	3	3	0		10	255	0	0	3
11	255	3	3	0		11	54	3	3	0

Extended

Far Distance: 12-13 inches from wall
3rd Goal Orientation

Short Distance: 22-23 inches from wall
1st Goal Orientation

Dist in Feet	Ultrasonic	IR (LEFT)	IR (RIGHT)	EO PD		Dist in Feet	Ultrasonic	IR (LEFT)	IR (RIGHT)	EO PD
1	255	7	7	0		1	255	7	7	0
2	255	6	6	0		2	255	7	7	0
3	255	5	5	0		3	255	7	7	0
4	255	6	0	0		4	255	7	7	0
5	255	6	6	0		5	255	7	7	0
6	115	6	6	0		6	34	5	6	0
7	255	5	5	0		7	255	4	7	0
8	255	5	4	0		8	255	3	3	0
9	255	6	0	0		9	255	3	3	0
10	255	6	0	0		10	186	2	3	0
						11	64	2	0	0

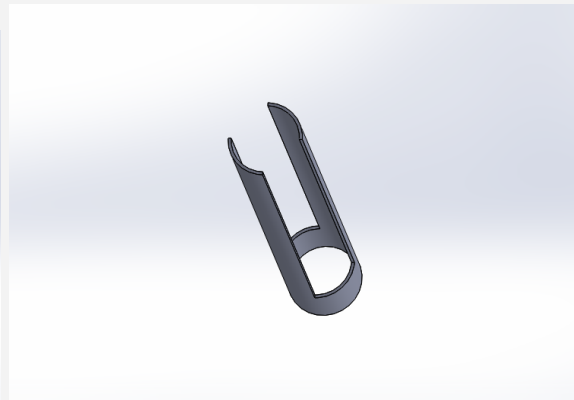
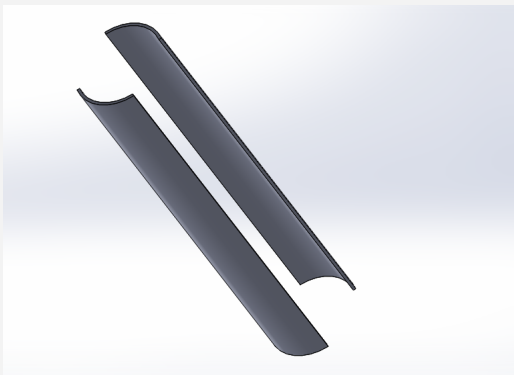
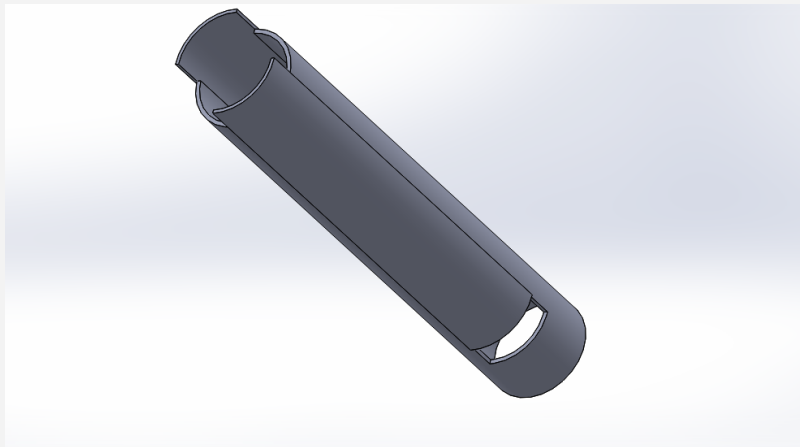
Extended

Short Distance: 22-23 inches from wall
2nd Goal Orientation

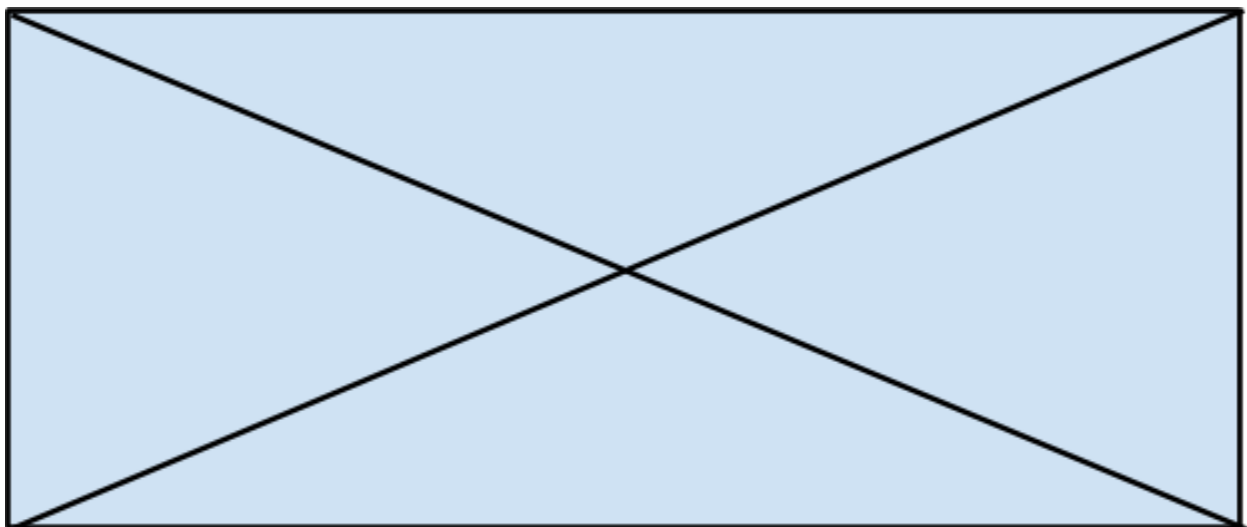
Short Distance: 22-23 inches from wall
3rd Goal Orientation

Dist in Feet	Ultrasonic	IR (LEFT)	IR (RIGHT)	EO PD		Dist in Feet	Ultrasonic	IR (LEFT)	IR (RIGHT)	EO PD
1	255	7	7	0		1	255	7	7	0
2	255	7	6	0		2	255	7	7	0
3	255	6	5	0		3	255	7	7	0
4	81	5	6	0		4	255	6	5	0
5	255	7	7	0		5	57	0	7	0
6	255	6	6	0		6	43	0	7	0
7	255	5	5	0		7	60	6	6	0
8	255	4	7	0		8	255	5	5	0
9	255	3	3	0		9	255	3	3	0
10	188	3	3	0		10	185	0	0	0
11	64	2	3	0		11	64	3	3	0

2. I was asked to CAD up our current prototype of the Ball Intake Device. Here are some screen shots of my final work. The bottom left picture is of the upper sheath, and the bottom right is of the lower sheath. then the top picture is the whole entire intake system. -Chris



3. No additional details.



10.7.14 Sparring Bot

Duration 6:00 pm - 8:30 pm

Attendance:

Chris, Bo, Matthew, Marcos, Aidan, PJ, Kristen, Coach, Mrs. Laker, Mrs. McKellar, Mr. Solomon

Tasks:

1. Finish Sparring bot
2. Decide how we are going to efficiently use space inside the robot
3. Work on parts for custom swerve drive
4. Show the 2 ideas of doing scouting for this years game to the team
5. Learn where to find things like tools, gears and screws
6. CAD up the Sparring bot

Reflections:

1. I completed the sparring bot by wiring up the motors, (we decided to use the new Neverest Andymark motors to test them) and I had to make a new switch assembly by tinning some wires and power polling them and connecting them to the battery and servo controller. I plan to test and refine the bot on Saturday.--AMP (See picture in details)
2. We used a big pad of paper and drew an 18" by 18" square to represent a top view and another for a side view of the robot leaving a 3" "No go" zone so we still have some freedom. Then, we sketched onto that square the sizes of our lift using standard 80/20 sizes, as well as, the bottom for our custom swerve drive we are working on. (See details.)
3. After another discussion and a few revised ideas we have decided to actually go with a swerve drive! We have some ideas to create a completely custom swerve drive system that hasn't been made before. -MMMs
4. This year we have 2 new ideas of tackling this year's scouting. One that would involve a computer in conjunction with paper and the other would solely involve technology. (See details.)
5. Aiden had to teach me where all the parts, electronics and tools go. He had to teach me this because I had no idea where a screw went and people were tired of telling me. He took out a box from the shelf, gave me it and I had to memorize where everything goes. In the end, I now know the general idea of where things go and I can get something if someone needs it. -PJ
6. After Aidan was finished with the Sparring bot I started to CAD it up. I took the bot and brought it next me as i started to make the base for it then added the motor mounts and motors then the NXT and all the electronics. such as the motor controllers and servo controllers. -Chris

Details:

1.

Aidan & PJ use a skill they learned at the 2014 Build-A-Better-Bot workshop to tin wires for a switch assembly on the Neverest motors on the sparring bot



2. Matt, Coach, and I pulled out a big pad of paper and drew an 18" by 18" square to represent the robot so we could decide upon how we wanted everything to fit so we could use space as efficiently as possible. We used some parts including: 80/20 T-slot extrusions and the AndyMark Neverest motors because they are about 2X the size of a normal tetrax motor. Then, we calculated the size of the lift and drew that in the middle roughly where it would be on the robot. Then we looked on the 80/20 website to see what other parts we could use on the lift and chassis so everything would fit together perfectly. Once we were happy with the spacing of everything we kept the pad of paper for future use. -Bo



3. No additional details.
4. Some problems our team has experienced in the past is delivering accurate information from the scouting team to the team captain within a reasonable amount of time during tournaments. Two ideas have sprung up:

(continued)

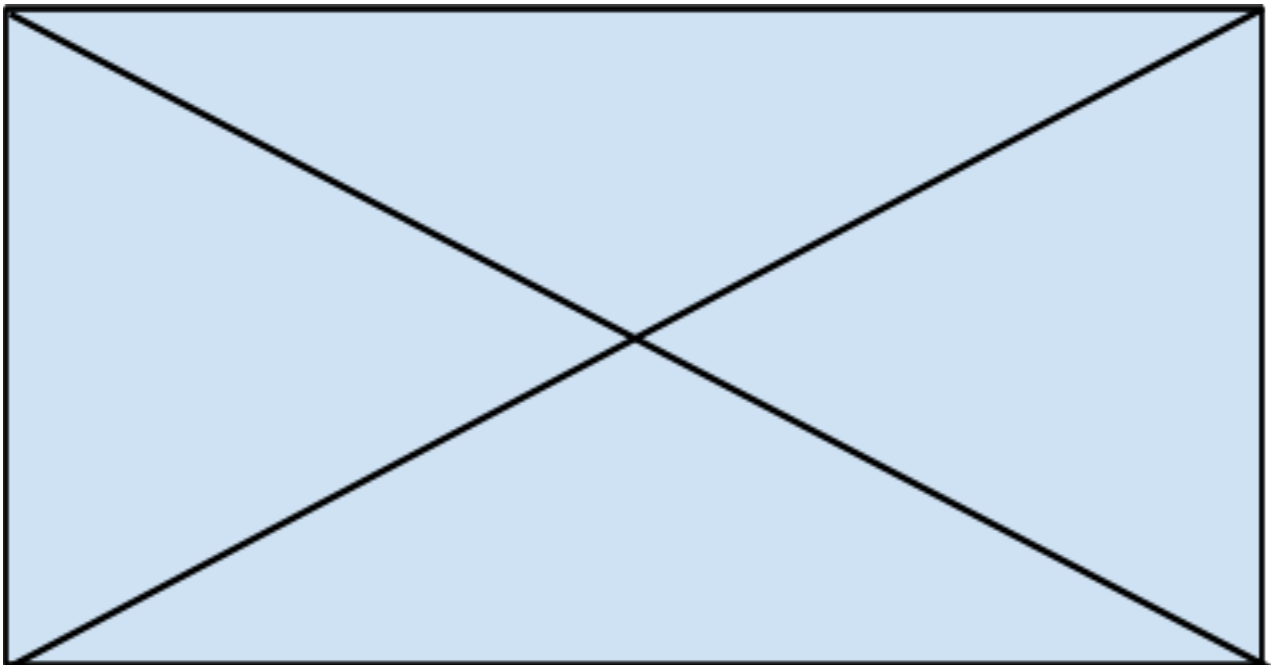
First is using a paper system to gather the information and inputting into a computer for compiling. There is one component to this system to be added to insure successful information passes through. This key is Google sheets. Since the information on Google sheets is located in the cloud all information is stored via the internet and has a constant save capability. It seems to be the optimal choice. This would also allow accessibility to the data for everyone on our team.

End plan is when I need information from the database I simply look at my phone and access the Google Sheets app. This whole process only uses cellular data, NO WIFI. Thus staying within FTC requirements.

Second idea, primarily using technology. The thought process behind this is if everyone on our scouting team is able to download the Google Sheets app. This app would be acting in the same place as the paper previously used, thus input and compile all in one 'step'. Team captain would also have a phone with Google Sheet. At that point he would be able to receive accurate information in real time.

After discussing other ideas we came up with a three part list. The first two are determining the differences between the two systems stated above. Third part is a list of 'wants', crazy goals that would be nice to accomplish. These don't have to be realistic and after the fact we will make a realistic list. -MMMs

5. No additional details.
6. No additional details.



10.10.14 IR Madness - Open Hours

Duration 6:00 pm - 9:00 pm

Attendance:

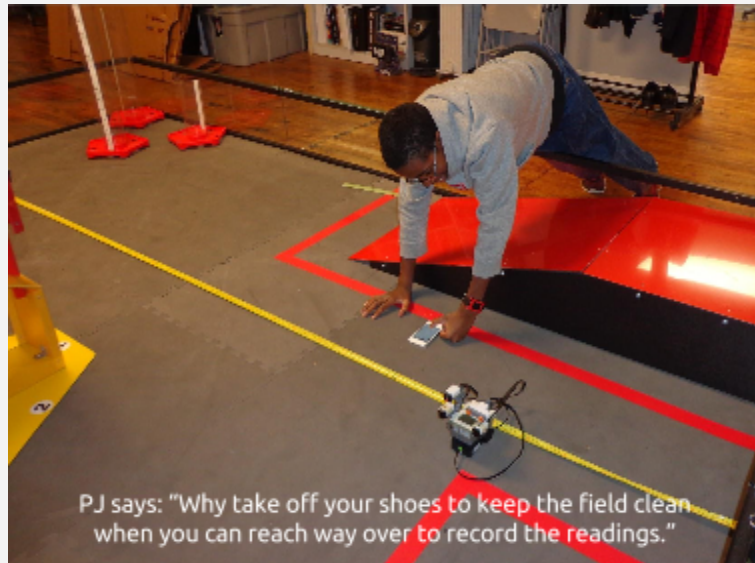
Chris, Matt, PJ, Kristen, Marcos, Coach, Mrs. Laker, Mrs. McKellar

Tasks:

1. Work on IR detection of the center goal in its three different positions

Reflections:

1. Using our previously recorded readings we set up a basic program to determine the position of the center goal based on known advantages. -PJ



10.11.14 Filming RoboTalk!

Duration 12:00 noon - 5:00 pm

Attendance:

Chris, Bo, Matthew, Marcos, Aidan, PJ, Kristen, Coach, Mrs. Laker, Mrs. McKellar, Mr. Solomon

Tasks:

1. Disassemble our previous season's robot "The Black Pearl"
2. Review all CAD files for our swerve drive
3. Film first episode of "RoboTalk!"
4. a) Get our old driving files working on our new robot

b) Write a program to record IR sensor readings under specified parameters and datalog those readings

Reflections:

1. Today I had the sad duty of disassembling last seasons robot The Black Pearl. First I gutted the electronics panel and moved on to the winch and lift mechanisms to finish. --AMP



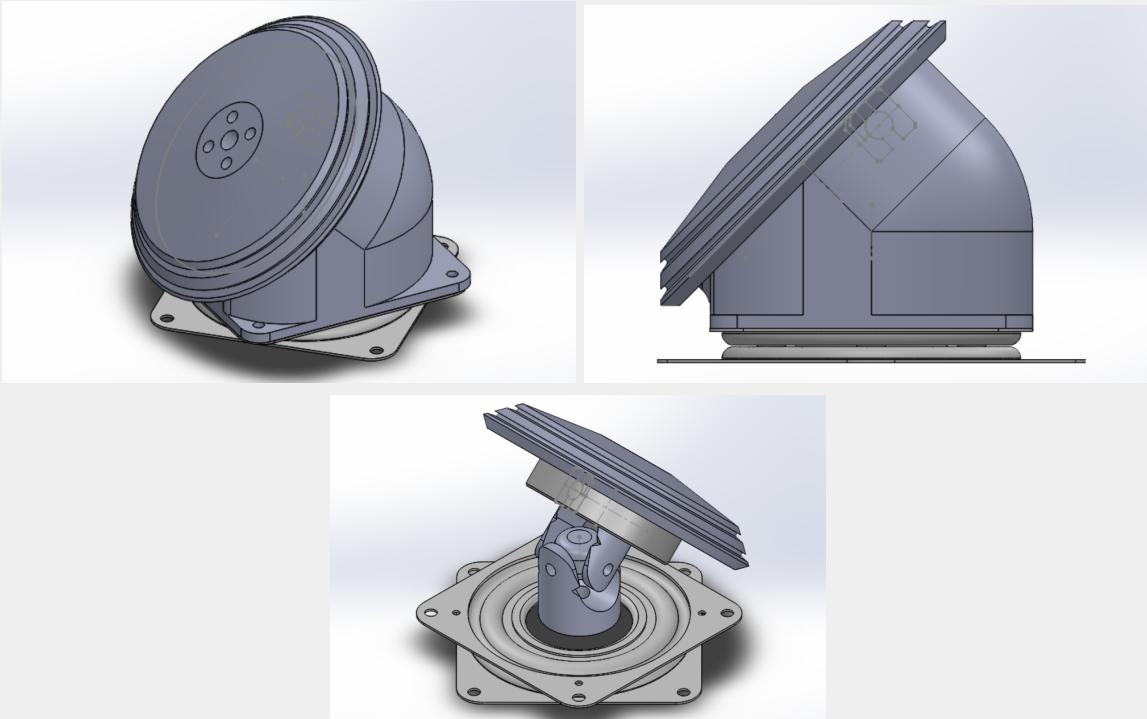
2. After each of us working on a separate part of the swerve drive, Matt, Bo, and Chris reviewed all the files they had been working on for the teams custom drive system. They then shared the files via the teams hard drive so they all could have the complete swerve drive virtually. (See details.)
3. We took our camera (iPhone) and blue screen and went to one of ETC's closed offices to film. (See details)
4. a) We were able to change the files slightly and get the robot driving. (See details.)

b) We created a program to record the IR over a selected distance with a selected number of samples. (See details.)

Details:

1. No additional details

2.



Custom Swerve drive with and without main housing

3. Chris, Marcos, and I went to the back office and set up the blue screen. I wrote a script of everything we were going to address this episode including: new rule changes, unclear questions about the field, and the locations of the 2015 world championship. Once we had all the footage I took it all home to edit it and then posted to our RoboTalk! and team social media sites. -Bo



- a. RoboTalk is going to be an awesome addition to our social media outreach this season. I am so excited to see this implemented. -MMMs
4. a) I was able to change 'auto.c' slightly in order to make our robot drive based on time. The reason I had to do this was because the code from last year doesn't work with our new robot. I had to change the sensor and motor ports to our robot. I also had to delete all of last years code from the 'auto.c' program that was for last years robot. My goal was to make sure the robot only used the code from this year. During this process we had some problems. (continued on next page)

At first I used the wrong unit of time so the robot drove for 5 millisecond instead of 5 seconds. It looked like the robot didn't even drive at all. Because of this I thought that the program was cutting off the motors early from the full time. I found the problem in the auto.c programs when I was calling the driving function.

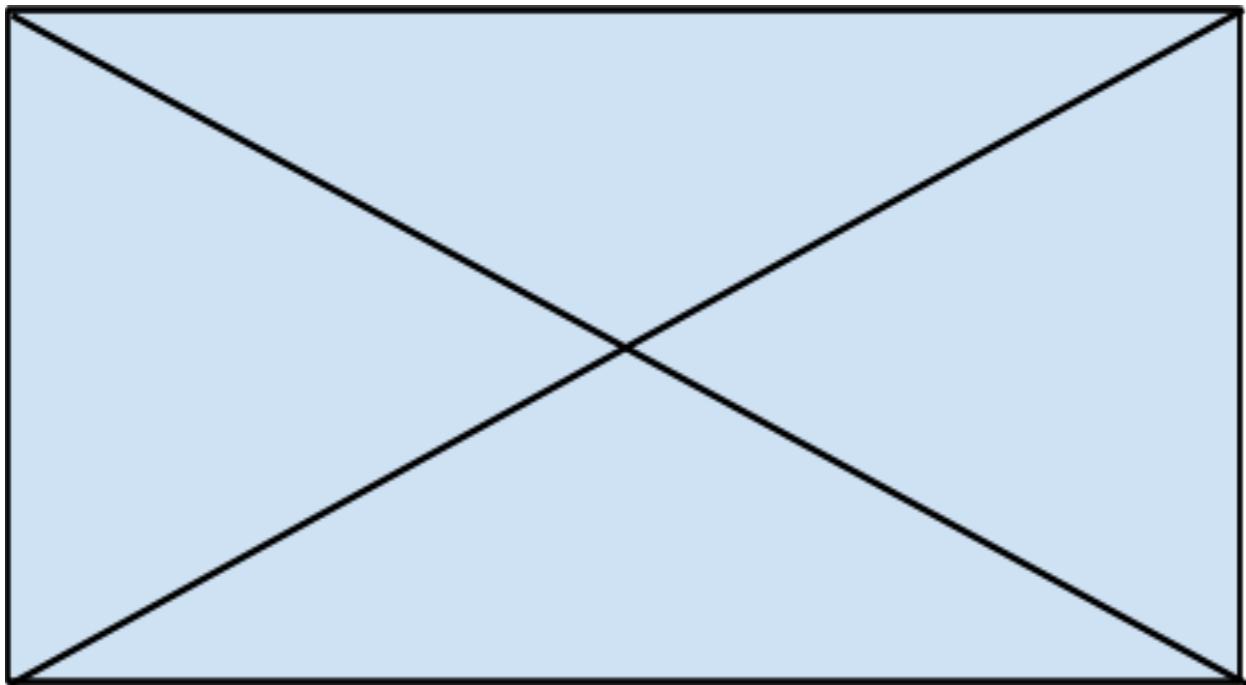
```
abs_drive(FORWARD, E_TIME, 5, 100, true, NON_SENSOR);
```

*I had to change the value to **5000** to achieve the proper result.*

I changed the 5 (above) to a 5000 (for 5000 milliseconds). We were thinking about multiplying the time input by 1000 in the driver control program but we thought that wouldn't be precise enough for the future.

I had to ensure that if for some reason the robot ran the encoder detection method, it wouldn't use that method. This is because if the robot used the encoder it would not work due to how the encoder wasn't programmed functionality yet. Our next step is to add a robot drive based on the encoder and angle sensor. -PJ

b) In the program we handle the number of samples read by taking the total desired distance and divide it by number of desired sample. That amount is used in a while loop to make the robot move for that fraction of the total movement. This causes the robot to take and record the IR/sonar readings every sample fraction of the total movement distance. That while loop is then repeated inside of a for loop that is set to the same number of samples. The end result is, divided distance by samples, take that fraction and run is by number of samples, this equals total desired distance. -K McK



10.14.14 792 Sensor Readings Later

Duration 6:00 pm - 10:00 pm

Attendance:

Chris, Bo, Matthew, Marcos, PJ, Kristen, Coach, Mrs. McKellar, Mr. Stephen

Tasks:

1. Decide how exactly we want our drive train to look so we can order the parts
2. Make a list of some design issues that needed to be solved
3. Test the new AndyMark Neverest 40 motor to see if the rumors about them getting excessively hot is true
4. Record IR sensor readings for different variants of beacon arrangements.
5. Slide lift material finalization
6. CAD up the slide lift

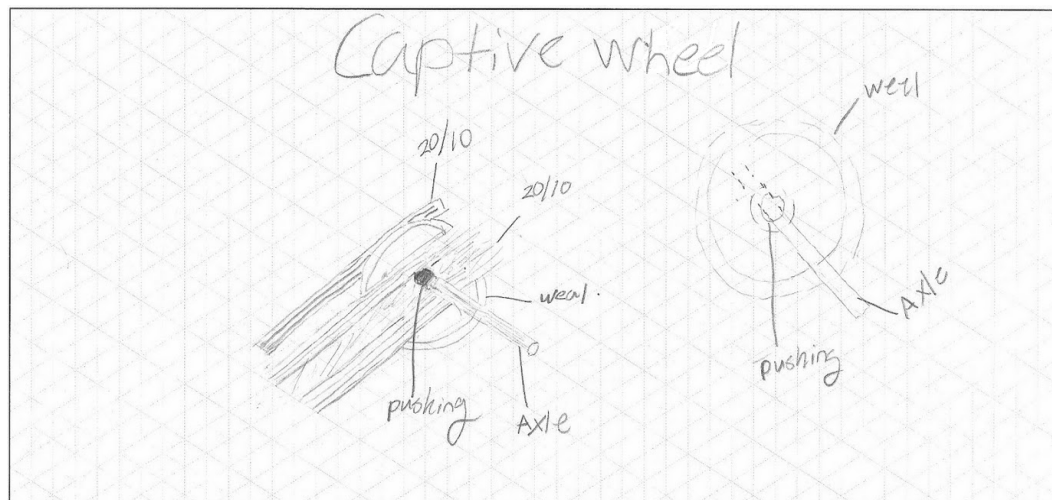
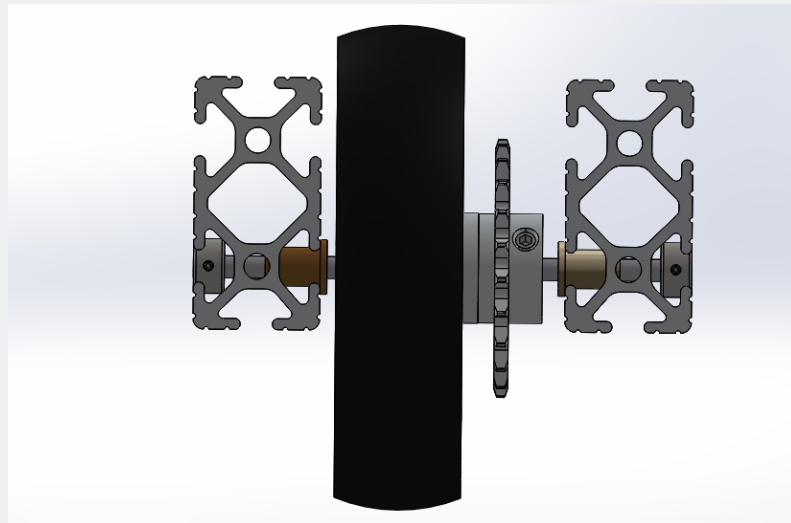
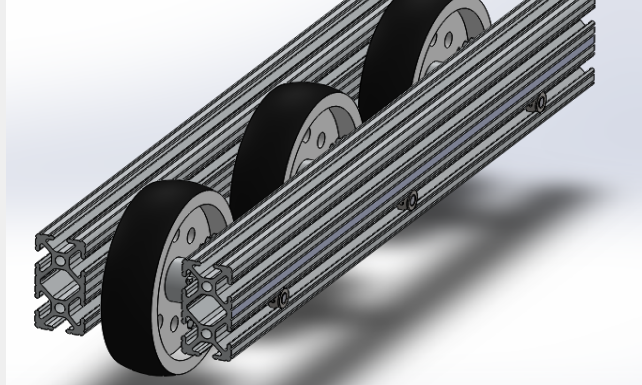
Reflections:

1. A design session was held with Matthew, Marcos, Bo, and Coach Mike. We, after considerable debate, decided upon a open box shaped chassis of 80/20 2010 rail. Bo then prototyped the idea into Solidworks. We are going to start with a tank drive and hopefully later in the season incorporate a swerve drive. (See details.)
2. The list is showing the design option and the answers to them. (See details.)
3. (See details.)
4. While brainstorming we theorized that the robot would be able to more accurately detect the position of the center goal if there was only one beacon. The idea was that without the interference or bleed over from two beacons we could get a clear read.

In order to test this theory we made a program to run the robot down the ramp and across the field. The sensor, and thus the left side of the robot, was roughly 3-4 inches from the edge of the ramp. This is about the same placement we had for our first tests we ran a week ago. (See details.)
5. We chose 80/20 1020 and compatible products for assembly, see details for the specifics. (See details.)
6. After we decided on the Slide Lift material and design I volunteered to CAD it up. (See details.)

Details

1. The approximate mass of the chosen chassis design is 7.1 lbs without fasteners, consisting of two side and a singular rear rail, with dual center runners and front bumpers. The center runners serve as both internal structure and partitioning for layout. The central cavity, approximately 9.5" wide, will house the robots scoring mechanism, while the dual outer cavities house the drive train and electronics. Thankfully the modular nature of 80/20 should make the swerve drive retrofit after the December 13 tournament straightforward to implement.
-Matthew



Marcos created this drawing of our wheel cavity design idea.

2.

Design List

Drive train material?

question

Answer

Drive train design

question

Answer

Weakness

choices material name = 80/20

a) material choice = 20/10 foot per pound .8

b) material choice = 10/10 foot per pound .4

a) how will we fasten wheels to 20/10?

d) we will use a shoulder bolt (.25 shoulder Bolt)

a) what design will we use for our drive train using 20/10?

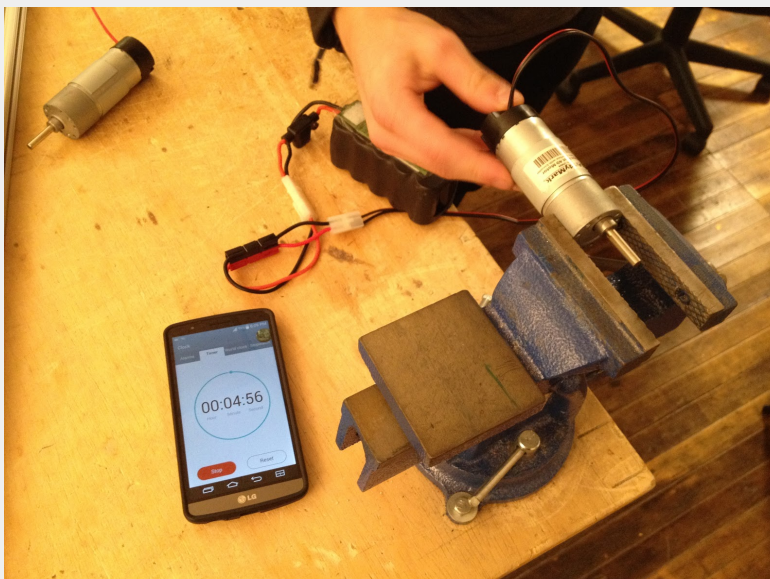
d) open box design. Example

20/10 a little over a inch

80/20's free CAD design software, AutoQuoterX™, is available for download at www.8020.net or contact Steiner for a complete 80/20 Resource DVD

80/20® Inc. The Industrial Erector Set® 1701 South 600 East, Columbia City, IN 46725-8753 (260) 248-8020 • Fax 260-248-8029 • www.8020.net			
Distributor Steiner Electric Company		Drawn By	
Customer		Purchase Order No.	
FIG 1	Not Drawn	Date	Quote No.
Rev 021810	to Scale		Rev.

3. After we read on Chief Delphi about possible problems regarding the Neverest motors getting extremely hot after running for a continuous time we decided to test this out by simply plugging one into a battery for 5 minutes then checked the temperature. After about 15 minutes without any load it only raised a few degrees over room temperature and the test proved positive. We then shared our data on social media to inform teams the rumors were proven false. -Bo



- All of the tests were made up of readings over 12 feet, taking 12 samples, so generally a reading every foot. We did this by repeating a while loop inside a for loop set to the number of selected samples. The while loop is set to a fraction of the total distance the same as sample number.

Through our tests we were hoping to find data showing that one IR beacon gives more accurate and precise readings than two. If this theory was true then we were planning on shielding the IR sensor from one side to simulate one beacon then utilize the theorized benefits of one active beacon. Looking at the data we gathered though, specifically in the first 6 feet, the distance practical to use strategy wise, we see that the combined beacon readings may be more useful.

Here are the first set of readings for center goal position 1, as you can see the readings with both beacons on is exactly the same as the reading with only the near beacon active.

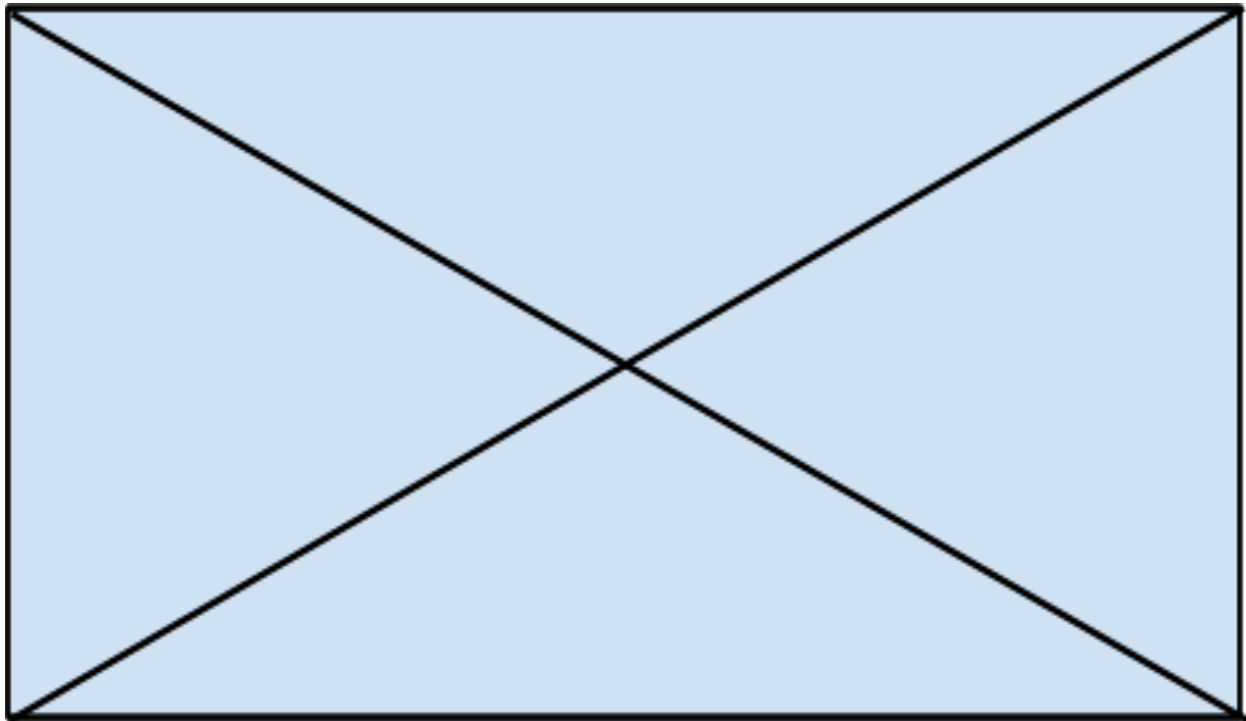
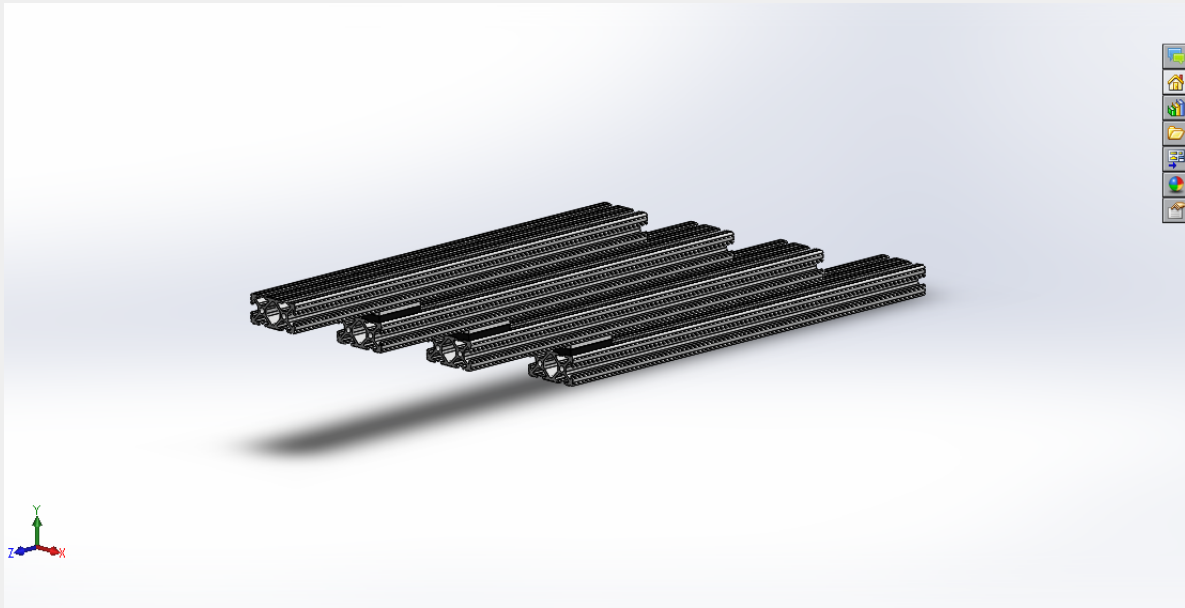
Sample Number	1	2	3	4	5	6	7	8	9	10	11	12
IR Beacon Near Side to Robot	7	7	7	7	6	5	5	5	4	3	3	3
IR Beacon Far Side to Robot	6	5	5	5	6	0	6	5	5	5	5	5
IR Beacons on Both Sides	7	7	7	7	6	5	5	5	4	3	3	3

We took a bunch of tests to see the IR readings to see what was the best strategy to find out the position on of the center goal. We were thinking of using IR shield to block one of the IR beacons. Our data shows that we should NOT do that and just use the raw data from both beacons. The way we know this is because the different positions have the most diferencial sensor readings. -PJ

- Lift designs, the slide lift system of choice now is a stacked set of four 16" 80/20 1020 shuttles, utilizing the 10 series 2753 roller slides and nylon bearing pads. The approximate lift height is 137cm, plus mount height and minus the Sin and Cos losses of the attack angle. Chris Laker is currently constructing a kinematic model of the lift system in SolidWorks, and the pulley system is being developed in parallel by Matthew, SolidWorks of course.

To address one of the prevalent inefficiencies in shuttle based slide lifts is a conical pulley design. When a slide lift is raised, the initial starting energy is much lower than the ending lift energy, this is because, due to gravity, slides will tend to rest in the lowered position until forcibly extended. The result is the mass lifted increases proportional to the extension of the lift. Optimisation of the working load can be achieved by imposing a conical winch, decreasing the radius of the fulcrum proportionate to the increase in required torque. CAD (specifically the mass properties tool) will be vital in the calculation and production of the conical pulley, but with any luck it should significantly reduce the chance of stalling and increase lift speed. -Matthew

6. I put four 1020 slides in the assembly and mated them up so they are each 6 inches from each other stacked, forming a perfect line. I added captive bearing pads to the 80/20 for proper spacing. After this I checked to ensure all the set mates were where I wanted them. - Chris



10.18.14 A Visit from Mr. Times

Duration 12:00 pm - 6:30 pm

Attendance:

Chris, Bo, Matthew, Marcos, PJ, Kristen, Aidan, Coach, Mrs. McKellar, Mr. Stephen

Tasks:

1. Measure, cut, and assemble our chassis using our CAD model for measurement
2. Handle the renewal of our RobotC licenses
3. Show Mr. Matt Times from Compass Automation around HQ and listen to him teach some tips about Solidworks
4. Finish up the slide lift in CAD

Reflections:

1. Over last week Bo put together the whole Chassis design virtually (pictures below) so we would know exactly how long to cut and drill the pieces. (See details.)
2. Quite a few of our computers have run out of RobotC license. We bought a new license bundle to discover that all new licenses are exclusively RobotC 4.x compatible. With our strict devotion to RobotC 3.x due to its superior capability we found ourselves stuck. (See details)
3. Mr. Matt Times is a mechanical engineer at Compass Automation. He was also part of an FRC team when he was in high school. We invited him to our HQ to teach us ways to more efficiently use Solidworks and for him to see what we do in a normal meeting. (See details)
4. While putting the Final touches on the CAD'ed slide lift I asked Mr. Times for some help with my advanced mates to make the parts slide. I asked him and he said try out the linear coupler and the distance limit mates. -Chris



Mr. Matt Times and PJ review CAD models on Chris' screen

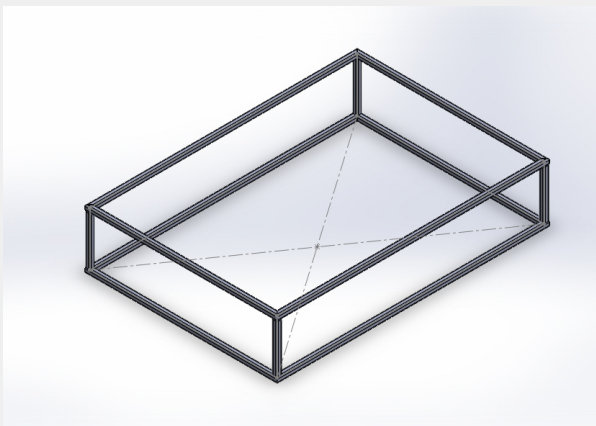
Details:

1. So we cut out some cardboard and laid out a 2D top view profile of our chassis on a 1:1 scale so we could look at it. Once we liked the profile we then took it over to the saw (with safety glasses of course) for cutting. Then to the drill press to drill the holes using the drill guide Bo and Mr. Times created in Solidworks. Then just assembled it and it looked great! - Matthew & Bo
2. Going through our Robomatter profile (the company that makes RobotC) purchase history we found six licenses that had yet to be activated. These are the licenses we are now running and will be running throughout this season. We will be contacting Robomatter about refunding our 4.x licenses or changing them out for 3.x. -K McK
3. Mr. Times taught the CAD team a couple great tips including: how to use the 3D sketch tool to quickly make frames in case we need to make one later in the season and how to make professional drawings in Solidworks. - Chris

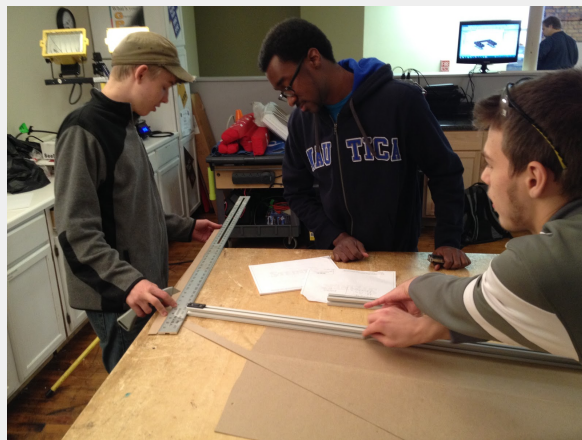
He then helped us with cutting and tapping our chassis out of 80/20 and we asked him if he could come on a regular basis to help more with CAD and engineering. He is hopefully gonna be meeting with us on a more regular basis so he can help with CAD throughout the season. It was also really cool to talk with a former FIRST-er about his years doing the FRC game "Lunacy" and how FIRST has really helped him in his career. -Bo

4. No further details.

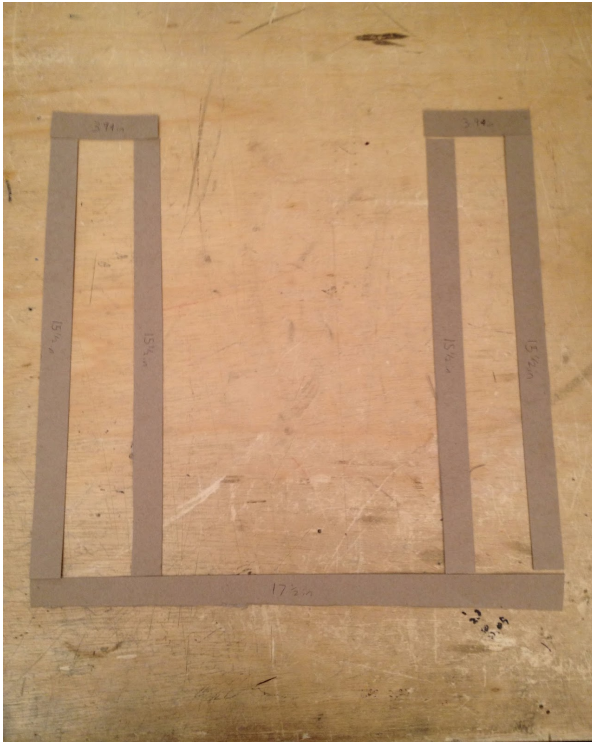
Pictures:



Mr. Times showed us how to do Weldments in Solidworks



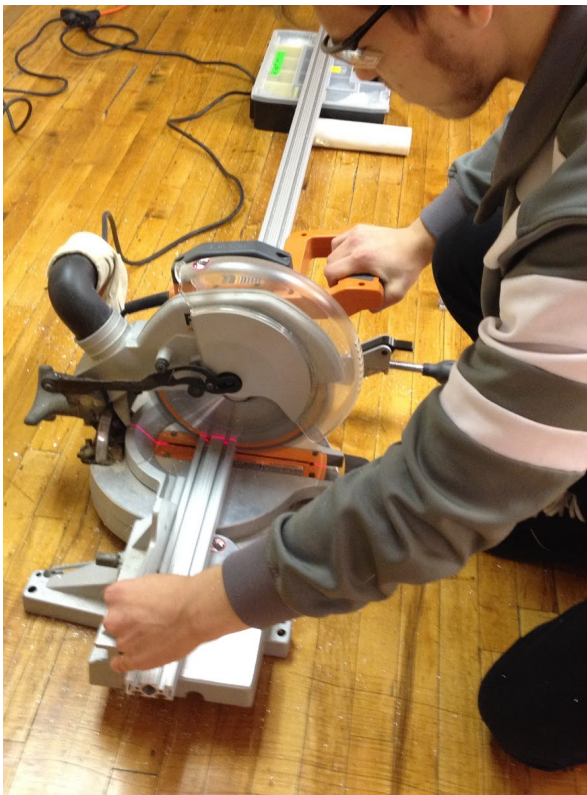
Aidan, Matt and Mr. Times measuring material for the lift bracket



Cardboard layout of 8020 chassis



Cut 80/20 chassis rails ready for drilling



Matthew cutting chassis rails



80/20 chassis rails ready for assembly

10.21.14 Some Assembly Required

Duration 6:00 pm - 9:00 pm

Attendance:

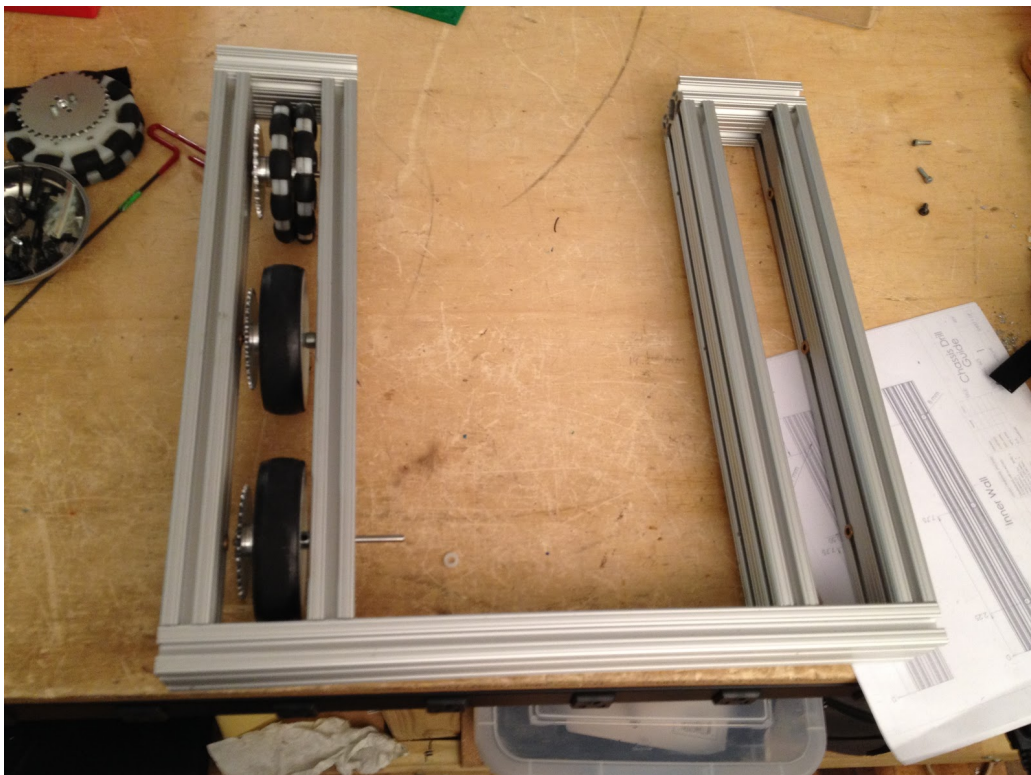
Chris, Bo, Matthew, Marcos, PJ, Kristen, Aidan, Coach, Mrs. McKellar, Mr. Stephen

Tasks:

1. Work on chassis
2. Discover a new way to connect two omni-wheels to a sprocket for the chain drive system
3. IR sensor results

Reflections:

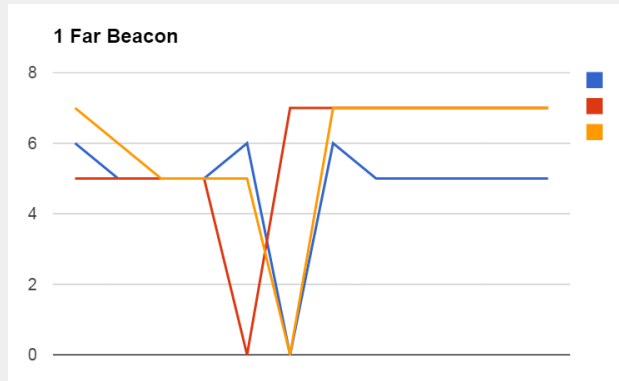
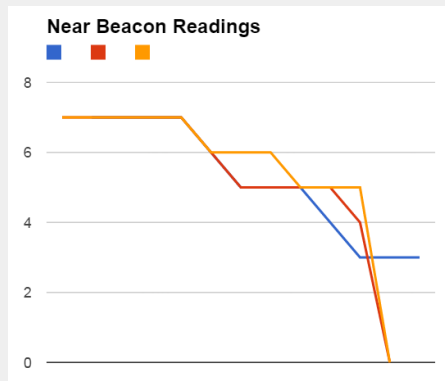
1. The engineering team spent a majority of the meeting assembling wheel-gear assemblies so we could mount them to our chassis, as well as, secured all the 80/20 together with standard 80/20 end fasteners so it was all attached correctly. -Bo
2. After much frustration we finally engineered a way to attach dual omni-wheels to gears by first screwing two small bolts across from each other, then, we sandwiched an axle collar between the gear and the outer omni-wheel and put a long screw through the open holes. (See details.)
3. (See details for stat charts.)



Half of Chassis Completed

Details:

1. No further details.
2. Marcos and I spent our time engineering a way to connect dual omni-wheels to a sprocket gear so it could fit within the robot chassis sidewall. It was a difficult task and took much trial and error but we finally came up with a design we think might work. -Bo
3. We have three charts will give us very clear results.
Vertical stands for sensor reading, horizontal for at what distance the reading was taken. Colors for center goal positions: Blue #1, Red #2, Orange #3



Looking at the three tendencies of the different beacon arrangements it becomes clear what is the the most useful beacon set up. With both beacons on we get a very nice split in data values between 3-5th readings. Assuming that the beacons are at least somewhat similar on battery power the robot should be able to accurately detect which position the center goal is in.

Strangely enough this is different from some of our previous theories, rather than the amount of usable data going up when only one beacon is active, the opposite is true. Before the robot reaches the end of the ramp we need the robot to determine the IR locations, with both beacons on giving a value split right where we need it this should be a do-able task. -K McK

10.24.14 Extra Meeting Time

Duration 3:00 pm - 9:30 pm

Attendance:

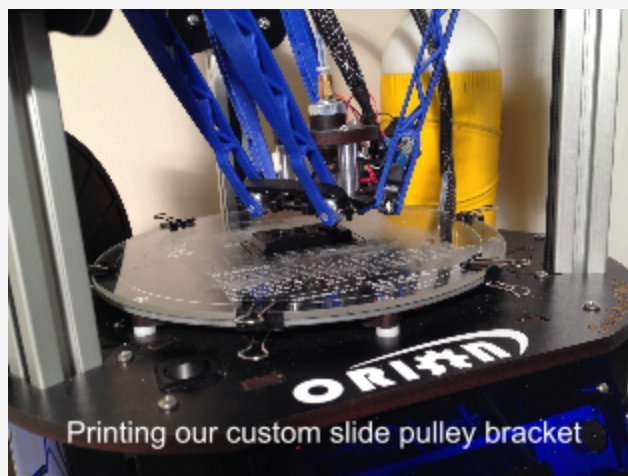
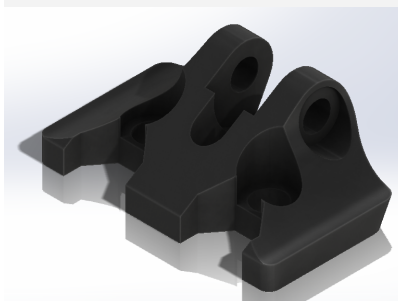
Bo, Marcos, Kristen, Matt, Coach, Mrs. Russell (team mom)

Tasks:

1. Finish Chassis
2. Brainstorm idea to have maximum efficiency on our lift winch
3. Measure, Cut, and assemble our slide lift for lifting our scoring device
4. 3D print our custom slide pulley mount
5. Brainstorm ideas on creating a try for the bottom our robot and create cardboard model of the drawn out version

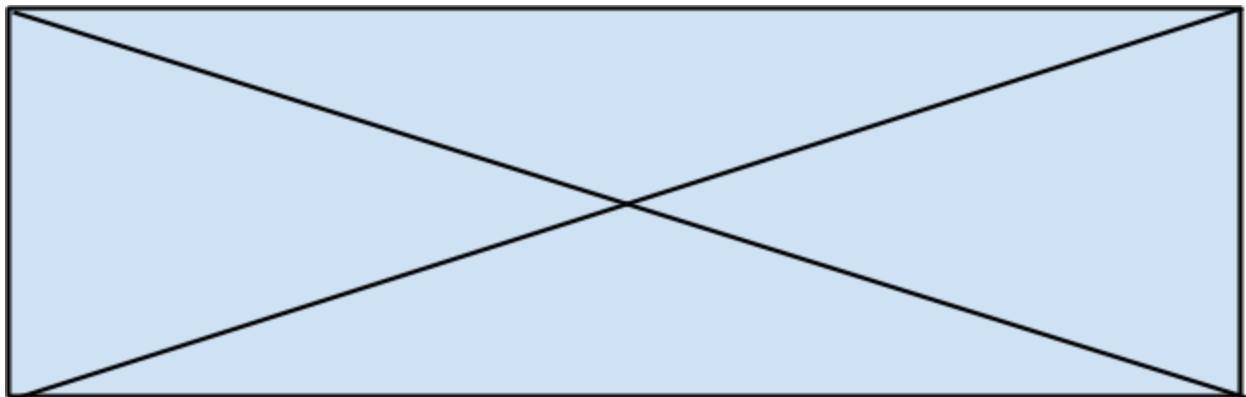
Reflections:

1. We finished assembling our chassis by putting on the rest of the wheel-gear subassemblies so we could see what it looked like. Hopefully they will be replaced with AndyMark stealth wheels very soon. (See details.)
2. We developed an idea to make 3D print a custom winch for our lift that was cone shaped with helical grooves so that when we winch the string would wind down to the smaller side working like its own gearbox so we could get more torque as we wound thus, more efficiency. -Matthew
3. We used the slide lift CAD model Chris made so we could determine the measurements for our slide. Then, we cut the 10/20 T-slot extrusion using the saw and attached them to the 80/20 roller wheel brackets. -Bo
4. We CAD'd a pulley bracket in Solidworks which we are going to use on our slide lift. We printed a prototype piece and discovered the part didn't hold the pulleys in place right because the slot was too small. We made the slot bigger and printed another and it housed the pulleys snugly. -Matthew



Details:

1. I worked on finishing up the chassis by making the rest of the wheel-gear subassemblies and putting them in between the two chassis sidewalls. I decided to start with the tetrix wheels so we could get a feel for what it will look like but we will soon implement the AndyMark stealth wheels for better traction. -Bo
2. No further details.
3. No further details.
4. No further details.



10.25.14 Secrets of Solidworks

Duration 12:00 pm - 5:00 pm

Attendance:

Chris, Matthew, Marcos, Kristen, Aidan, PJ, Coach, Mr. Stephen, Mr. Times, Mrs. McKellar

Tasks:

1. CAD'ing the Slide lift
2. Assembling part of slide lift
3. Welcome Mr. Times to got robot?

Reflections:

1. While CAD'ing the slide lift Mr. Times came over and asked me if there was anything I needed help with. Mr. Times is a new mentor for our team. He is a mechanical engineer at Compass Automation and works with SolidWorks on his job. Mr. Times was team captain for an FRC team when he was in high school. (See details.)
2. Using 3D printed spacers we were able to rapidly assemble the mountings for the christmas tree sliders and lock together the slide shuttles. The assembled lift seems to be very low friction and is quite rigid. While we were experiencing sticking with the 8020 rollers, reseating them significantly mitigated that qualm.
-Matthew
3. Mr. Matt Times is a new mentor for our team. He is a mechanical engineer at Compass Automation and a recent MIT graduate. He works with SolidWorks on his job and is very generous to help us learn more about it.

Mr. Times was team captain for an FRC team when he was in high school. We met Mr. Times when we presented FTC and FIRST to Compass Automation on October 4th. We are honored that he is now a part of got robot?. -Kristen



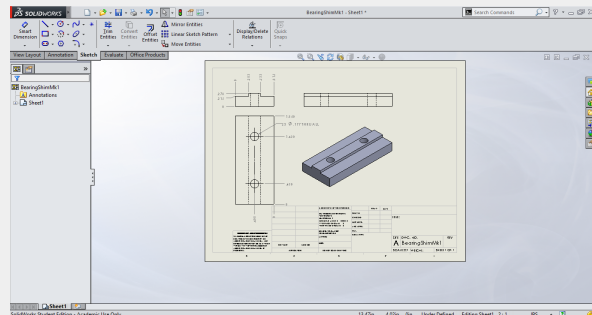
Our new mentor, Mr. Times, shows us some of the finer points of Solidworks

Details:

1. I told Mr. Times what I was working on and my future plans for the CAD designs. For the rest of the meeting he instructed me on how I might improve my work along with some useful CAD techniques.
Some examples of what he showed me are:

- How to make a measured drawing for an individual part and an assembly.
- The advantages of using the Hole Wizard Tool.

(Image Right) This the part that I was working on.



I learned that while making a drawing and subsequently labeling holes the Hole Wizard Tool will display the count for how many holes were created. -Chris

2. No additional details.
3. No additional details.



10.28.14 Stringing the Lift

Duration 4:30 pm - 7:30 pm

Attendance:

Chris, Bo, Kristen, Matt, Marcos, PJ, Aidan, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Work on slide lift
2. Finish Scouting Sheet
3. Review Engineering Notebook

Reflections:

1. Matt, Bo, and Coach worked on the slide lift by attaching the rest of the slides into each other and then running string through all the pulleys and then testing it out. (See details.)



2. Today I finished finalizing our scouting data compiler. (See details.)
3. We reviewed our engineering notebook and added photos from past events, as well as, wrote some of our bios. (See details.)

Details:

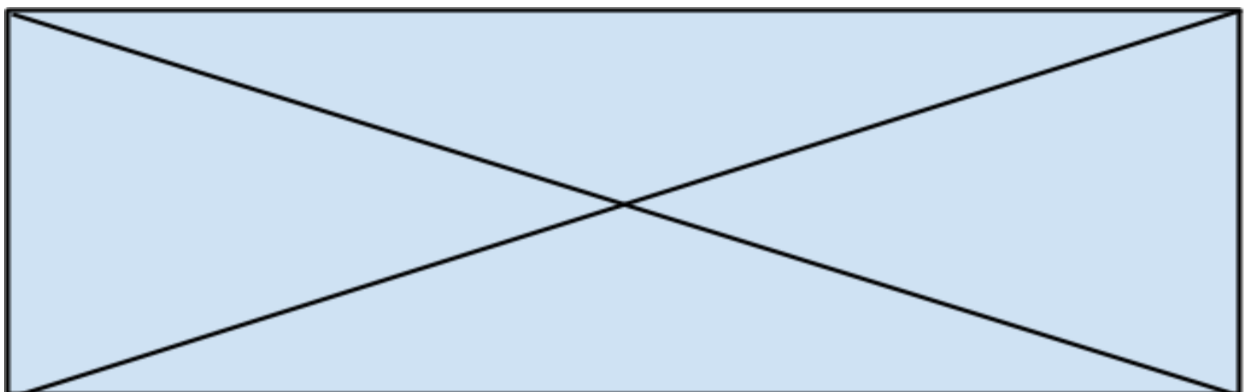
1. Once we had all the slides properly mounted into each other, Matt and I ran string through the whole setup so we could get an idea for how well it actually worked. Then, we placed it inside the current chassis design without mounting it to see how much room it would take up. We are planning to meet tomorrow to make some CAD assemblies so we can determine how we are going to mount it to the chassis and how much material we'll need so we can order it and have it by the next Saturday meeting. -Bo



Slide lift with custom 3D printed pulley brackets

2. This spreadsheet will be able to compile information in three different ways.
 - a. First: Information from the scouting sheets. This information will give use quick analysis on any team throughout the day
 - b. Second: Condensing the original information from the scouting sheets
 - c. Third: Subtracting a variable from a scoring element in the game. -MMMs

3. I've been working on filling out some past engineering notebook entries since some haven't been done with the needed amount of details. One example of where I've been writing is "141020: Filming Robotalk". As a minimum, I want to do at least two entries per week from now on. -PJ



10.29.14 Mounting the slide lift (virtually)

Duration 3:00 pm - 6:00 pm

Attendance:

Bo, Matt, Marcos, Mrs. McKellar

Tasks:

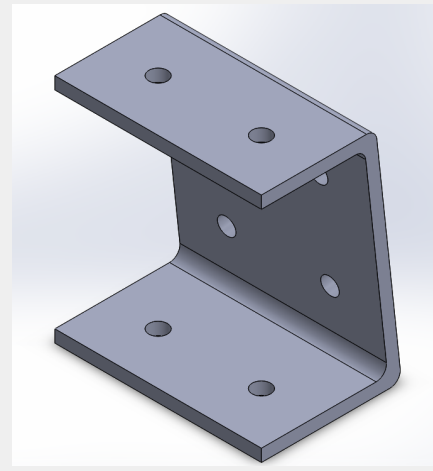
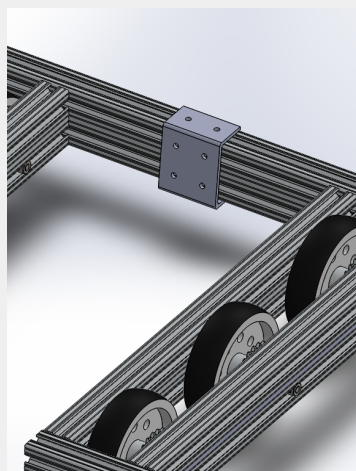
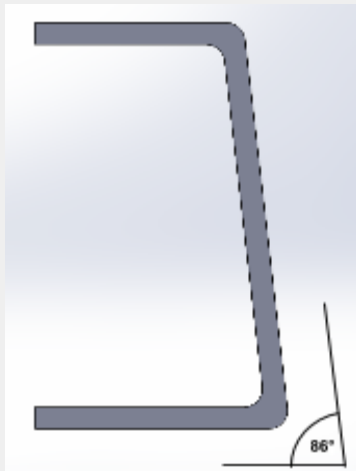
1. Find out how we are going to attach the lift to the chassis
2. Low resolution 3D print of custom winch for slide lift

Reflections:

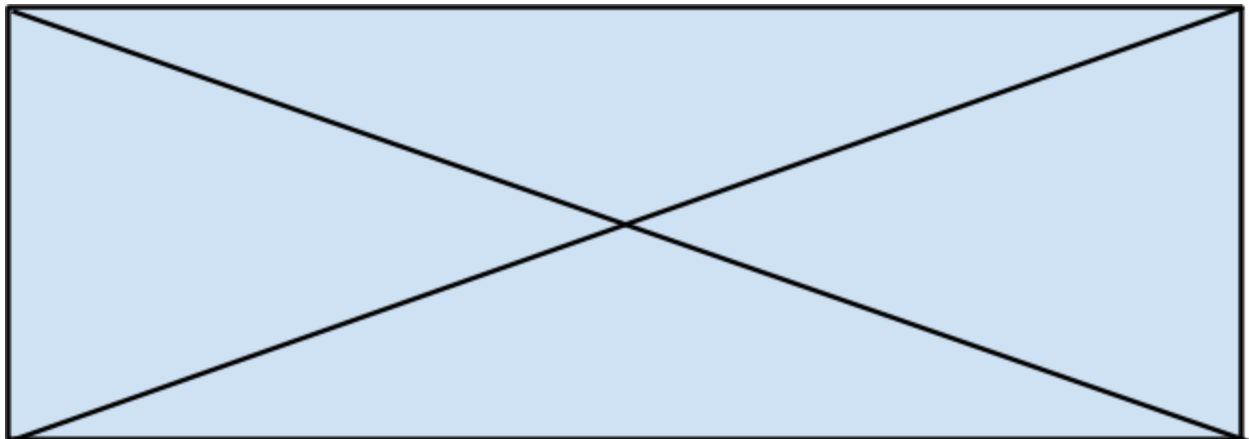
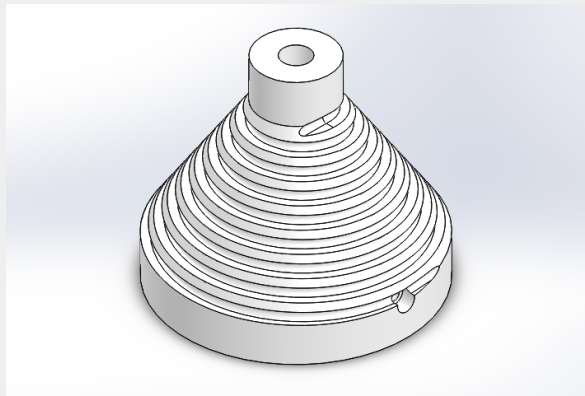
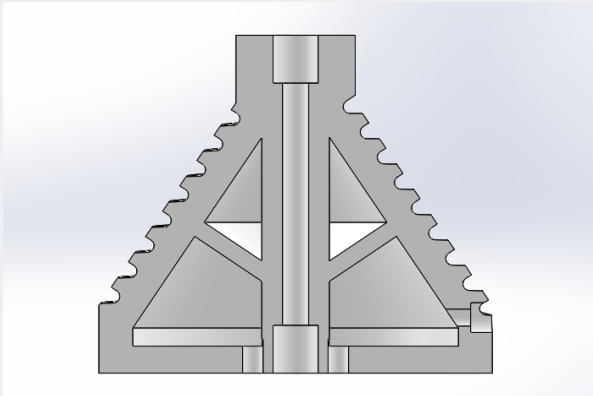
1. We decided on bending a piece of steel bar stock into a 'C' shape with a slight angle on the face so it would hold the lift securely at an 86 degree angle. We would then drill holes into it and fasten the 80/20 T-slot slide nuts onto the chassis and feed the screw through the other end. We then made the part in CAD so we could test out how it worked. (See details.)
2. We 3D printed the custom winch Matt made on the roughest setting so it would print faster and we could get a prototype for testing. (See details.)

Details:

1. My main job for today was to get the slide mount part in CAD so we could see how it would work on the chassis. I just drew the general 'C' shape from the side making sure to make the face was at an 86 degree angle. Then, I extruded the part 2 inches and put the holes in their proper places. Then, I brought that part into the chassis assembly just to make sure I had the right measurements and placed the slide lift on top of that. It fit quite well and held the slide lift at a perfect 85 degree angle. -Bo



2. The prototyped ABS plastic Conical Winch Mk5 functions correctly. It successfully balances the available torque in the lift system, the geometry of the cone could still use tweaking, but the widened entrance gap on the groove made the winding more consistent. -Matthew



11.01.14 Glad We Have CAD

Duration 12:00 pm - 6:00 pm

Attendance:

PJ, Bo, Chris, Marcos, Matthew, Aidan, Kristen, Coach, Mr. Times, Mr. Solomon, Mr. Stephen, Mrs. McKellar, Mrs. Laker

Tasks:

1. Develop a 'skeletal program', a basic outline of our code, to be adapted to the robot once it's built
2. Add encoder driving capability as part of working towards the skeleton program
3. Use CAD to determine the exact measurements and placement for mounting the slide lift to the robot chassis
4. Use CAD to see how much clearance we have underneath the robot once we had attached the slide lift
5. Design motor deck and winch housing
6. Continue work on the communication map

Reflections:

1. Due to some unexpected troubles we had to work on what turned out to be a nonexistent problem. (See details)
2. I was able to add the encoder driving functionality to the robot. I faced some difficulty but got the job done. (See details.)
3. After a look at the slide lift assembly virtually we decided we had to make multiple revisions to the slide mount part if we wanted it to work the way it was designed. (See details.)
4. Mr. Times suggested we create a "ramp" shape then mate the robot to the ramp to see how much clearance we have underneath the robot. We did that by simply mating the robot to the ramp shape and checking the clearance by slowly moving it up. (See details.)
5. The robot's chassis has 12 80/20 1010 standoffs to which we are undersliding the drive motors of the robot. This deck will be cut from acrylic and mounted and will act as the base plate for the winch mount and the electronics card. --Aidan
6. Today I have been designing and improving the new communication map, for the purpose of communicating effectively with our alliance partner to create reliable strategies. -MMMs

Details:

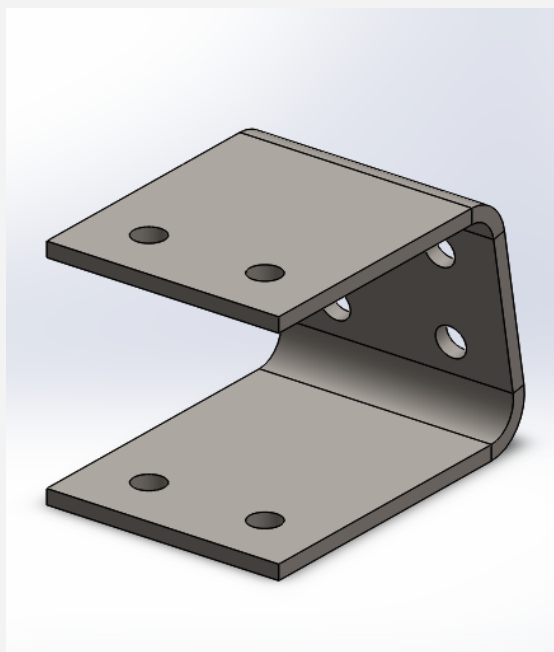
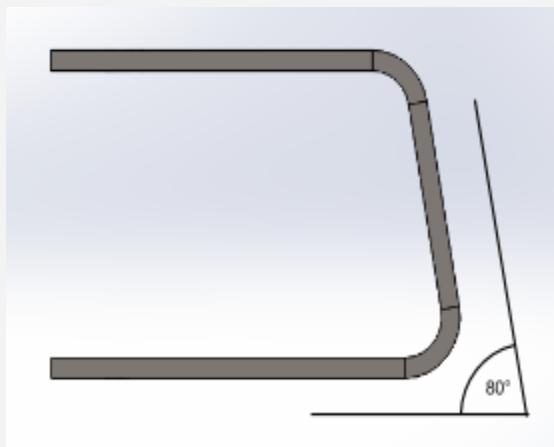
1. We ended up spending a lot of time trying to work out two errors that kept popping up. Both of them related to the joystick driver include which seemed to not be working properly. With more tests we found that functions referencing the joystick driver would work outside of the initialize function (which the errors showed up in) but not vice versa.

After a kinda embarrassing amount of debugging attempts we found that the 'problem' was actually that the compiler target was set to virtual world. Once this setting was changed back to physical robot the errors went away. -K McK

2. I worked on revamping last years code to get the encoder drive capability working again. One of the problems had to do with our right-back encoder being broken. Last week, we discovered that the encoder wasn't giving us any readings. In order to keep making progress last week we simply used the left encoder in place of the right one. This solution isn't acceptable for our final code. To address this I added a compiler flag allowing us to change the robotc preferred encoder to read from easily.

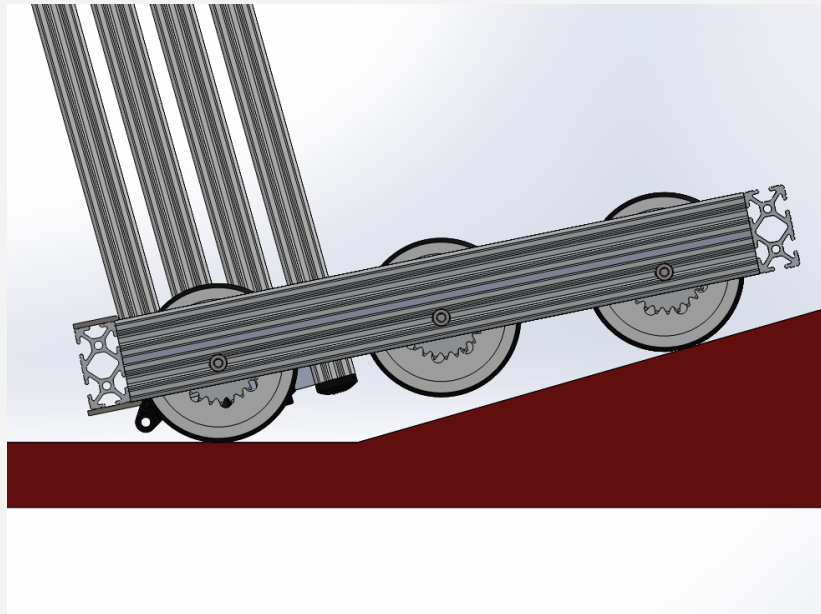
Even still the robot still didn't perform a simple test program correctly, this is the second problem. Whenever it would run it would exit out early as if the requested distance was met instantly. With debugging, the issue came down to a simple macro, the purpose of which is to convert requested distance in centimeters into drive distance in degrees for the encoder. After a bit of research we found that one of the values used in the math for the conversion was incorrect. It was set to 360 instead of the proper value of 1440. Once the numbers were changed out the program started working properly. -PJ

3. Matt, Mr. Times, and I worked on revising the slide mount I made last week so it would be not only more symmetric, but also even stronger and able to be input into a drawing as a sheet metal format so the engineering team can get exact measurements. We started by measuring the degrees of the slide lift (which needed updating) when set into the down position, which was actually 80 degrees, not 85. Since we needed to change this we had to extend the top and bottom sections by about 1 ½ inches so it wouldn't hang off the back of the robot. Then, Mr. Times showed me how to use the sheet metal tool in SolidWorks so once it was done we could flatten it and show exactly where we need to make the bends. We drew the rough shape, inserted the correct dimensions, and then put in the new ¼ inch holes. Finally, Mr. Times aided me in how to make professional manufacturing grade drawings the so engineering team could make this part once I gave them the drawing. -Bo

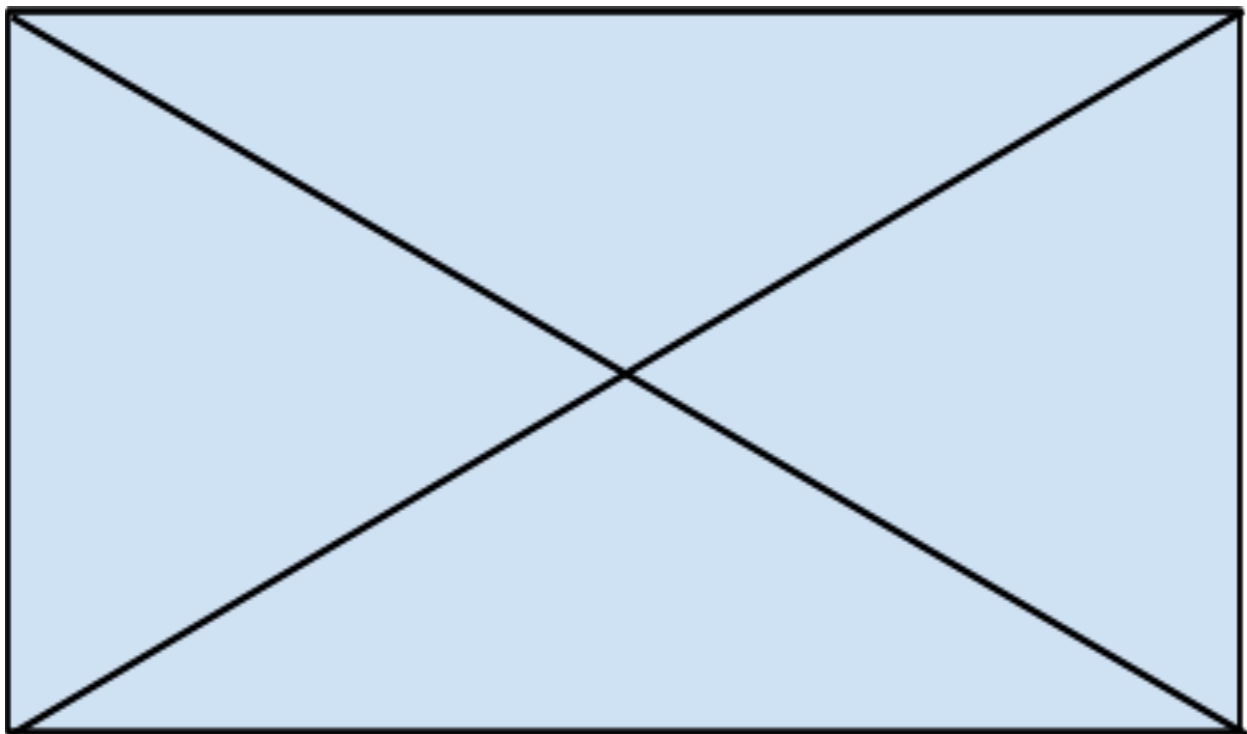


Angle bracket for mounting the
slide lift to the 80/20 chassis

4. I measured the dimensions of the ramp and input that information into a CAD model. Then, I added a little flange at the bottom of the ramp acting as the "floor". Then, I brought in the robot chassis with slide lift attached so we could find out how much clearance we have underneath the robot. It ended up being about a $\frac{1}{2}$ inch clearance from the bottom of the slide lift to the ramp. -Bo



5. No further details.
6. No further details.



11.04.14 Election Day

Duration 6:00 pm - 10:00 pm

Attendance:

PJ, Bo, Chris, Marcos, Matthew, Aidan, Kristen, Coach, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

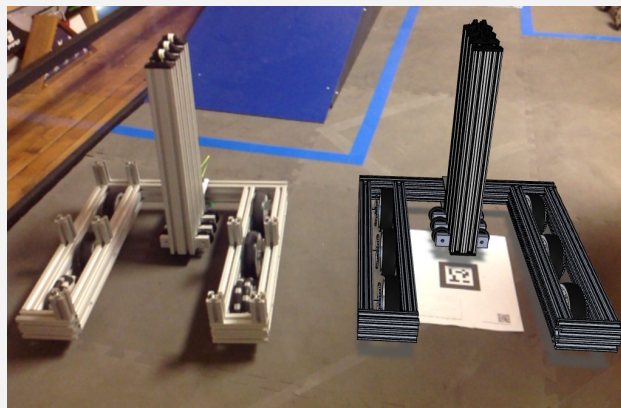
1. Cut, bend, drill, and mount slide lift mount bracket
2. Experiment with the new eDrawing app from Solidworks
3. Cut the stand offs and put them on the robot

Reflections:

1. After a long 4 hour meeting we finally finished the steel mounting bracket that we attached the slide lift to. Then, we tested its height on the center goal and it reached with inches to spare. Now we just have to come up with a final idea for the ball scoring device and the slide lift assembly will be complete. (See details)



2. We downloaded an app from the app store that allows us to view our Solidworks CAD models on any mobile smartphone or tablet. However, this particular app has an augmented reality (AR) feature which means we can virtually project the model into the real world through the devices camera at a 1:1 scale. (See details.)

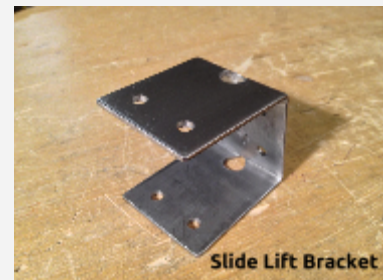


3. I set up the chop-saw to cut the mountings out of 80/20. Each mounting was 5.08 cm, I cut 8 of them. Once the cutting was done I took them to the the bench to thread them, so that we could bolt them on the robot. - AMP

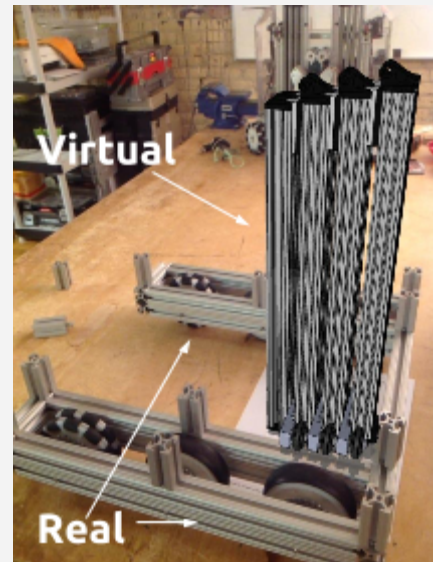


Details:

1. We have been thinking of a flipping ball tube and separate stationary ball intake, the brushes would push balls into a lightweight tube, and zip tie ratchets would keep the balls from falling out of the tube when lifted, we are thinking about a zip tie brush, but another potential candidate is a foam wheel. -Matthew



2. After searching the app store for an app that would allow me to view the teams CAD files mobily I stumbled upon an app by Dassault Systems called "eDrawings". I began to download the app because in the description it mentioned it had augmented reality capabilities so we could view our models and assemblies on a 1:1 scale in real life. So we began experimenting with the app and we were very impressed by what it could do. For example, we took our slide lift assembly and projected it inside our chassis so we could see exactly how it would look, and it blew our minds to see our robot being there without actually being there. Then, once we assembled the lift to the robot, we took our CAD assembly for the robot chassis with lift and projected right beside the real robot and they looked identical. We are definitely going to using the app in the future to see how parts react with others and so we can see how much room is being taken up within the robot. -Bo



3. No additional details.

11.07.14 Lots of Screens

Duration 4:30 pm - 8:00 pm

Attendance:

Kristen, Matt, Bo, Chris, Marcos, Coach, Mrs. McKellar, Mrs. Laker

Tasks:

1. Unbox our donated monitors from *La Huerta Grill and Market*
2. Create a custom idler pillow block and motor mount for the robots drive train in Solidworks
3. Continue work on our scouting app that we are implementing for this year's game

Reflections:

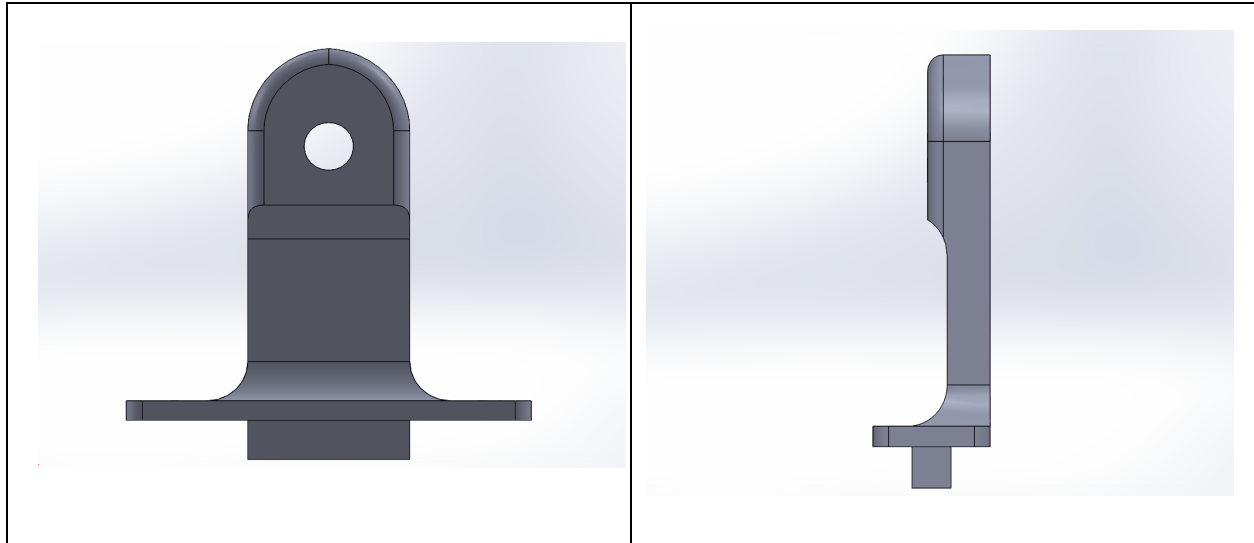
1. We received some new monitors from La Huerta market that were graciously donated so the CAD team has better monitors for modeling. -Chris
2. The C.A.D and Engineering team worked on creating some custom parts for the robots drivetrain. First we took multiple measurements and decided how we wanted the drive chain to wrap around the sprockets. Then, we worked on creating the custom idlers and motor mounts. (See details.)
3. I have been working for a long time on creating new system for compiling information from the scouting team. I did end up changing directions not only on our compiling system but our whole system of scouting. (See details.)



Unwrapping the monitors *La Huerta Grill and Market* donated for our CAD team



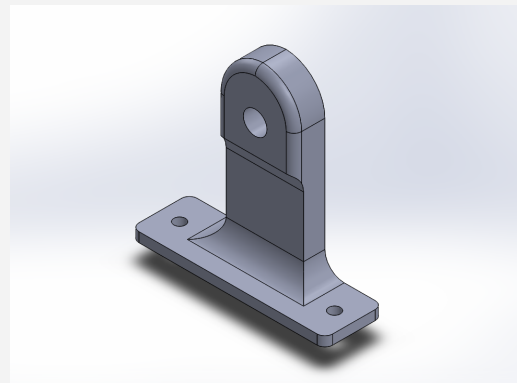
The new line-up of Screens



Front and side CAD view of our printed drive idler

Details:

1. No additional details.
2. I worked on creating the idler pillow blocks for holding the free floating idlers on the drivetrain. They needed to be 1.75" high so it would clear the rest of the chain, and needed to fit a brass bushing inside the thru hole. Then, I put a "key" on the bottom so it would slide into the 80/20 channel and then attach with the T-slot bolt. We will soon 3D print these so we can put them on the robot at our normal meeting tomorrow. -Bo
3. For the last 3 years our team has done a paper filing system for scouting. This system has proven to be a solid system up to a certain point. Our team really realized the flaws in our system when we went to the world competition and super regional competition. The flaw was gathering information in a timely fashion and compiling information in an effective manner. An example of this would be when we were at super regional competition it was a challenge receiving information via paper. Instead of trying to fix that problem within the parameters of this system, I decided to create a new system using google drive specifically the form and spreadsheet function. With these two functions we are able to present our compiling and data compiling system in an app view and interface. -MMMs



11.08.14 Printing Idlers

Duration 12:00 pm - 4:30 pm

Attendance:

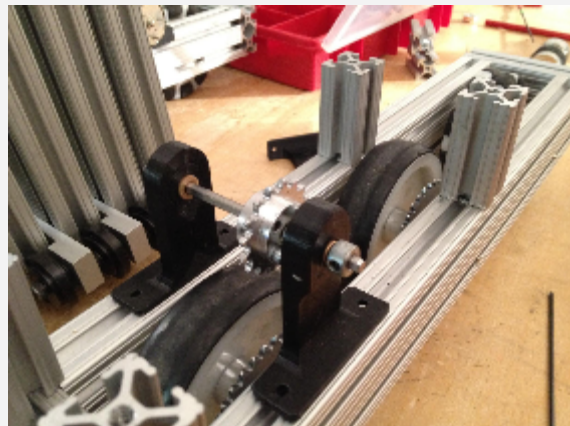
Kristen, Matt, Bo, Chris, Marcos, Aidan, PJ, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Design and 3D print our custom idlers and attach to the robot
2. 3D print our custom tetrax motor mounts and drill the holes for the baseplate where they will be mounted

Reflections:

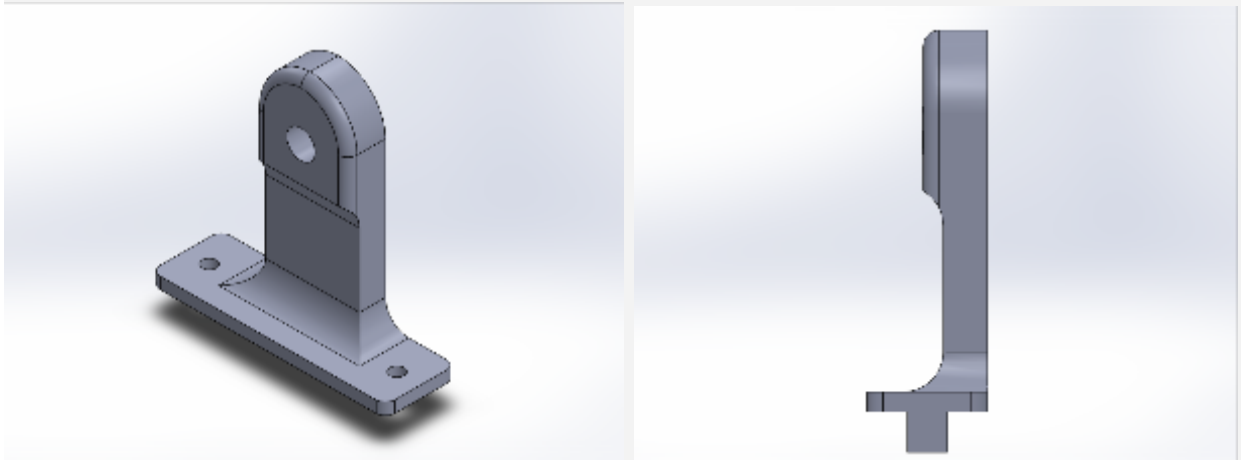
1. Matthew designed the drive system idlers, Bo CAD'ed, and Aidan installed the idlers. (See details.)
2. We were able to create a design in Solidworks for the motor mounts. The theory is that we will bend threaded rod to use as a U-bolt, and run it through 3d printed spacers to mount the motors. Sugru putty may function to prevent motor slipping. (See details.)



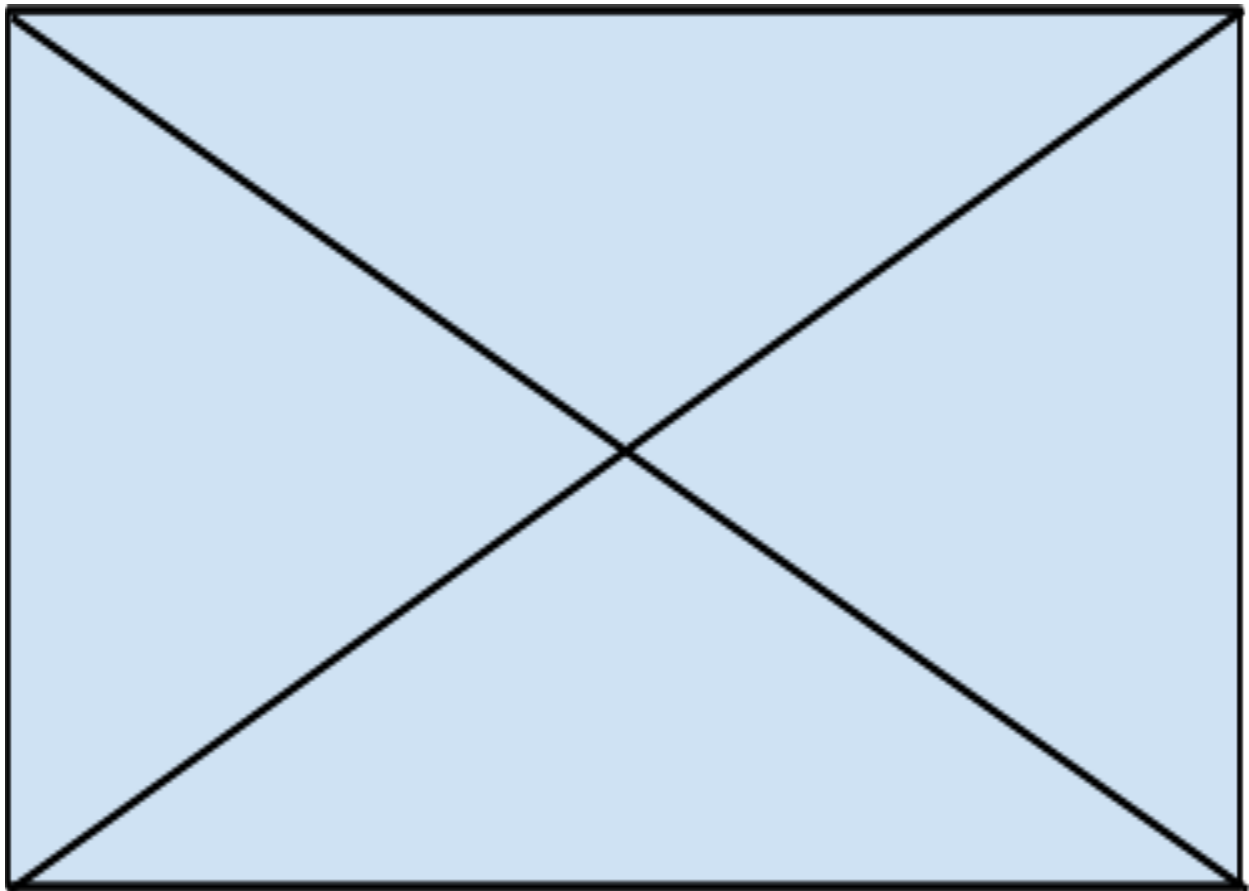
Details:

1. I designed the robot drive system idlers in CAD based off of the drawing Matt made on the whiteboard. After I made the part and made all the holes and chamfers I brought it into the virtual robot assembly to see how they would fit. Once I quickly made the necessary adjustments we sent it to our 3D printer. Finally the part was done and we tested it on the robot. As well as Bo CADing them, Coach McKellar and I installed them. After the idlers were printed and had holes drilled we took some brass bushings and stuck them into the top holes so that the axles would spin smoothly. Then we took 10/24 aircraft nuts and put them through the holes on the bottom of the idlers. We slid the idlers on to the drive train and added 80/20 fasteners to hold them in.--Bo/AMP





2. Printed spacers seem to work well despite the early demise of using Sugru padding. A test shim was printed from ABS plastic, but we will need to modify the files to match the shape of the steel mounting bracket and print 4 from PLA.



11.10.14 Chain Gang

Duration 6:00 pm - 10:30 pm

Attendance:

Matt, Aidan, Coach

Tasks:

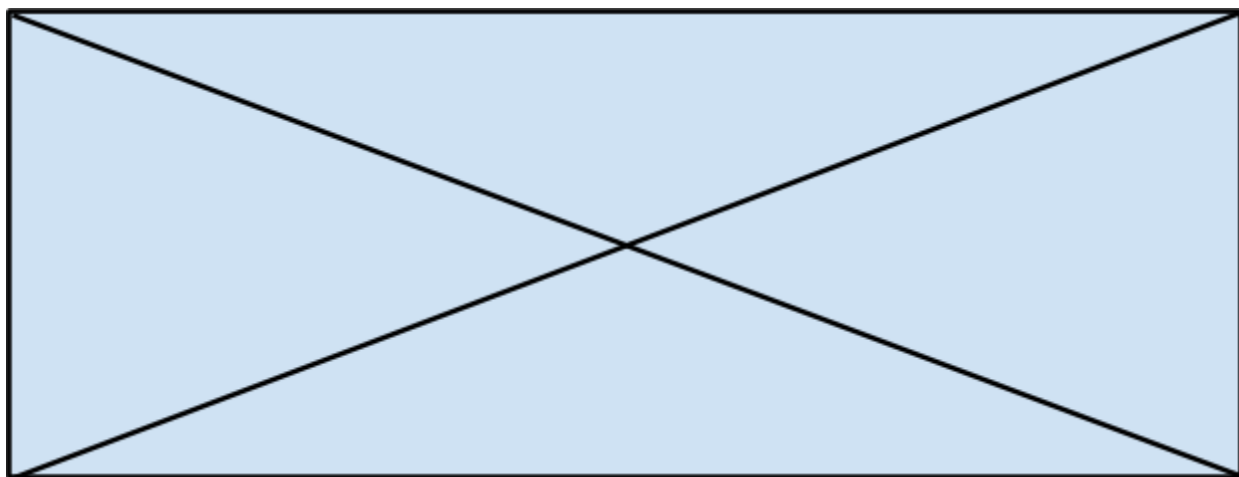
1. Mount the motors, idlers, and chain to make the robot drivable by next meeting

Reflections:

1. We began by remounting the motor mounts, because the sugru we had used in the motor mounts had expanded and the motor would not fit, so after a the long and strenuous task of remounting the mounts we proceed to start mounting the idlers and chaining the robot. (See details.)

Details:

1. At this point we ran into a slight snag - the chains we used on last years robot were too short for this years robot so we had to add about 3 inches to the chain. Knocking the new pin into the hole was not easy but I did it eventually and mounted the first chain on the robot by wrapping it around all the sprockets and idlers and linking the two parts of the chain. Matt came at this point and finished the other side of the chain.--AMP



11.11.14 TARS goes for his 1st Drive

Duration 6:00 pm - 9:30 pm

Attendance:

Matt, Bo, Kristen, Marcos, Chris, PJ, Aidan, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

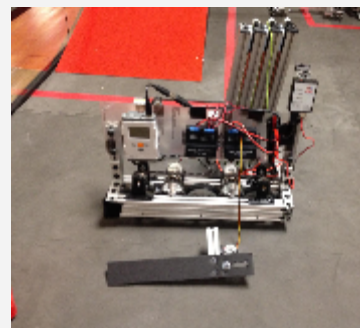
1. Mount temporary electronics panel so we can drive our robot for the first time
2. Brainstorm ideas for ball paddle
3. Update terminology in the scouting app

Reflections:

1. We all came to this meeting with one main goal in mind: to drive this robot tonight. After we mounted our temporary electronics panel on the robot and made a quick teleop program we did just that. We drove our robot for the first time this season. Now we can test all sorts of things including: pushing force, speed, and overall efficiency. (See details.)



2. I have been thinking of a way to protect our robot from small balls getting lodged underneath the robot. I thought of using a piece of plastic that would simply sit on all sides and be low enough so that no small balls can get passed. -MMMs

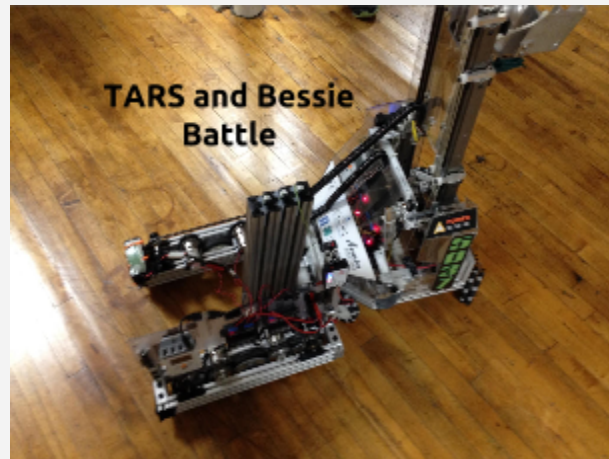


3. We addressed the terminology inside our scouting app, specifically addressing the proper way to present questions. This is to insure team members and scouters can understand the questions inquired from the scouting app. -MMMs

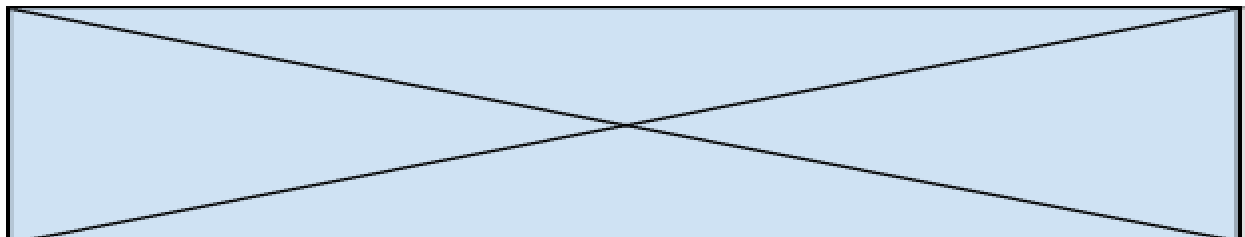
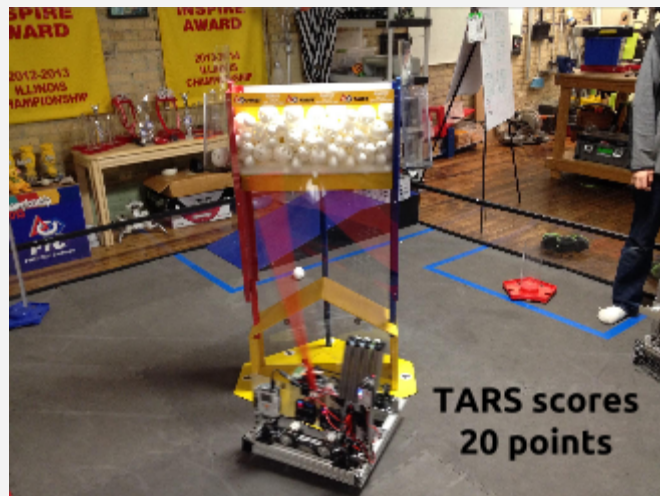
Details:

1. A temporary electrical panel was mounted, but by mounting components using velcro for quick placements we have been able to figure out our finalised Controller mounting positions. While I had to cut out new front posts for the robot, we have determined that a sheet of 0.2" acrylic on both sides will function for the mounting platforms and internal dividers. -Matthew

- a. After Matt was done mounting the electronics panel I started to drive the robot to test the pushing power of TARS, the first test we did was to drive into the kickstand and see if we could knock it down. It was quite easy to knock it down because we had the weight and power of the robot to knock it down. After testing that we wanted to test the pushing power against our robot from two years ago, Bessie. They were about equal in power both going full speed. -Chris



2. No additional details.
3. No additional details.



11.12.14 Crafting the Servo Shoulder

Duration 2:00 pm - 8:00 pm

Attendance:

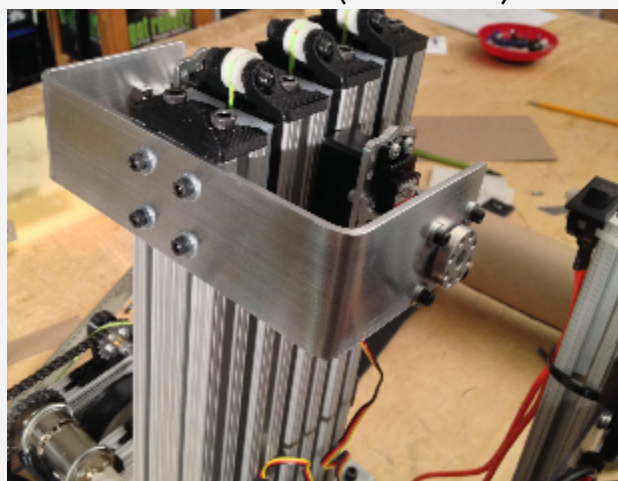
Matt, Bo, Kristen, Marcos, Chris, Coach, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Use CAD to create a Servo Shoulder which will hold and then flip our ball intake so we can score into the tubes
2. Work on some ball intake prototypes
3. Create first version of the bottom pan of the robot

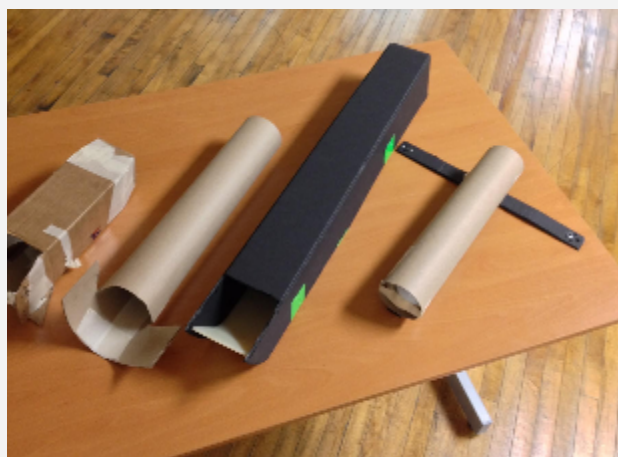
Reflections:

1. I worked on creating a CAD model of the Servo Shoulder so I could print out a flat pattern template on a 1:1 scale so Matt could use it as a guide for cutting and drilling the aluminum bar stock. -Bo (See details.)



Servo Shoulder in Place

2. We had many ideas on how to intake the balls and be able to score them with easy. most of our ideas were involving tubes that we could house the balls in. And then when we want to score them we would just flip it over the back of the robot.- Chris

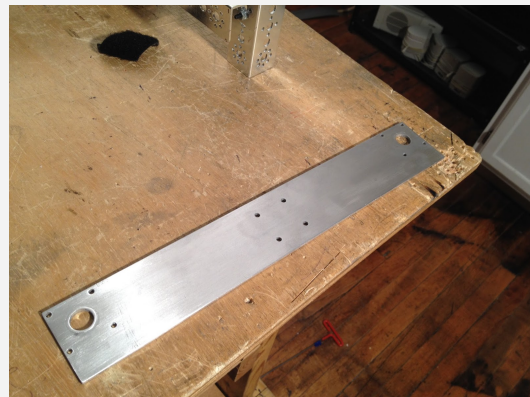
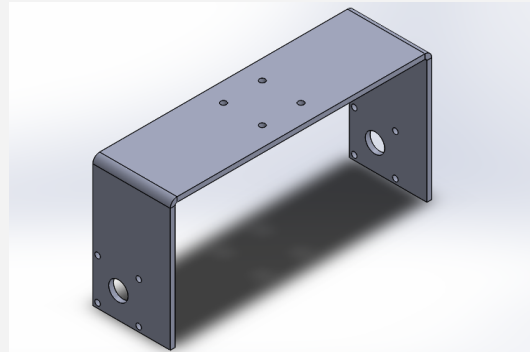


Ball Intake Ideas

3. Today I created the belly tray out of PETG and found it to be amazing with some fall backs. (See details.)

Details:

1. I made a simple sheet-metal “U” shape that was to the specifications I measured. Then I used the hole wizard tool to create all the necessary holes which would mount the servos to the lift. Once it was complete I printed it out and gave it to Matthew for cutting, bending, and drill. Once that was complete it was buffered and mounted to the robot. It looked great! -Bo



2. No further details.
3. I was contemplating on what material I would like to use. I originally was considering using acrylic or plexi but my coach suggested for me to use PETG. PETG offers outstanding part definition, which enables more realistic, intricate designs. One difference between PETG and other plastics is that PETG reaches its glass state at a much faster rate than others plastic materials. For example the temperature it needs to reach its glass state is 250 F-300 F as opposed to acrylic which is 325 F-390 F. Because of the lower forming temperature it will increase productivity. -MMMs

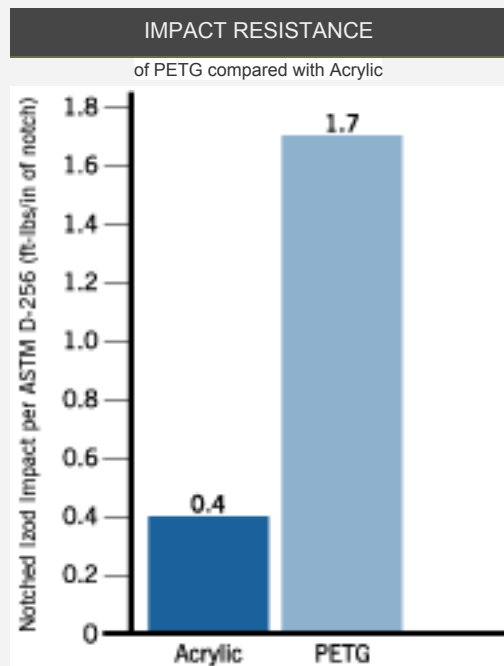
(Continued on next page)

PETG

Properties

	UNITS	ASTM TEST	PETG
Tensile strength	psi	D-638	7,700
Flexural modulus	psi	D-790	310,000
Izod impact (notched)	ft-lbs/in of notch	D-256	1.7
Heat deflection temperature @ 264 psi	°F	D-648	157
Maximum continuous service temperature in air	°F		-
Water absorption (immersion 24 hours)	%	D-570	0.20
Coefficient of linear thermal expansion	in/in/°F $\times 10^{-5}$	D-696	3.8

Values may vary according to brand name. Please ask your Curbell Plastics representative for more specific information about an individual brand.



11.14.14 Preparing our Scouting App

Duration 5:00 pm - 10:00 pm

Attendance:

Kristen, Aidan, Bo, Matt, Chris, Marcos, Coach, Mrs. McKellar, Mrs. Laker

Tasks:

1. Finalize scouting app for testing at League Meet tomorrow
2. Work on delivering to the center goal
3. Threading 80/20

Reflections:

1. Consulted with Mrs. Laker and Mrs. McKellar about app usability and functionality. We learned the app has to be opened from an email and not from Google Sheets because it opens in the edit mode and things can easily get changed.-MMMs
2. We had an idea to use Zip-Ties at the end of our ball tube. This would allow us to more accurately score the balls in the tubes. -Chris
3. I spent most of the meeting threading 80/20 stock so that we could put bolts in the to of the 80/20 to assemble it as the lift.--AMP

Details:

1. No additional details.
2. No additional details.
3. No additional details.

Matt and Marcos
discuss our
delivery system



11.15.14 Testing the Scouting App

Duration 9:00 am - 10:00 pm

Attendance:

Kristen, Aidan, Bo, Matt, Chris, Marcos, PJ, Coach, Mrs. McKellar, Mrs. Laker, Mr. Stephen, Mr. Times, Mr. Solomon

Tasks:

1. Test our scouting app at the Barrington High School league meet
2. Prototype and test the second part of our ball intake device
3. Begin printing out CAD drawings for review
4. Review rule clarifications about questions that came up at the Barrington league meet

Reflections:

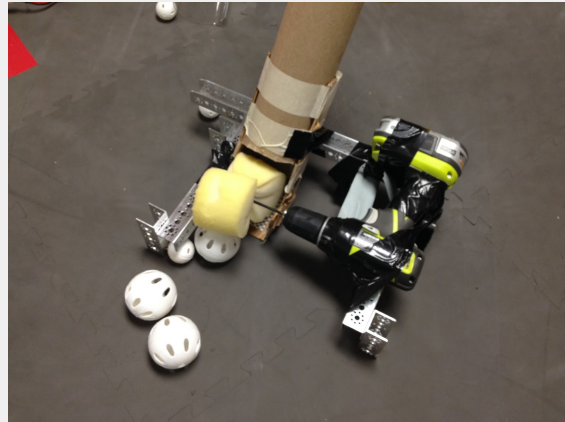
1. We all got up early today to go to the Barrington High School league meet in order to test our new scouting app. (See details.)
2. Today we're testing the prototypes we've created for the ball delivery. (See details.)
3. Coach tasked us to start printing out CAD drawings of the parts we had. While printing them I asked our mentor Mr. Times to help me with what needs to be marked for the drawings. (See details.)
4. After coming back from the Barrington League play. Marcos and I decided to look into some of the penalties they were calling. (See details.)

Details:

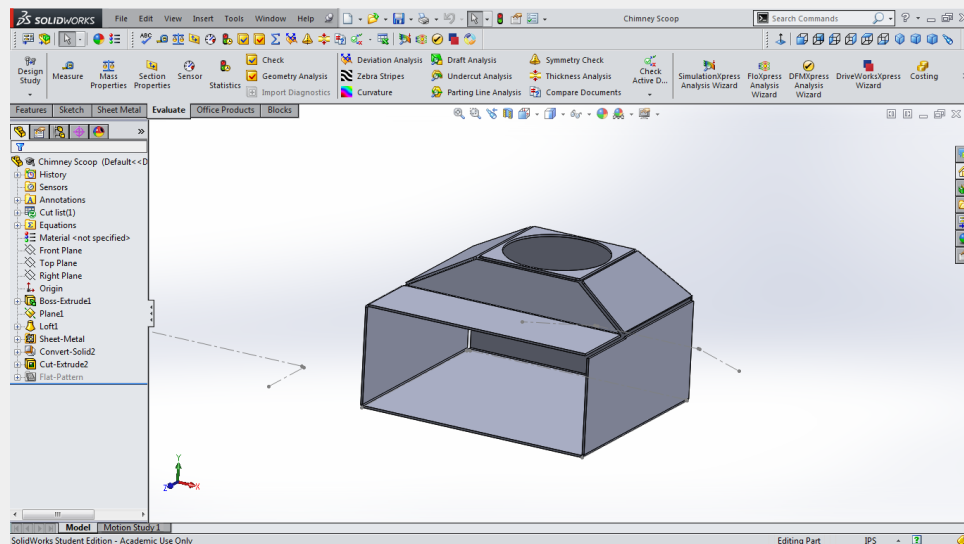
1. We are testing 3 things.
 - a. Determine how user friendly the interface is.
 - b. Observe if the information we are receiving is viable information.
 - c. How easy is the information able to be condensed.

In these 3 areas there are some improvements that need to be made but all in all it works fine. - MMMs

2. We had a couple ideas for collecting and deploying the plastic balls. As many teams have discovered, dealing with two different sizes has turned out to be harder than it looks. Our 1st prototype is a vertical tube mounted to the lift with a beater brush collection system. It was thought the beater brush would have enough power to drive the balls up the cylinder but it turned out the weight of five balls quickly overpowered the zip ties on the brush. We found a way to add more beaters to the system but doing so makes the system too heavy for the servos on the shoulder joint at the top of the lift. This idea is a dead end.

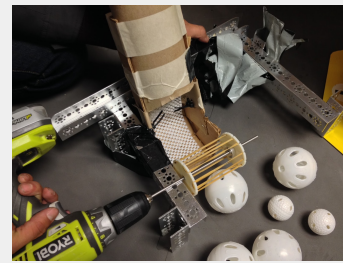
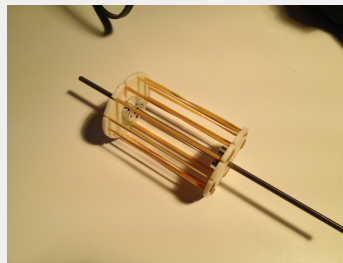


The second idea is a scoop and chimney. It looks a like a fireplace and chimney where the balls are collected into the lower chamber and when the whole thing is turned upside down the balls drain into the chimney. A prototype was constructed out of cardboard. However we discovered that when the contraption is turned upside down the big balls are forced to the walls which prevents them from draining into the chimney. We fiddled with rounding the chamber so there were no corners inside but doing so reduced the inside volume to the point where it was difficult to hold 4 large balls. Given the space constraints increasing the size isn't an option. This idea is also a dead end. Back to the drawing board. -MMMs



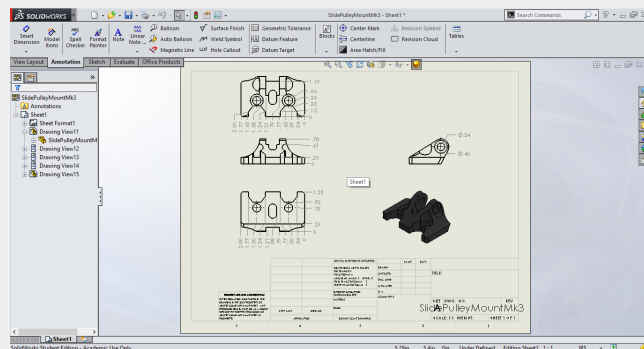
Bottom half of Chimney collector box minus the cylinder top

This is an idea that Bo and Mr. Times thought of. It used two 3D printed wheels with rubber bands stretched between them. This would allow for an easy intake system that would be easy to make. The only con however, was that the rubber bands began to snap after a little bit of use. We decided to not use this means of intake because it ran a risk having rubber bands snapping during a match. -Bo

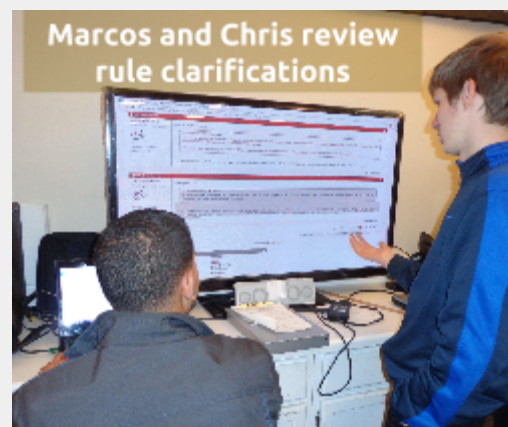


3. After asking Mr. Times, I knew what I needed to document for each part. During the progress of the day I was able to complete 4 drawings.

The 4 parts I finished consist of our three different pulley mounts for the lift and the end caps. -Chris



4. One of the rules that we saw being called at the Barrington League meet was touching the tube, no matter if it was accidentally touched, more than 4 times is a penalty. Another thing they called was a rule called funneling. Which meant if a mechanical device is used to direct the flow of balls into the tube. After talking about these rules we decided to look them up in the FTC forums so we were clear on what was and wasn't a penalty. - Chris



11.17.14 Ball Intake Ideation

Duration 6:00 pm - 9:00 pm

Attendance:

Kristen. Matthew, Coach

Tasks:

1. Programming team works with gyro
2. Invent a ball collection system

Reflections:

1. Remove Delta drift functionality (See details.)
2. Coach and I talked last night about the ball collection and deployment. Since our earlier ideas didn't work I decided to try another idea I have been thinking about. (See details.)

Details:

1. We are still in the 'research' phase of the gyro, were trying to properly understand what needs to be done to optimize the gyros use. Working towards that we are removing the delta drift part of the code. Delta drift works on the concept that the gyro will drift exponentially yet consistently in the same direction. Thus by calibrating the gyro five separate times each for five seconds, or 25 seconds total of gyro cal, we should be able to accurately interpret the gyro. Although this concept proved good last year, it's over complicated for our goals of simplicity this year, especially since now we have a consistent and steady gyro the code's unneeded. -K McK
2. Our current lift system and U-shaped chassis limits some of our options for implementing a ball collection and delivery system. Those limitations are a 6" x 7" area for collecting and corralling balls and a weight limit from the servos on the shoulder of our lift. A system I've devised to overcome these limitations is two impellers made of foam blocks mounted to servos on either side of of our deployment tube. These impellers will take balls collected into a tray by a beater brush and force them to the back of the tray where the balls get caught in the foam impellers that drive them up and into the delivery tube. One big advantage to this system is that is has a small footprint and forces the balls into a vertical column which reduces the leverage force needed to lift the shoulder to the goals.

Last Sunday our coach ordered some Futaba servos that have 180 degrees of movement and 160 oz/in of torque. This should give us the lifting power at the shoulder to lift the ball tube from it's down position and over into the deploy position. Should we need additional force we can implement a torsion spring out of surgical tubing to give it some extra help. --Matthew

11.18.14 Intake Prototype

Duration 3:00 pm - 9:00 pm

Attendance:

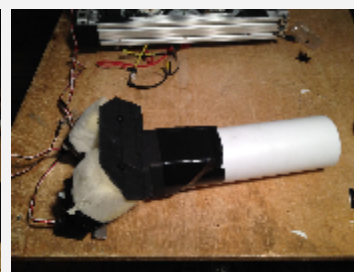
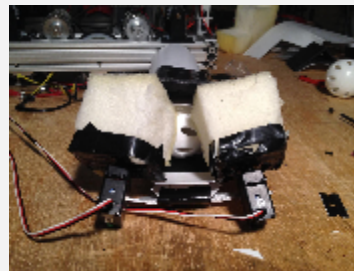
Matt, Bo, Kristen, Marcos, Chris, Aidan, PJ, Coach, Mr. Solomon, Mr. Stephen, Mrs. McKellar, Mrs. Laker

Task:

1. Prototype a ball collection system
2. Programming team works with gyro
3. Engineering Notebook Palooza

Reflections:

1. After a late night R&D session we eliminated stationary ball intake systems based on volume of space it would take up on the robot and time to implement it. This forced us to



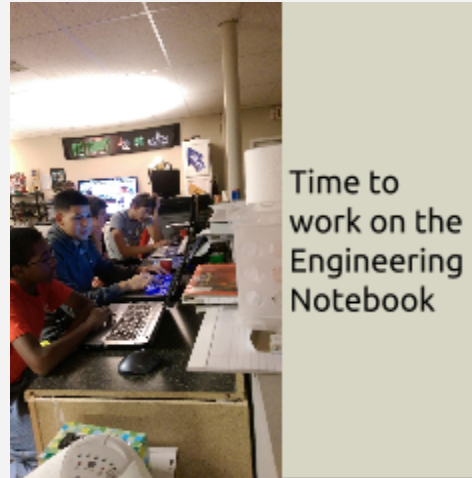
consider other grabbing mechanisms for the balls, one of which is two SpringRC continuous servos driving foam impellers. This systems ease of implementation and relative light weight makes it a viable candidate. -Matthew



2. The robot was deemed ready for us (the programming team, Kristen and PJ) to work our magic. We started

with the intention of making a functional autonomous but had to change focus to ensure the sensor legacy code sub functions would work fully for the new robot. (See details.)

3. We went over all the notebook pages we had done from the beginning of the season. We added more details, and matched photos to the the tasks to insure that we have accurately documented our work so far. (See details)

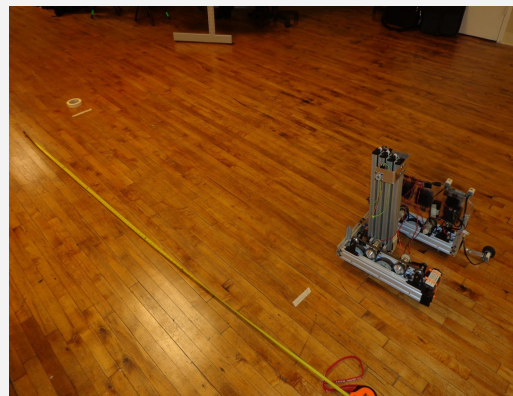


Details:

1. No additional details.
2. When we started we had trouble with the robot refusing to drive straight. Originally we thought that the `abs_drive` function was broken due to the condition 'NON_SENSOR' being selected. Last year we added NON_SENSOR as a means to request a drive movement that had no sensor directional correction applied. We never ended up using this ability last season. When we used it this year for some beginning cursory tests we blamed the issues we were seeing on it assuming that since we didn't see these troubles last year due to NON_SENSOR's minimal use. The robot was drifting and we assumed that NON_SENSOR didn't properly stop the gyro's effect but instead partially hindered it causing the curved movements.

With further testing though, we discovered that in fact NON_SENSOR was not broken, in reality it wasn't the code at all. In not a shining moment, we didn't notice that one of the motors had been unplugged earlier for better storage, and we forgot to plug it back in. Two motors on one side against the one on the other the robot naturally drifted to one side.

Once this was fixed we started working on the other sensors and decided to test the angle sensor. We did this out on the open



floor since this would be the first test of the season and we didn't know the working condition of all the components yet, so it seemed smart to give the robot all the room it needed. Amusingly enough the robot didn't need the extra space. After measuring the desired distance and coding it in we let the robot go, to which it perfectly performed on the first try.

Readdressing the gyro we found some troubles with an unacceptable amount of g_drift and delta drift. Not wanting a repeat of last year, where we caused compounded issues trying to fix what ended up being a broken sensor, we worked to revert the gyro code back to a form that is very directly inspired from the 3rd party sensor sample code. The main factor being to nullify the unneeded code and to slow down the gyro refresh rate. In the sample code the gyro is updated five times a second. In our legacy code the gyro was updated as fast as it would go, which was probably several hundred times a second, if not more.

Theorizing that the gyro's twitchiness was due the these constant reads since the gyro's value is based on previous read plus current read we decided to lower the refresh rate. First to 500 reads a second, then 50, it was still too much. Finally we separated the gyro's code away from the rest of the sensors so that we might manipulate its refresh rate separately, then lowered it down to five per second. In order to continue improving accuracy we tried changing out different gyros going from D to B to C, which tends to perform the best. This seemed to fix most of the issues, but still the gyro will at random times jump in value unreasonably. Due to the gyro's additive read style one bad reading could ruin the rest. As we've seen in past years, fluctuating power will cause erratic change in gyro accuracy, and we've noticed some static when operating the robot.

The wiring will be readdressed for the final version of the robot. But to make our sensors enforced against interference our next step is to make a gyro interpreter to 'weed out' the bad readings. This should fix all potential issues. - K McK

3. During the process of reviewing the Engineering Notebook, Bo and I made sure all our CAD drawings and assemblies were in and where we wanted them to be.
- Chris



11.19.14 Impeller Brackets

Duration 4:00 pm - 11:30pm

Attendance:

Kristen, Matt, Marcos, Bo, Coach, Mrs. McKellar

Tasks:

1. Test our new FoxSmart 3D printing filament
2. Make some CAD drawings
3. Finish program quality sheet
4. Print our impeller brackets

Reflections:

1. We recently discovered a filament sold by a company called "FoxSmart". The difference between this particular filament then any others is that it is available for about \$18 compared to the \$40-50 price range normal filament costs. <http://www.foxsmart.club/> (See details)



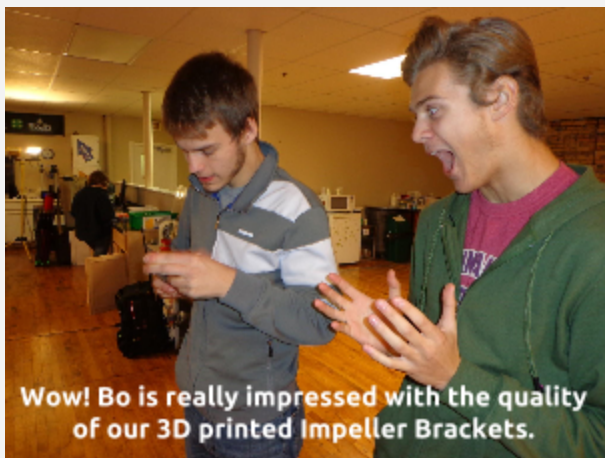
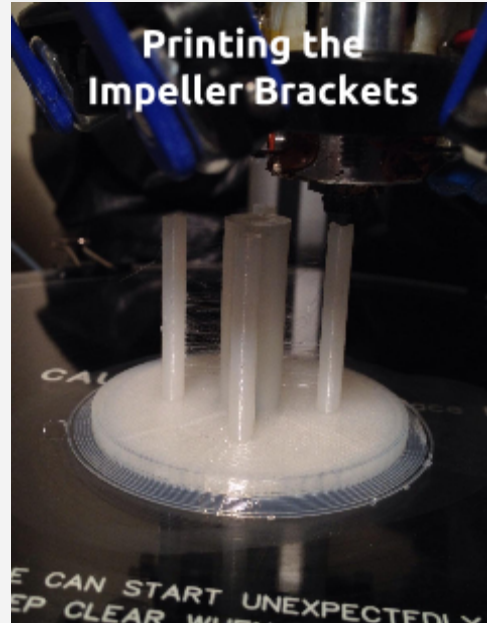
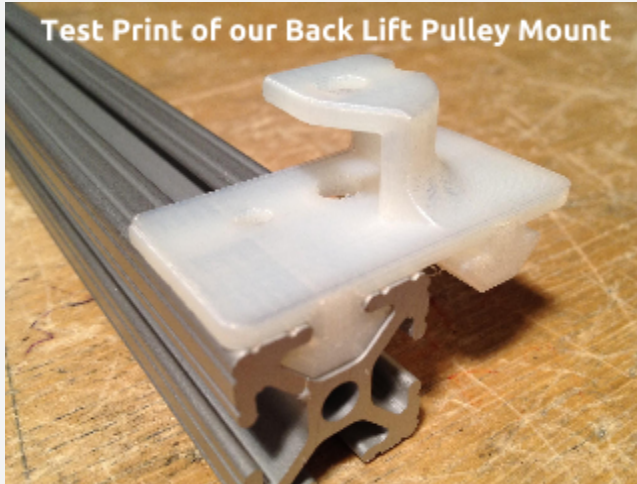
2. We worked on making some dimensional drawings of our robot including: the idlers, the chassis side rails, and the chassis itself. (See details.)
3. Today I looked at and revised a program quality sheet that I created during summer break. -MMMs
4. Since we liked the FoxSmart printing filament so much, we decided to print our impeller brackets for the robot's intake system out of it and it made a great print. You almost couldn't tell it was 3D printed! (See details.)

Details:

Despite nonstandard spooling of the FoxSmart PLA filament, the print quality with it is more than up to par with SeeMeCNC filament and other competitors. The clear filament prints at a higher viscosity, but results in stronger more rigid prints. Overall these filaments have the same printing (Fluid) temperature, but have a higher glass temperature, making printing of complex shapes more reliable.

Since we chose to make a completely custom robot this year we are going to make dimensional drawings in CAD of all of our custom parts (Basically the whole robot) so we can display all the exact dimensions in the back of the notebook. -Bo

During the summer my coach suggested that I make a programming quality sheet. The purpose of this sheet is to identify programming routes that may be obstructed either by other robots or by field elements. The sheet is in question and answer format.



While no other options were pursued, I decided that a two part interlocking cage for the foam blocks would be the most viable solution. Normally the stressing on the 0.1" would result in reliable and consistent breaking of 3D printed parts printed cross grain, but observations as to the superior layer adhesion of the FoxSmart brand PLA should allow more delicate designs to become robust enough for reliable mechanical use. One cage was printed for performance testing, and while dimensionally it is in need of tweaking, the durability of the print is confirmed as sufficient as no visible stressing was observed.

-Matthew

11.20.14 Belly Pan

Duration 3:00 pm -10:00 pm

Attendance:

Kristen, Matt, Marcos, Coach, Mrs. McKellar

Tasks:

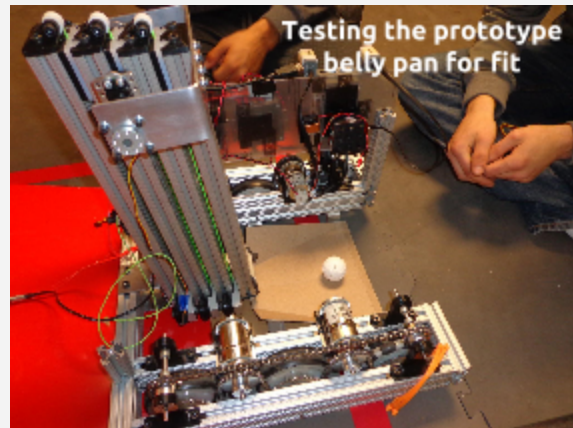
1. Prototype and build a Belly Pan and all associated parts
2. Create foam impellers for ball intake and motorize

Reflections:

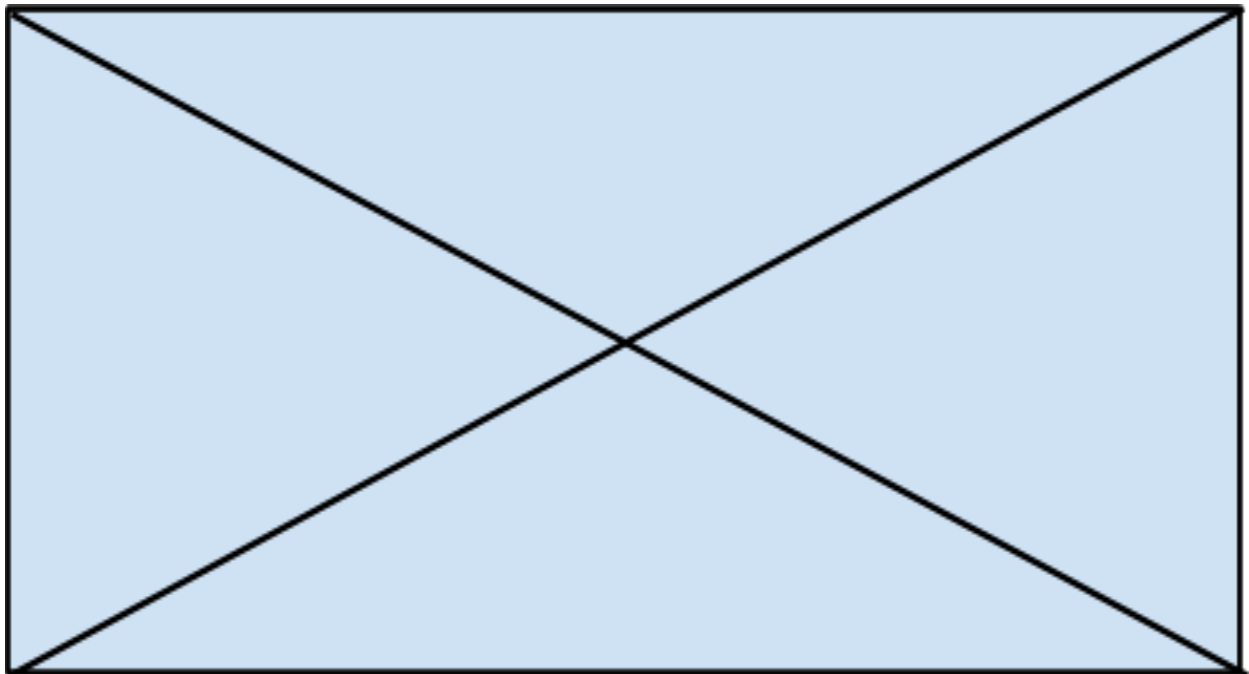
1. Marcos was tasked with prototyping and fabricating a belly pan for the robot. (See details.)
2. Matt marked the impeller pad mounting holes, inserted the brackets we CAD'd and 3D printed, mounted on continuous rotation servos, and attached to a prototype ball tube to test. (See details.)

Details:

1. Today we were prototyping a belly pan for our robot. The belly pan will help guide balls into our intake system and protect balls from getting lodged. This is due to it's V/squared construction. It was a really exciting day for me because I used the drill to put the mounting holes in the belly pan - MMMs



2. Continuation of the previous meeting, I tweaked the CAD file for the Impeller brackets at home and was able to print out two final models. The tweaks include shortening to account for the decreased expansion of the foam after compression, reduced diameter of support capping, and a fillet around the base of each pin to reduce horizontal flexing. - Matthew



11.21.14 Prototype Skirt

Duration 5:00 pm - 2:00 am

Attendance:

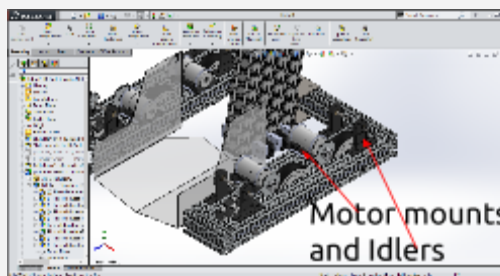
Aidan, Bo, Chris, Kristen, Matt, Marcos, Coach, Mrs. McKellar, Mrs. Laker

Tasks:

1. Mount the impeller system on the robot
2. Update robot in SolidWorks
3. Make prototype chassis skirt
4. Make job list for team members duties for tomorrow's meeting
5. Continue work on belly pan prototype
6. Motor Connections
7. Jake Urban, former got robot? FLL member and Geneva High School FRC member, stops by for a visit

Reflections:

1. The mounting hardware for the impeller system has been cut out from aluminum. While the foam cubes should provide significant tolerance for the ball sizes, slots were cut into the mounting hardware so that the intake width can be adjusted to improve performance. - Matthew
2. Today we were tasked with updating the robot. which involved putting the motor mounts on there respected spot. Those spots were right in the between the wheels. Which gave us the power we needed. We also adding the Idlers so we could wrap the chain how we needed it. That placement was right after above the last wheel. (see photo in details) - Chris
3. Bo had the job of cutting out the side skirts that will fit on the robot. (See details.)
4. Matthew and Marcos nailed out a production schedule:



Saturday, November 22:

Matthew: Intake, Spring Assisted Shoulder

Marcos: Pan

Aidan: Connector End Assembly

Mr. Times, Bo, Chris: Bumpers & Skirt

Tuesday, November 25:

*Matthew: Rear Goal Grabber, Encoder Wheel,
(hopefully) Front Goal Grabber*

Wednesday, November 26:

Matthew: Electrical Panel

Sometime very soon:

Shielding: Can be done while they program

Battery Mount: We can re-use Pearls. A new one might be able to be done while they program

Programmers up to bat:

Saturday, November 29

Monday, December 1

Tuesday, December 2

Wednesday, December 3

Thursday, December 4

Friday, December 5

Saturday, December 6

Programmers and/or Drivers:

Monday, December 8

Tuesday, December 9

Wednesday, December 10

Thursday, December 11

Pack for qualifier:

Friday, December 12

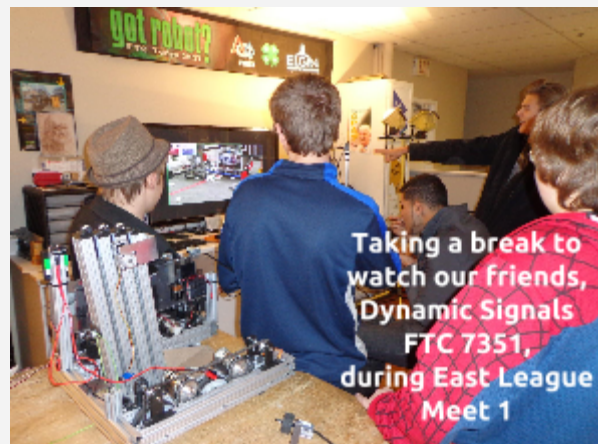
5. We even further expanded on our previous idea for a belly pan. We plan on making a final belly pan during tomorrow's meeting, out of PETG. - MMMs
6. I had to solder longer wires for the motors on the right side of the robot so that they would reach around to the left side of the robot and to the electronics panel. I solder about 6" of wire on the original length of wire then I had to shrink wrap the wires together to prevent electric shock of the user after that I fitted it on the robot to test it, it fitted just right.--AMP



7. Jake spent some time visiting with the team, sharing a few stories, checking out the progress of TARS, our robot, as well as having some fun getting an old FRC 2739 robot driving. (See picture in details) - Matthew

Details:

1. No additional details.
2. No additional details.
3. I used the measurements from the CAD file Chris made a little while ago which happens to be 15" by 2 ½ ". So I measured it out in PETG, drew it, scored it, and snapped it. Since it was PETG, it snapped cleanly and easily without any sharp edges. Then I used the side bumpers of the robot and attached it. -Bo
4. No additional details.
5. No additional details.
6. No additional details.
- 7.



11.22.14 *Crunch Time*

Duration 12:00 pm - 4:00 am

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

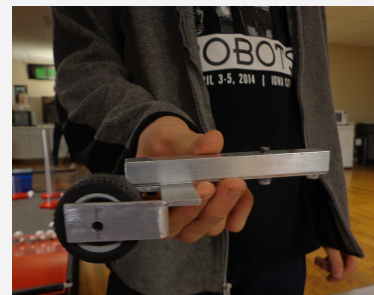
1. Work on intake device
2. Work on spring assisted drag wheel
3. Make final Belly pan out of PETG
4. Design in CAD then print robot corner bumpers
5. Determine Good/Bad Controllers
6. Identify different variations of autonomous
7. Make a wireframe image of the field for Marcos so he can continue his work on the strategy sheet

Reflections:

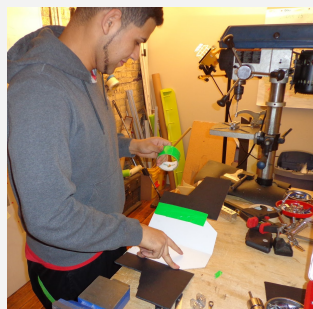
1. We worked on our prototype intake device to try and make a final version that we'll use in competition. We replaced it with clean white foam to the exact shape and size we needed it to be. Then, we fabricated the tube that houses the balls out of polycarbonate so it bends easily. -Matthew



2. We created a drag wheel that has a spring in the middle to hang underneath so we can get accurate readings for how far the robot traveled. It's spring loaded so it stays in constant contact with the field floor. (See details.)



3. Marcos and Bo worked together making the belly pan out of PETG.

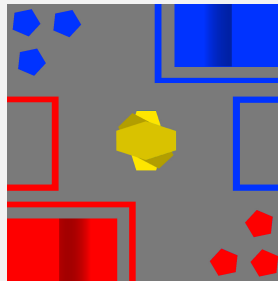


We took the final dimensions of the prototype and used that as guides for cutting it out of the plastic. Once we had the flat shape we then worked on bending the walls and the fins up so no balls would fall into the robot.

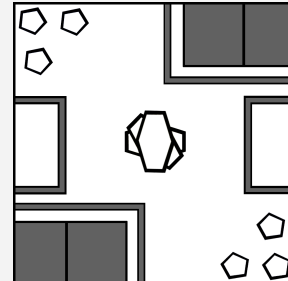
4. Mr. Times assisted us in making a corner bracket to help shield the sharp corners of the robot and also hold onto the robot side skirts that we will hopefully attach our shields to very soon. (See details)



5. During the Process of determining if the remotes were good or bad, I looked on the back of the remote and saw that all of them were on 'X'. (See details.)
6. Working with Marcos we determined six autonomous alternatives that we want to get working for the December tournament. Four of them start from the ramp, two from the ground. Of the two ground options they seem to be variants of the same goals, thus we will work on those capabilities later. (See details.)
7. Marcos asked me to make a black and white wireframe version of the field image I made for him earlier in the season. I used the online tool Pixlr, basically a free online photoshop to make the new image. - K McK



Original

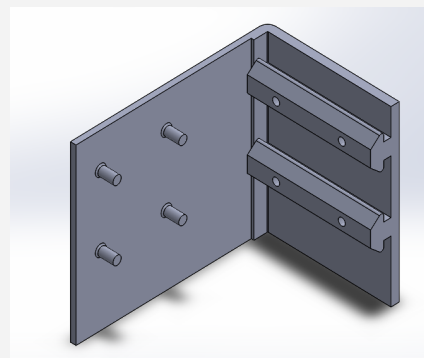
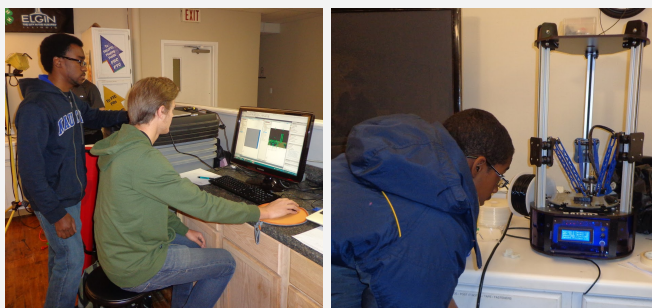


Wire Frame

Details:

1. No additional details.
2. No additional details.
3. No additional details.

4. Mr. Times helped me model the bumper in Solidworks. We used a previously made 80/20 profile so we could slide the bumper into the 80/20's T-slot and then add a lead screw through it to keep it in place. Once we had the model made we put a .02 slot in, so we could add a couple pegs that would easily and securely attach the skirt to the bumper.



We then printed the bumper with supports so the pegs would print correctly and we tested it out. It fit very securely. Now, all we need to do print the rest. -Bo

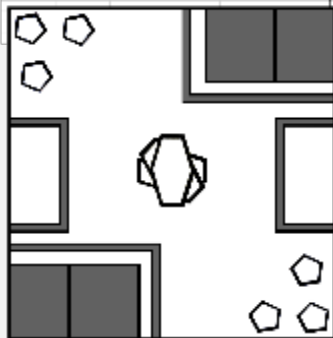
5. The difference between 'X' and 'D' is that 'D' mode is a playstation input, the style which the FCS can understand, opposed to 'X' mode, which is an Xbox input format, the style that the FCS can not translate. While the remote was in 'X' mode, it was giving a constant value which caused me to think that all of our remotes were faulty. Thus changing them back to 'D' mode fixed the problem and gave a non-constant active signal, ie: a normal signal. After putting all the remotes back to 'D' mode, still only 2 of the 5 worked. I marked the 3 bad remotes and notified Coach. - Chris
6. Our first approach was to make a logic tree of all our planned 'missions'. Like last year we want to make an autonomous based on objectives, but due to the inherent exponential time it takes to test this style of autonomous we plan to work off of autonomous missions for this upcoming competition. Still we plan on having the objective style autonomous later on, and as such we built the base of the selection program and the autonomous itself on this concept. We're going to use quick select as a mission select to use the fully debugged auto 'missions'.

Last year to prevent the drivers from selecting autonomous objectives that were incompatible we used select true/false prompts. The disadvantage of this was that we needed interpreters at the end of all our selection sub-programs to translate the inputs into the mission numbers the autonomous ran from. This year, I didn't want to go the same direction. Instead, I changed it so that rather than not showing the impossible option the robot simply informs the driver of the selected options incompatibility, and rejects the input. - K McK

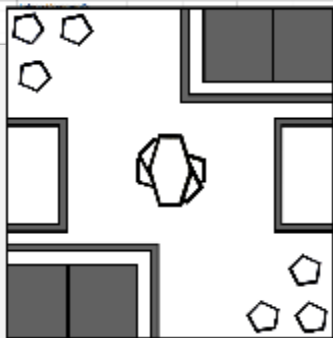
- The black and white version of the field image was inserted into a form that has the scouting questions. I will use this new form when I talk to teams and decide on strategy for both the autonomous and tele-op section of the matches. (See image on next page) - MMMs

Match	Autonomous	Tele-op
Match 1		
Match 2		
Match 3		
Match 4		
Match 5		
Match 6		
Match 7		
Match 8		
Match 9		
Match 10		
Match 11		
Match 12		
Match 13		
Match 14		
Match 15		
Match 16		
Match 17		
Match 18		
Match 19		
Match 20		

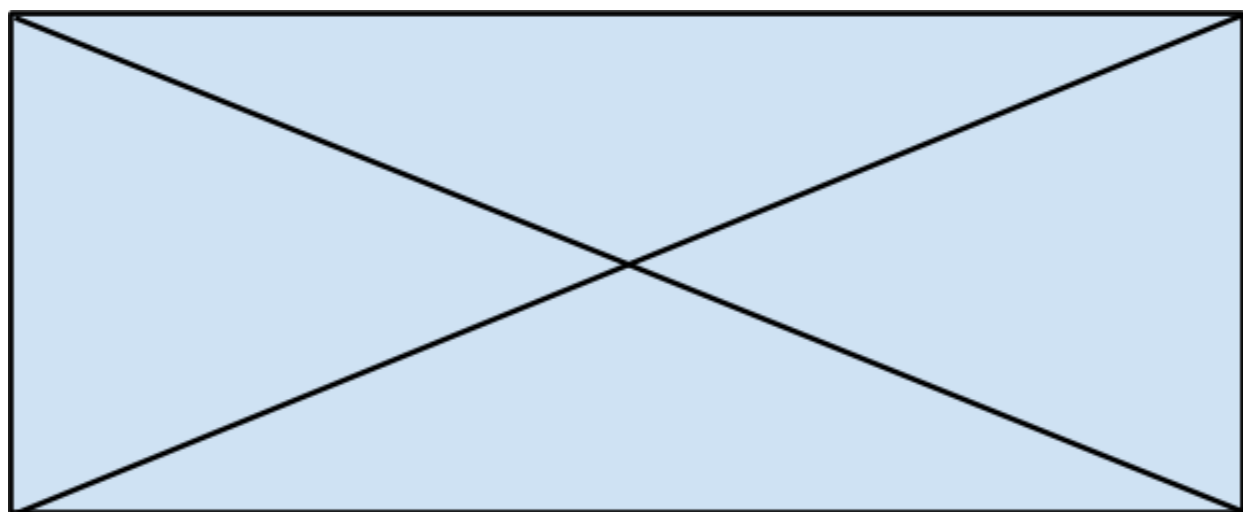
Match	Autonomous	Tele-op
Match 1		
Match 2		
Match 3		
Match 4		
Match 5		
Match 6		
Match 7		
Match 8		
Match 9		
Match 10		
Match 11		
Match 12		
Match 13		
Match 14		
Match 15		
Match 16		
Match 17		
Match 18		
Match 19		
Match 20		



Autonomous



Tele-op



11.25.14 Printing The Power Switch

Duration 5:00 pm - 4:00 am

Attendance:

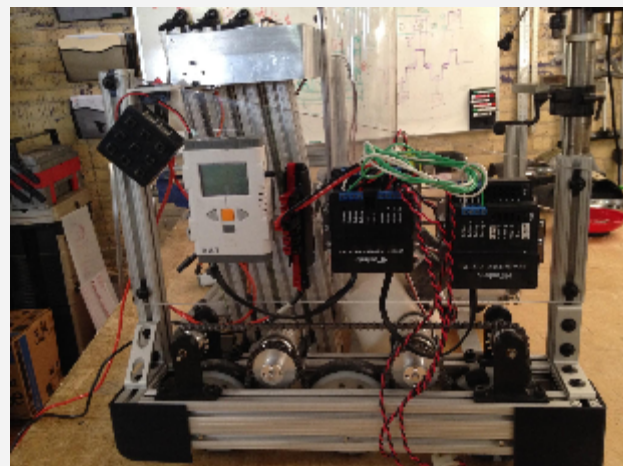
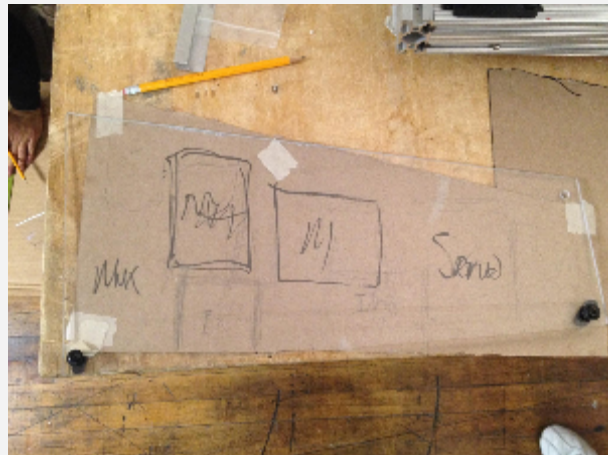
Aidan, Bo, Chris, Kristen, Matt, Marcos, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

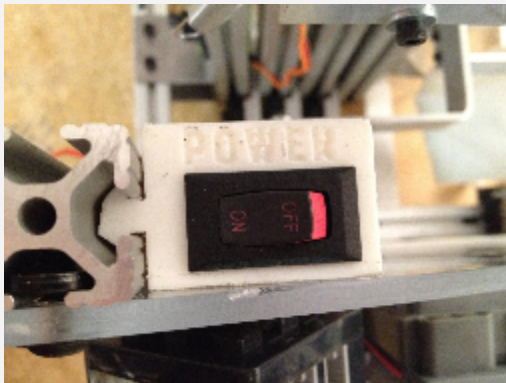
1. Use cardboard to make a template for cutting out our polycarbonate electronics panels
2. Model a custom power switch mount for our power switch in CAD
3. Model a custom IR sensor mount for the side of the robot that is about 7-8" off the ground
4. CAD the Lift Winch system
5. Cutting out acrylic for the Lift Winch System
6. Today I wanted to create a devise that would be able to kick balls into our delivery mechanism

Reflections:

1. I began to cut large cardboard triangles with the points cut off and used these for templates for the cutting of the acrylic. To cut the acrylic we tried using a jigsaw a first but it kept getting stuck on the melted acrylic as well as diverting off course because of a bent blade so we tried using a hacksaw to cut it but it wouldn't fit in the cut made by the saw so we had to move to the good old dremel and it cut through the acrylic quite well but for a few hiccups with the melted plastic getting stuck in the dremel blade but other than that it was fin.--AMP



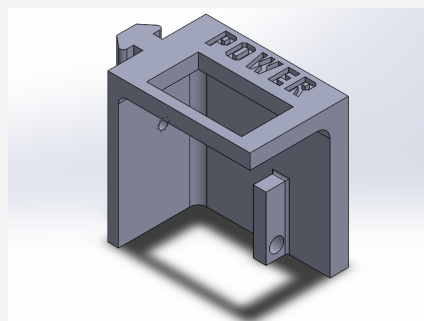
2. Bo made a custom powerswitch holder that would easily attach to an 80/20 T-slot. (See details.)



3. Bo also worked with the programming team on making a custom IR mount that we could attach to the side of the robot. They requested it to be about 7-8" off the ground to get accurate readings from the IR beacon. (See details.)
4. Tonight myself and Mr. Times were tasked to CAD up the Lift Winch System. We went with a two motor configuration of one motor on top and one on bottom. We started by getting the dimensions for the panel. (See details)
5. We printed the dimensions of the panel we needed, taped that on to a piece of acrylic and cut out the right size. After cutting the panel we started on cutting out all the holes for the chain, gears, and the winch. Then we drilled the holes to be able to mount the motors. -Bo
6. Today my goal is to create a beater with zip ties connected to it to help push balls into the intake wheels. (See details.)

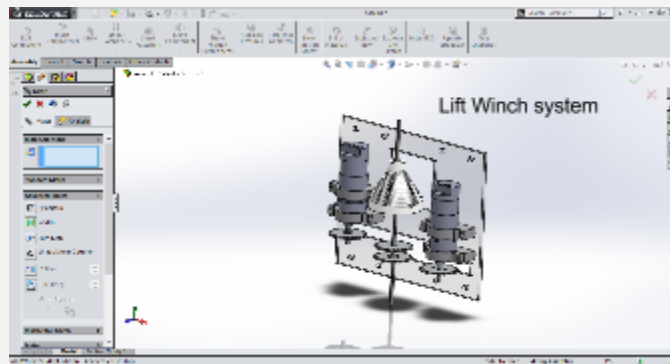
Details:

1. No additional details.
2. I made a simple power switch holder that we could easily mount to an 80/20 T-slot channel. I decided since I was going through the trouble of making the part I might as well try my best to make it better. So I did by adding a rib between the where the two wires come through so I wrap a zip tie around them to keep them secure. -Bo



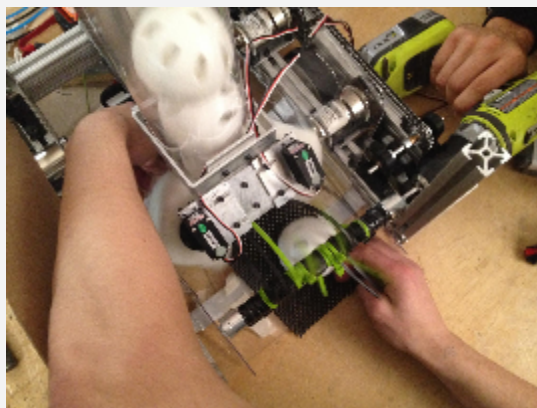
3. I worked with Kristen, PJ, and Mr. Stephen on making a 3D printed part that would hold the IR sensor securely off the 80/20 sidewall and over our chain. When I modeled it I used our new custom ways of mounting it to the T-slot which can be seen in the CAD drawings section in the back of the book. Then when I had the final design, I wanted to use the Solidworks eDrawings smartphone app to test how it would fit on the robot. -Bo

4. After getting the dimensions we started figuring out where the holes needed to be for the motor gears and chain and also where the hole needed to be for the Winch that would hold the string from the lift. After getting the dimensions we needed for the holes we did a cut extrude to get the holes. After that was done we figured out where we needed the holes for the motor mounts. -Chris



5. No additional details.

6. When I was thinking of an idea on how I will create an intake for the robot, I ended up using an old beater that we had. The beater was an axle connected to a servo with zip ties connected to the axle. I noticed that the zip ties would push some balls away because there were not any gripping material at the ends of the zip ties, so I put surgical gripping material at the tips of the zip ties. That definitely helped a lot, so much so that we were able to kick balls in with a minimal amount of power. But there was one problem, the grips at the end could grip on to the front of our delivery system and could damage it. So for now, we are not able to implement, but we are looking at redesigning our robot after our first qualifier. -MMMs



11.29.14 Finally Lifting the Intake

Duration 12:00 pm - 2:00 am

Attendance:

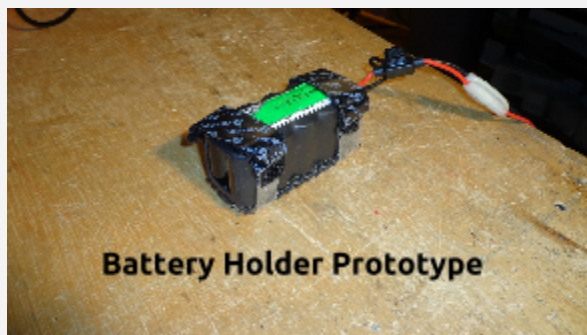
Aidan, Bo, Chris, Matt, Marcos, Coach, Mr. Times, Mr. Solomon, Mrs. Laker

Tasks:

1. Finalize our robot chassis skirts
2. Model the robot winch gearbox in CAD so then we can get measurements and make it lift!
3. Remake intake shoulder assembly for releasing balls
4. Finish rotation sensor drag-wheel
5. Proto-type battery holder

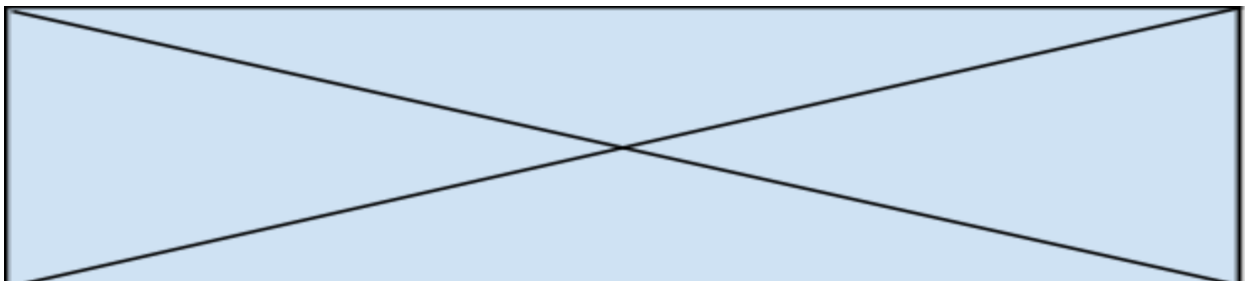
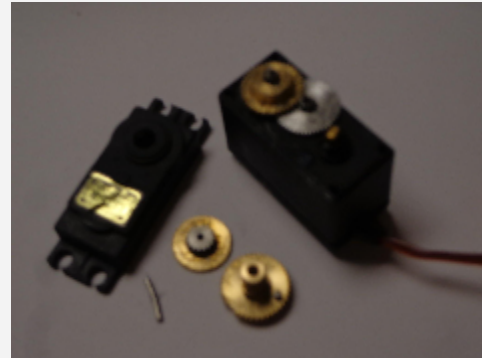
Reflections:

1. We took the measurements from the skirt we made in CAD and traced them onto a piece of polycarbonate and then, printed out the hole spacing on a 1:1 scale so we could just drill it and then mount it. (See details.)
2. We had to remake the gearbox for the lift assembly so we could make it stronger and with less complicated holes in the acrylic sheet. So, Mr. Times worked with Bo on creating a more simple gearbox in Solidworks so we could have exact measurements for holes, cuts, etc. (See details.)
3. We had to abandon the servos we purchased to lift the shoulder assembly because the internal gears are too fragile to handle the loads required to flip the assembly into scoring position. (See details.)
4. We finally finished inserting the spring and final pieces onto the drag wheel and mounted it to the back inside of the robot where no balls would interfere. -Bo
5. I decided to go with a vertically mounted battery to save space on the robot, I began with cutting out a 1"-4" bed for the battery then two 6"-.64" strips of PETG plastic. After I had done that I drilled two holes on either end of the bed and did the same with the strips of plastic the once done with drilling the holes I bent the strips at 2" intervals. once finished I sprayed the bed with adhesive and stuck foam mat to the bed then bolted the strips of plastic to the bed and put velcro® on the edges of the strips of plastic. Coach decided to not use it on the robot in favor of a 3D printed one.--AMP



Details:

1. I worked on cutting out the robot side skirts using the CAD model as a template. Matthew and I decided that we were going to use thin polycarbonate that would attach the same exact way as the polystyrene except it was a little thicker. Once it was cut I drilled the mounting holes and found out that with the new robot bumpers we needed to shave the corners down to an angle so they would fit. -Bo
2. Mr. Times and I also reworked the lift winch assembly Chris made the other day so it would be easier to make with less cuts. We mated all the parts in the program into the orientation we wanted and then cut holes in all the exact same places the motor mounts connected to. Then, we printed out the dimensions on a piece of paper as a template and simply drilled the holes into the acrylic then mounted that to the 80/20 vertical extrusions on the sides of the robot. -Bo
3. We purchased 4 servos that have metal gears and over twice strength of the HS-485s (85 oz in. vs 183 oz in.) to move the lift shoulder and ball assembly. The servos had no problem lifting the assembly but the small internal gears couldn't handle the heavy inertial force of the ball tube as it flipped over the top of the lift. We damage 3 of the 4 servos we had purchased. Disassembly revealed brass gears with stripped teeth and bent axle shafts. We decided to abandon using of servos in favor of a standard Tetrax motor along with a 10:1 worm gear assembly. We did a quick CAD assembly to double check mount clearances and then made the switch. This solution is very strong and provides over 3000 oz in. of rotational force--way more than we need to move the shoulder assembly. -Matthew
4. No further details.
5. No further details.



11.30.14 More 3D Printing

Duration 12:00 pm - 4:30 pm

Attendance:

Kristen, Matt, Coach

Tasks:

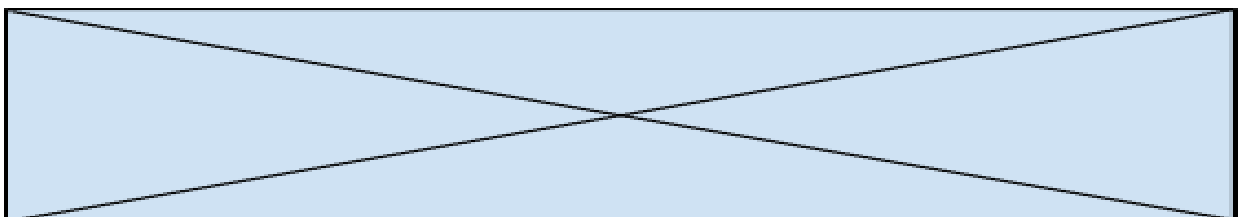
1. Re-design top and bottom pulley brackets
2. 3D print lift brackets
3. Re-design and 3D print new bumpers

Reflections:

1. The original top and bottom pulley brackets designed to use the delrin pulleys needed to be removed and replaced. (See details below)
2. The upper lift components were already printed, and the remaining lower sections were printed as needed. Thankfully all of the dimensions have worked without issue.
-Matthew
3. I printed out the remaining 3 of 4 corner bumpers for the robot. --Matthew

Details:

1. At 2:00 AM on Sunday morning, after installing and wiring our lift motors, we discovered our lift assembly had friction in the system causing our motors to struggle and nearly stall. Closer inspection revealed the delrin pulleys had become misshapen and weren't turning--the braided line was cutting into the plastic rollers. The only way to fix the problem was to find something that can replace the rollers. After some time looking on McMaster Carr website I found a small ½ inch bearing with an inside diameter that would accommodate a number 8 cap head screw. I redesigned the upper and lower pulley mounts to use this bearing and printed out a test. The test piece looked good so I sent my dad (Coach) the link for the bearing item number so he could order and pick-up the part with hopes we can rebuild the lift on Monday. - Matthew
2. No additional details.
3. No additional details.



12.01.14 Ready to Roll

Duration 3:00 pm - 2:00 am

Attendance:

Kristen, Matt, Coach

Tasks:

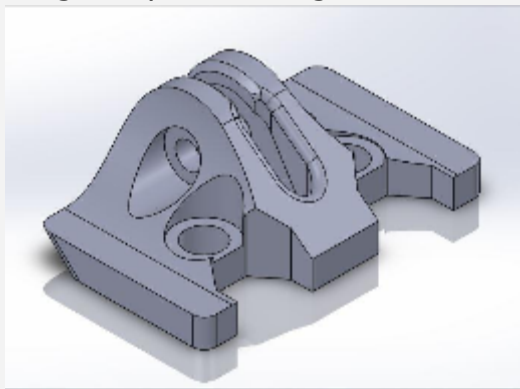
1. Order and pick up bearings from McMaster-Carr
2. Replace all top and bottom bearings on lift
3. Re-string lift
4. Build rolling goal clamp
5. Fix shoulder joint
6. Wire robot

Reflections:

1. We specified 7 - ABEC-1 Double-Sealed, Number R3 for 3/16" Shaft Diameter, 1/2" OD Bearings which were ordered and picked up at McMaster-Carr "Will Call". -Matthew



2. I removed all the original pulley top and bottom blocks and replaced with the updated versions using the 1/2 in. bearings - Matthew



Our custom Slide pulley bearing mount

3. Since I had to disassemble the slide lift I went ahead and replaced the 3mm braid with some new line of the same specification--Matthew
4. A quick rolling goal clamp prototype was assembled using one of the Phidgets servos aluminum bar stock and some 3" foam padding. The foam allows accommodation of the irregular contours of the rolling goal and grabs it securely. Tests look promising. - Matthew
5. Replace the servos with the Tetrax motor and worm gears. (See details.)
6. Even though not all the robots components are installed yet we needed to start work on wiring. We ran into a problem regarding the pure number of wires needed to run the robot. There were so many that it would be ridiculously hard to add or remove wires from the bundle in the future.

As such we had to plan through exactly what we would need, add the wires in preparation for when the corresponding components would be added.

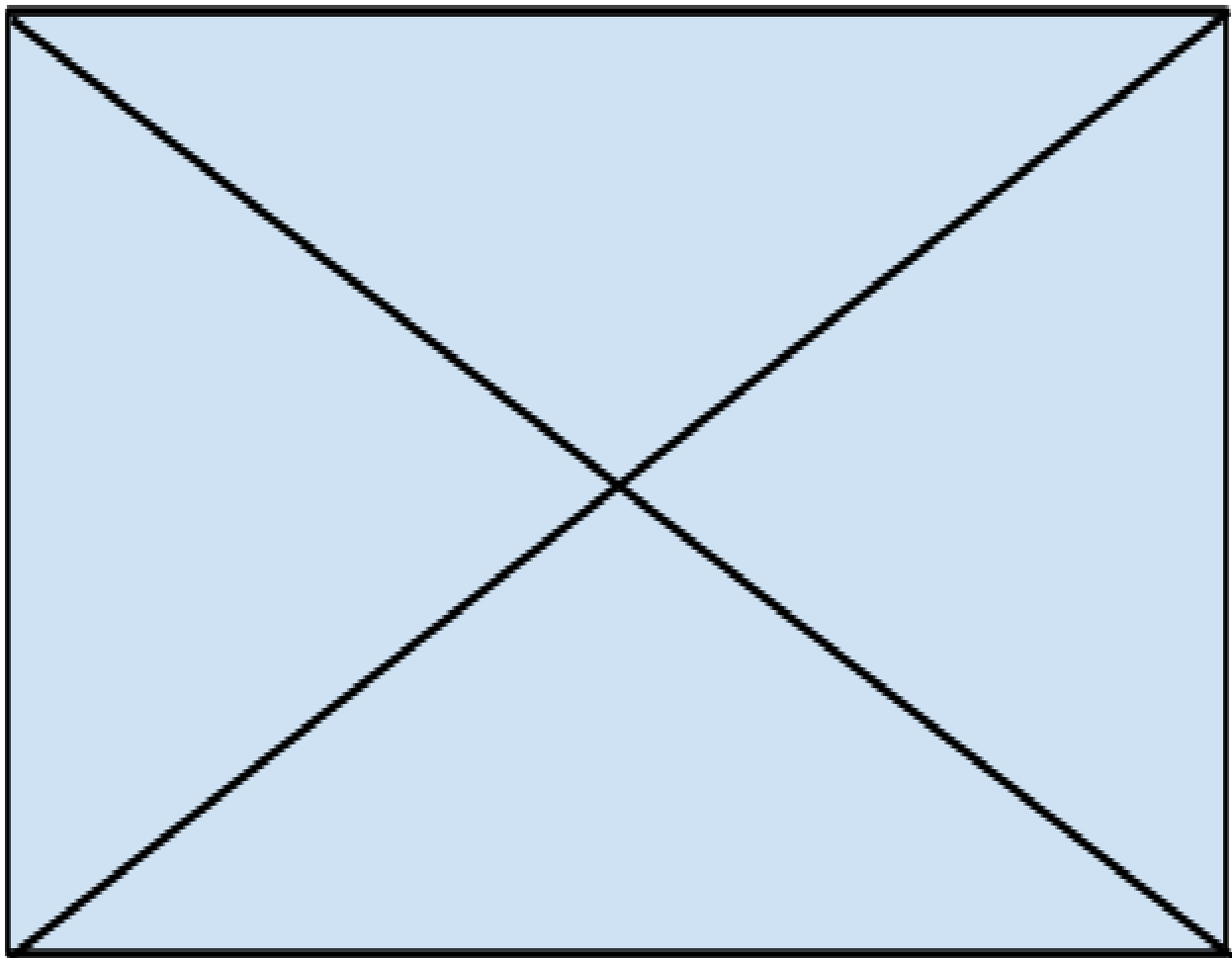
(See details for full wiring/address list.)

Details:

1. No additional details.
2. No additional details
3. No additional details
4. No additional details
5. I removed the servo blocks and replace them with a Tetrax motor and 10:1 worm gear assembly on the left side. I repurposed the Hitech Servo City servo horns using the bearing block on the right to hold the horn and printed a PLA adaptor so the remaining Hitech Servo City servo horn could be mated with a Tetrax motor hub. Testing proved the new assembly has no trouble lifting the tube assembly.
--Matthew

6. **Bold** for port. *Italic* for component name

Sensor Port 1	<i>Motor Mux/ Daisy Chain</i>	Sensor Port 2	<i>General Sensor Mux</i>
Sensor Port 3	<i>Gyro Sensor Mux</i>	Sensor Port 4	<i>Angle Sensor</i>
Mtr S1 C1 1	<i>Right Motor</i>	Mtr S1 C1 2	<i>Left Motor</i>
Mtr S1 C2 1	<i>Lift 1</i>	Mtr S1 C2 2	<i>Lift 2</i>
Mtr S1 C3 1	<i>Brush</i>	Mtr S1 C3 2	<i>Shoulder</i>
Srvo S1 C4 3	<i>Goal Claw</i>	Srvo S1 C4 5	<i>Impellar1</i>
Srvo S1 C4 6	<i>Shutter</i>		



12.02.14 Moving Forward

Duration 1:00 pm - 10:00 pm

Attendance:

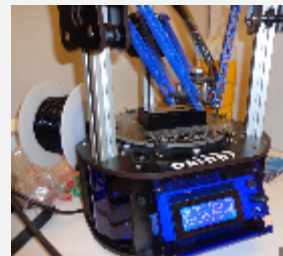
Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mrs. McKellar, Mrs. Laker

Tasks:

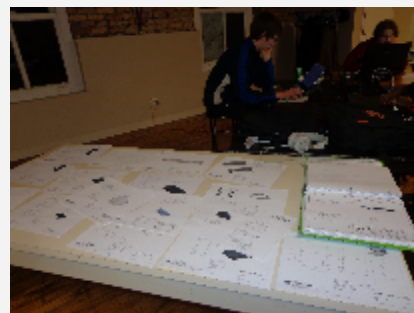
1. Re-CAD bumpers
2. Print out dimensional CAD drawings
3. Create exploded view of slide lift
4. Program autonomous missions 2, 4, and 1
5. Create names for autonomous missions
6. Work on ball intake with shelf liner on tips of zip ties

Reflections:

1. We edited our current chassis bumpers so they would cover the entire front of the chassis sidewall and would shield both the inside and outside edges of the robot. (See details)

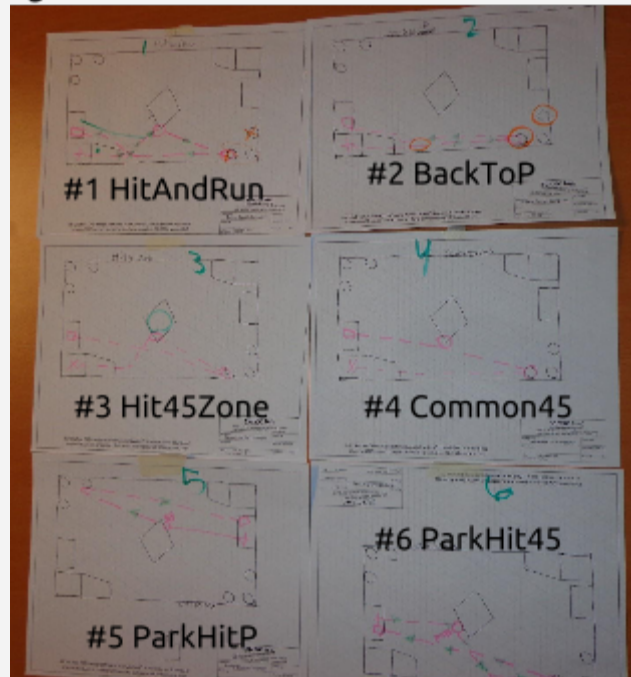


2. Chris and Bo worked on making/printing all of our CAD dimensional drawings and laid them all out on the table so we could see what we had and what we needed to include. Since our robot is almost fully custom this year we have a lot of drawings and BOM/exploded views to make. (See details.)



3. Chris was assigned the job of making an exploded view of the slide lift so we could show how the slide lift connects together via all the 80/20 slide connectors (See details.)
4. We tried to program missions 1, 2 and 4 but we ran into problems on the way. (See details)
5. Today the programming team asked me to create names for the autonomous missions. Which include the following:
#1 HitAndRun,
#2 BackToP,
#3 Hit45Zone,
#4 Common45,
#5 ParkHitP,
#6 ParkHit45.
The purpose of the mission names is to optimize the autonomous selection period during matches. -MMMs

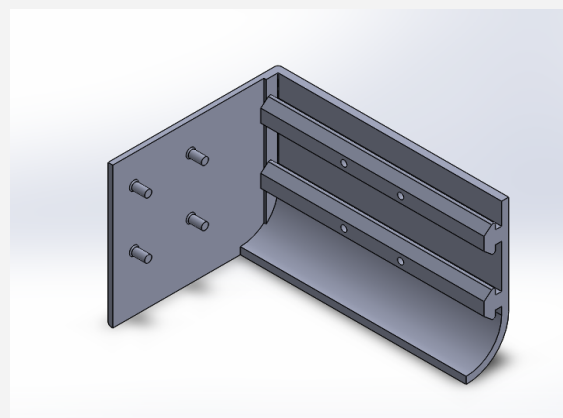
got robot? Phase 1 Autonomous Missions



6. A little bit ago we had an idea of using zip ties on our beater system. The logic behind this zip ties tied to the beater and at the tips of the zip ties we use shelf liner to help beat the balls in tube. The problem that arose was the zip ties were too long. The shelf liner at the ends would catch on the delivery system. So we decided to shorten the ties and now it works perfectly. -MMMs

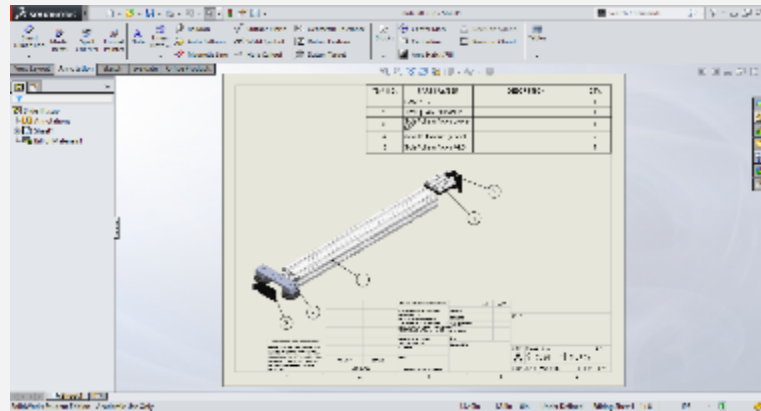
Details:

1. Matt and I talked about editing the corner bumpers of the robot so they would extrude the whole length of the front of the sidewall. I did so by just editing the extrusion I made and it worked great thanks to parametric modeling. -Bo



2. No additional details.

3. While getting the exploded view of the slide lift I decided to do a sub assembly of the slide lift. which entitled everything attached to one piece of 80/20. After getting that done I then moved on to showing how the slide lift would be taken apart. -Chris



4. We started to program auto missions 1, 2 and 4 but we were having problems with the gyro. It was giving us weird and random readings. To diagnose this we did some tests to see what was going on, the gyro continued to give us messed up readings. For instance, the gyro reading could be 0 degrees, thus straight, and suddenly spike to an orientation 400. We decided to program the robot so it didn't use the readings that were bizarre by calculating to see if the value of the gyro was realistic. We did this by taking 5 readings a second and taking out the high value and low value, and averaging the remaining. This is helping to curve the bad gyro issue, but still not fixing it entirely. -PJ



5. No additional details.
6. No additional details.

12.03.14 Ball Intake Beater

Duration 12:00 pm - 10:00 pm

Attendance:

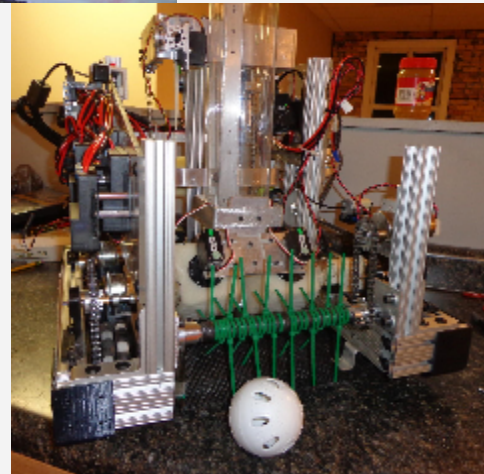
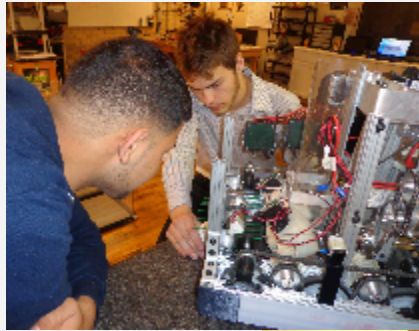
Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mrs. McKellar, Mrs. Laker

Tasks:

1. Finish mounting brush stuffs
2. Re-integrate ball beater fingertips.
3. Design a new custom drag wheel
4. Program robot to drive off ramp and capture first rolling goal
5. Compile Strategy Book

Reflections:

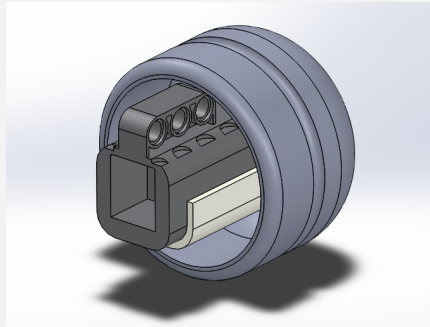
1. Motor mounts and brush tube were finished and mounted, when mounting I leveraged the 8020 fasteners to make the height adjustable with the turning of set screws.
-Matthew



2. While testing our Beater Intake we realized that it was not intaking as good as we hoped so our solution was to add rubber grips to the end of the Zip-Ties to create more friction with the balls. Which caused them to intake easier than they were. -Chris



3. Bo worked with the engineering team on making a new custom drag wheel that we could 3D print. The difference with this particular wheel is that it would cover the entire angle sensor to make it more compact and we could add a bearing for more freedom. (See details.)



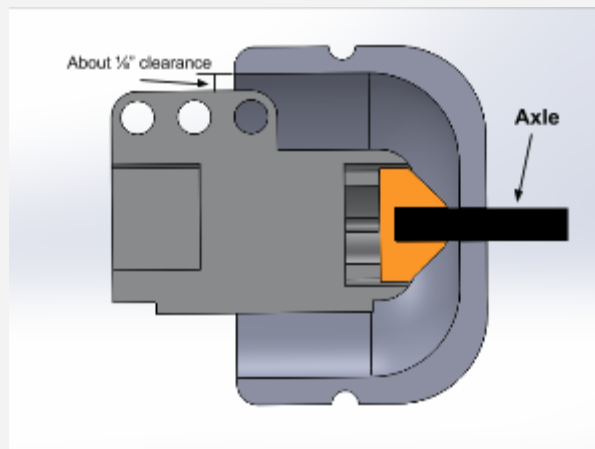
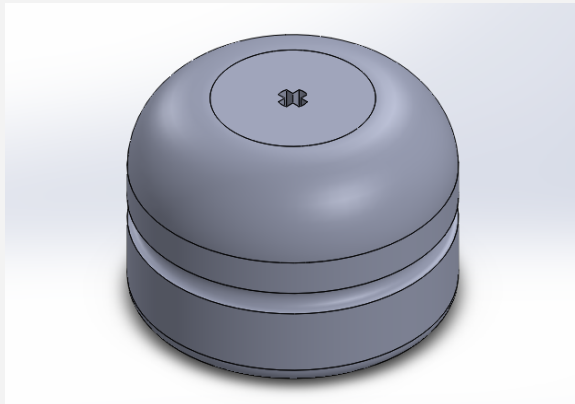
4. We started our work to have the robot drive off the ramp and get the first rolling goal, mission 2. We made some progress but the gyro was being shaken a lot when we were going down the ramp. This was causing it to correct too sporadically and quickly resulting in the robot crashing into the wall. We tried to reinstate formulas that were added last year to the code, but it didn't help the cause. -PJ



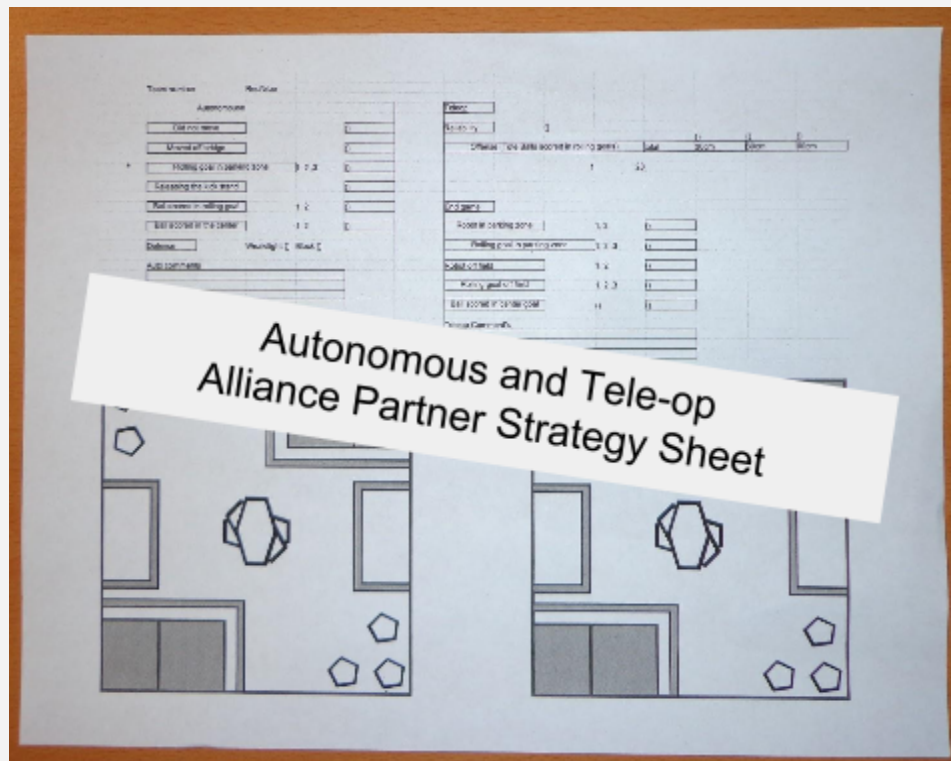
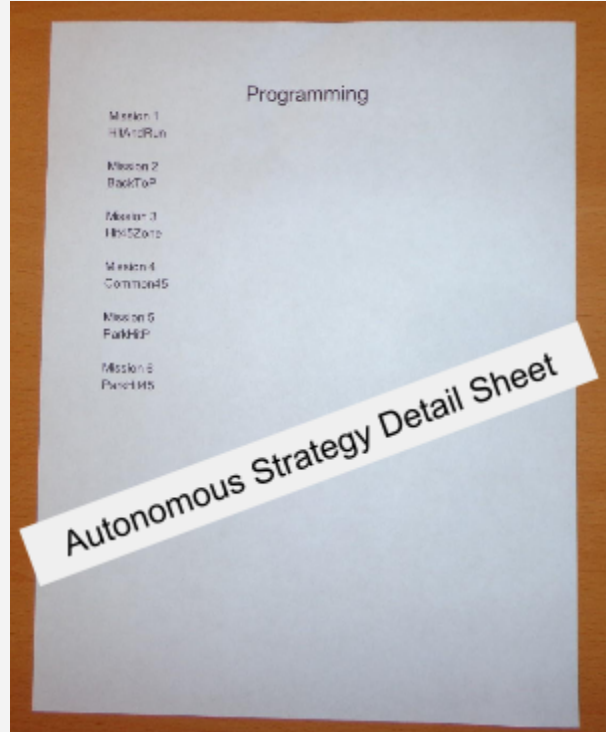
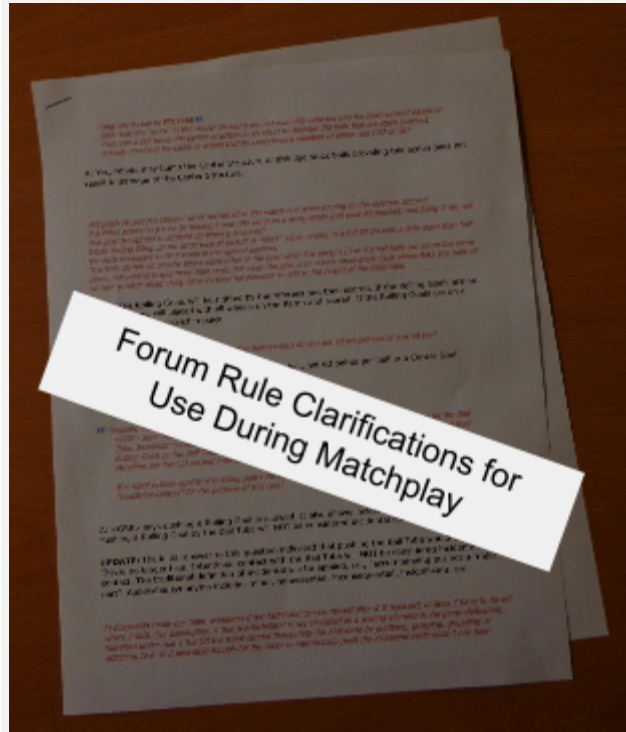
5. In an effort to simplify and organize the various pieces of information regarding rules, clarifications, and our strategy sheets we are creating a Strategy Book. (See details.)

Details:

1. No additional details.
2. No additional details.
3. The size and location of our rotation sensor was causing problems during robot turns. I worked with Matt and Coach on designing a custom drag wheel that could spin freely over the angle sensor and significantly reduce the width. We wanted a wheel the would not only act as a shield for the angle sensor, but also not get as twisted and torqued when the robot turns. We accomplished that having the wheel clear the sensor by only $\frac{1}{8}$ of an inch so that when it turned the wall of the wheel would press up against the sensor keeping it from getting twisted. Then, I added a slot for an O-ring so we could slip one on and have better traction. -Bo



4. No additional details.
5. In our strategy book I have different information to help us strategize with our alliance partner and to help beat our opponents. We also use this information to help clarify any rulings that may have been ruled wrong do to a misunderstanding as well as rulings that we have miss understood. -MMMs



12.04.14 Autonomous

Duration 3:00 pm - 1:00 am

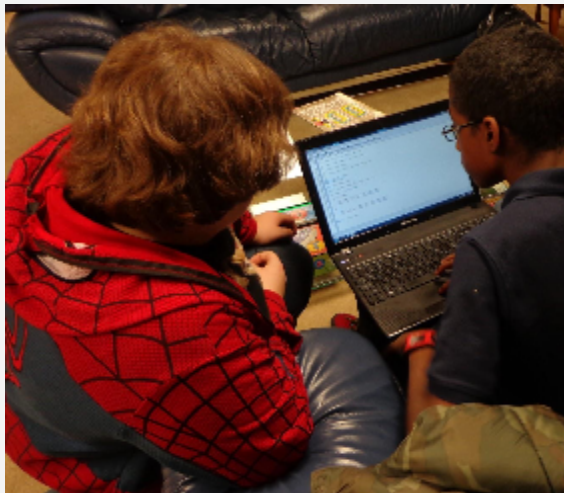
Attendance:

Kristen, Matt, PJ, Coach, Mr. Stephen, Mr. Times, Mrs. McKellar, Mrs. Laker

Tasks:

1. Try to complete Autonomous missions 2 and 4
2. Remove gyro from abs_drive function
3. Make wires and wiring harness for lift
4. Update details and CAD files in Engineering Notebook

Reflections:



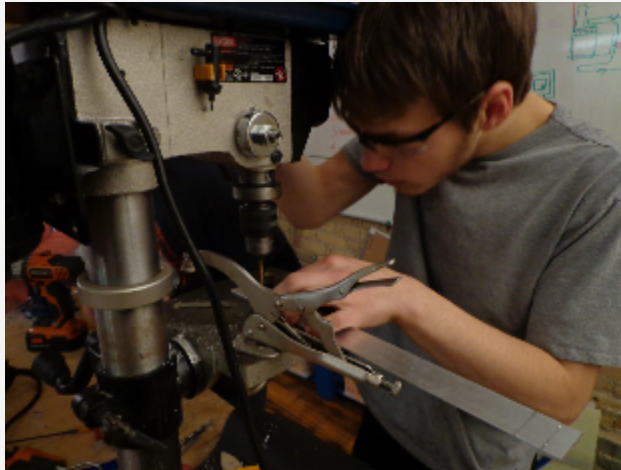
1. We attempted to complete missions 2 and 4 but we were only able to complete mission 2 due to gyro problems. The gyro continues to give us random readings and randomly makes sharp turns because of those readings. Usually, the robot turns right when the gyro value spikes because the bad values are positive, positive gyro values tell the robot its drifting left. Causing the robot to correct by turning to the right. Because of all of these problems, we decided to minimize use of the gyro and not drive using the gyro correct. -PJ



2. The gyro is so far not working in a consistent manner. In general the first turn of an autonomous mission would be accurate, but drive correction and the second turn would always be troublesome. Thus, with few days till tournament we decided to stop using gyro correction all together, and absolutely minimize

the use of turns. Things don't look up right now with seeming all our sensors not working. The gyro readings fluctuates in spikes like it's power source is bad, the angle sensor seems to turn off and on again at random, and the IR refuses to refresh its readings past 1.5 seconds into the program. At this point all we can do is secure what few things seem to work and keep debugging the other systems. -K McK

3. After a lot of work I was able to stuff the servo cables into the Igus energy chain on the lift. We ended up using all of the MPI servo cables, and used a significant amount of velcro for cable organisation, but the result is clean and upgradable. -Matthew



4. Tonight I focused on updating the Engineering Book. To make sure we had all the detail we wanted/needed for each reflection and detail. On top of that task, I also made sure we had all the CAD files for every entry about CAD. - Chris

Details:

1. No further details.
2. No further details.
3. No further details.
4. No further details.

12.05.14 Drag Wheel

Duration 12:00 pm - 4:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar

Tasks:

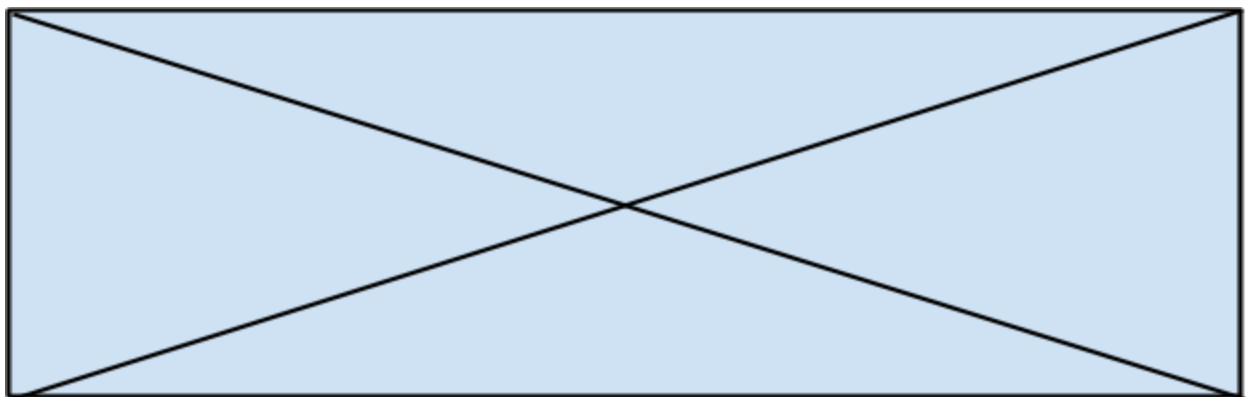
1. Install new temporary drag wheel for first qualifier
2. Add tips to our zip-tie intake beater device

Reflections:

1. We came to the decision that we weren't going to make our spring assisted drag wheel before our first qualifier. So we made a temporary drag wheel that is based off of our previous seasons drag wheel which hangs off of the robot at about a 45 degree angle. -Matthew
2. Foam tips were cut out from shelf liner and hot glued to the end of the zip ties. The end result of this is for the brush to grab and walk the larger 3" balls into the intake instead of beating them. This lets us more reliably feed balls in. -MMMs

Details:

1. No additional details.
2. No additional details.
3. No additional details.



12.06.14: Broken Battery Box

Duration 12:00 pm - 2:00 am

Attendance:

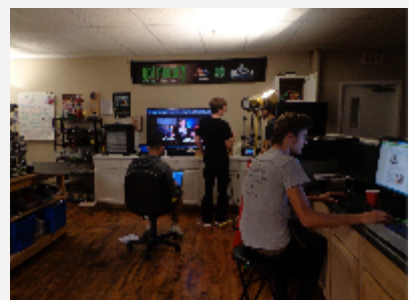
Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

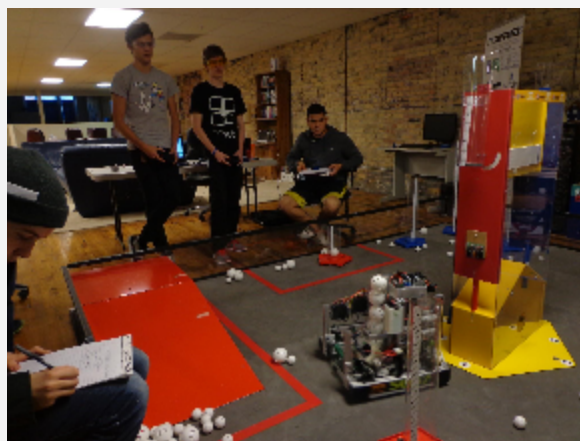
1. **a)** Continue work on debugging auto and sensors trouble.
b) Create gyro datalog debugging program
2. Study award criteria
3. Create list of extra 3D parts to have on hand for tournament
4. Create shutter on intake device
5. Drive robot and test ball intake

Reflections:

1. **a)** We finally found the root to most, if not all, of our sensor and subsequently autonomous issues. Our two primary navigation sensors, the gyro and the angle sensor, both had individual physical issues that impaired their accuracy. (See details)
b) I created a gyro debug program that's only job is to go straight and log the gyro values. I made this program because the gyro was giving us a random reading at times. This program gave us good feedback that allowed us to confirm what that nothing was wrong and I just needed to plug in the new, working, battery box. (See details)
2. We did our annual award study where every year we read aloud all the award descriptions and criteria. (See details.)
3. I took inventory of the 3D prints on the robot and made a list of what we would need extra for competitions and emergencies so that we wouldn't have to spend hours printing a whole new piece. (See details.)



4. We needed a shutter type device on the top of our intake to prevent the balls from falling out when the tube is upside down in scoring position. We made one from a piece of aluminum because of its ability to easily bend and re-bend in case we made a mistake. (See details.)



5. Finally, once we made our shutter for our scoring tube at around 1:30am we were able to drive the robot and play the game. Shazam!! -Bo

Details:

1. **a) - Gyro Sensor:** The gyro's personal battery box has a faulty wire connection. We didn't find this up to now since whenever we would check the power diagnostic lights on the SMUX, they refused to falter, implying that there was nothing wrong. Today though, the lights finally showed what was going on. We can safely assume that the majority of the issues we ran into were caused by the bad battery box, since after the box was replaced the problems stopped occurring.

- Angle Sensor: After extensive work code-side trying to explain the inconsistent angle readings and still finding nothing we started checking the robot for a physical reason, and that's what it turned out to be. The sensors wheel, although touching the ground, was barely free enough to do so. The sensors next cable was just tight enough to look ok, but still not give the needed movement to maintain contact with the ground. This caused the wheel to skip or skid as the robot moved rather than actually turn, giving us the bad readings. Loosening the cord fixed the random readings issue, although since we had been depending on what turned out to be bad readings we had to reprogram the autonomous movements. (Not the abs_drive function, just the distance values)

Our final sensor trouble is related to the IR, this one is a bit confusing. Everything we do seems to react strangely. The 3rd party IR 2 SMUX test code works fine, but

when we build an equivalent in abs_sensors the readings stall out in about a second. When the code is moved to Auto.c things seem to work, but utilizing that consistency instantly causes inconsistently. In retrospect some of the IR troubles can be explained through the angle sensor problem. The IR is partially based on the angle readings, this is how the robot knows when to take the IR value as it drives down the ramp. With the angle readings off we can safely reason that some of the values we read were from points on the ramp other than the optimal one at about three feet. Still, this doesn't explain the sensor cutting out after about a second, but a second might be all we need. We will continue debugging in future meetings. -K McK

b) At first the program didn't stop because the angle sensor was stuck and wasn't moving. Also, there was a FOR LOOP that was crashing the brick because it wasn't implemented correctly. I had the robot drive for 40 seconds because we were running out of space on the robot and the program couldn't hold anymore gyro data. Later, I had to change the drive time because we didn't have enough physical space to run for that long. In the datalog, I only put the gyro readings and time to make sure it wasn't too complicated and made a gyro error. In the data log on the left was the time in milliseconds and on the right there was the raw gyro rotational speed. -PJ

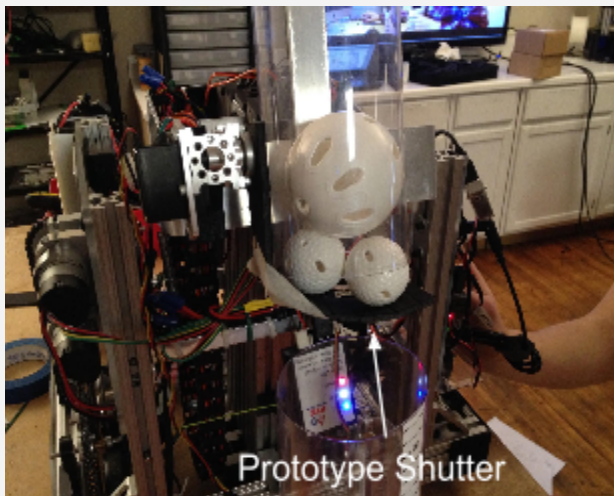
2. Today as a team, we went over all the different awards to see how many of the awards we might qualify for. We feel that we are solidly acceptable for every category, which is where we want to be.

-MMMs

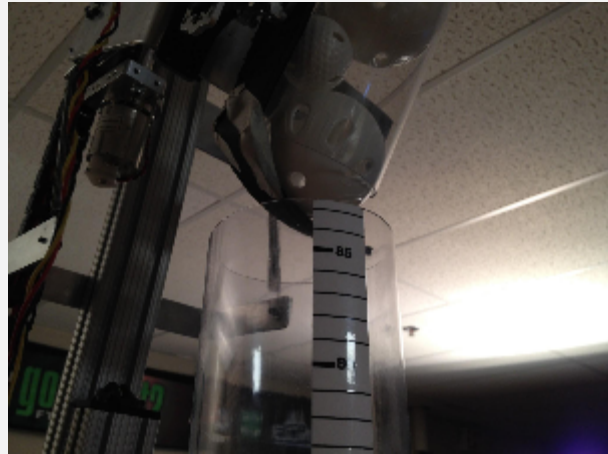
3. Here is the list of parts:

- Battery mount x1
- Intake axles x4
- Pulley x1
- Pillow Blocks x1
- Motor beds x2
- Corner protectors x4
- End caps x2
- Sensor mount x1
- AMP

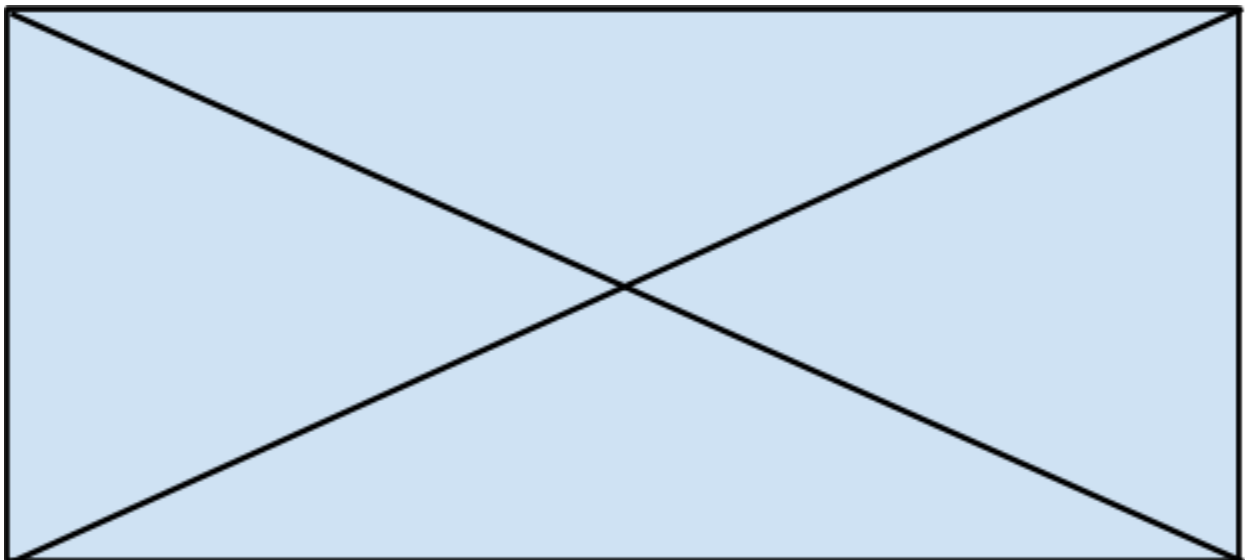
4. One of my jobs today was to make the shutter on the scoring tube. Matt and I worked on making one out of foam board. When we had the right measurements we then attached it to the robot and tested it out. Once we were happy with the bend I started to make the final shutter out of aluminum while Matt



threaded the wire through the Igus energy chain all the way to the top. I used the measurements from the prototype and began bending the aluminum into shape. I cut about $\frac{1}{4}$ " of material just so we would have it close with no possibility for balls to slip out. Then, I brought it to the drill press and drilled the mounting holes, then, started bending the front into a round bend. When we were satisfied with the final part I gave it to Matt to polish. -Bo



5. No additional details.



12.08.14 Hotkey's

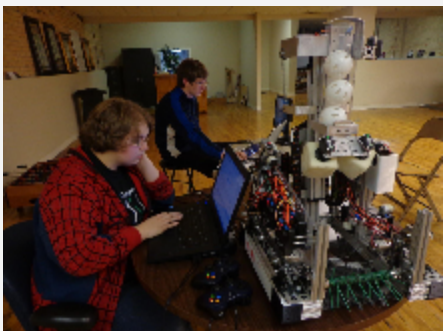
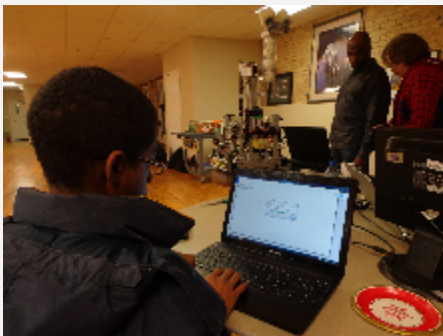
Duration 12:00 pm - 12:30 am

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mrs. McKellar, Mrs. Laker

Tasks:

1. Develop hotkeys for different tube heights to make it easier for the drive team
2. Film next RoboTalk! episode
3. Drive team practice



Reflections:

1. The lift and shoulder combo, when controlled properly, performs in a clean and elegant manner. Problem is though that to control it properly the gunner has to coordinate the individual movements of the lift and shoulder at the same time. Failure to do so could result in a penalty from touching the tubes, or worst case, damage the robot by lowering the shoulder while the lift is too far down.

Thus our fix was obvious, automate the primary lift movements. With the implementation we've used the gunners main job is now simply to select desired scoring heights and ok a ball drop. The rest is left to the robot. Our presets and encode values are as follows:

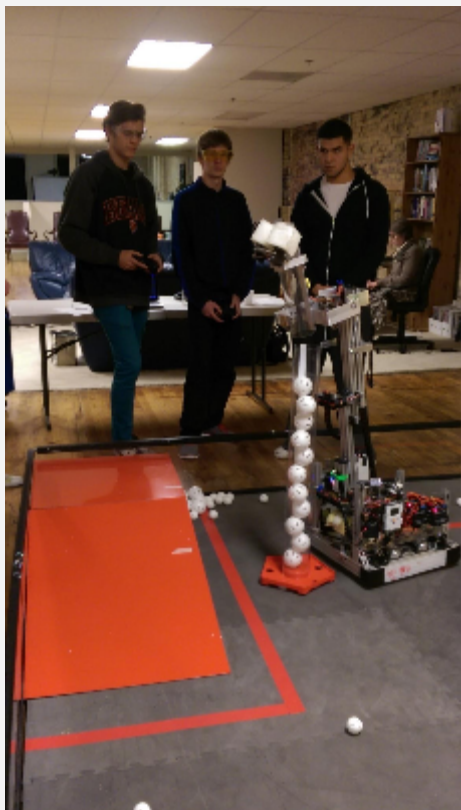
Lift Heights

Low Goal	:	0
Mid Goal	:	2500
Tall Goal	:	7550
Center Goal	:	6800
Max Height	:	10000
Jog Height	:	200

Shoulder Heights

Low Goal	:	6209
Mid Goal	:	6900
Tall Goal	:	7550
Center Goal	:	4600
Max Height	:	8000

We have some other features added in such as safeties to ensure that the lift properly lowers itself into the down position. As well as a check to prevent the robot from ever lowering the ball tube onto a rolling goal, increasing accuracy and preventing penalties.
-K McK



2. Marcos and Bo took some time to film another RoboTalk! episode in the media studio. It's theme was "How to save money in FTC." We covered topics including where we get our free energy chain, cheaper and stronger servos, and the fox smart PLA filament which is available for only \$18.(See details.)
3. Bo and Chris got to drive the full working robot around the field. They worked on collecting the baseball sized balls while avoiding the smaller sized ones and then scoring them into the different tube heights. (See details.)

Details:

1. No additional details.
2. This episode of RoboTalk! was all about ways to save money by purchasing cheaper parts from websites such as foxsmart.club and phigets.com. We talked about different parts that we use this season that we've searched the internet for to get the best prices we could find. We covered topics including the SM-4315R High Torque Continuous Rotation Servos, Fox smart PLA filament, and our Igus energy chain we got from the Igus Y.E.S (Youth Engineers Support) program. We also covered certain company's that offer discounts exclusively to FIRST teams including ServoCity, Igus, and 80/20. -Bo
3. It was really fun to finally drive the robot in game scenarios. We've worked very hard this season and it felt great to finally have to robot working and playing the game. This is gonna be a fun season! -Bo



12.09.14 Dancing with the TARS

Duration 11:00 am - 1:00 am

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Develop better ways to automate the intake during tele-op
2. Touch base with Mr. Solomon adjust as needed for scouting
3. Programming autonomous
4. Install new winch cone
5. Install limit switch
6. Repair motor with broken gear box
7. Save off CAD in PDF
8. Write the BOM

Reflections:

1. Continuing what we worked on the other day we tried to refine some more of the automated arm movements.

Beyond this though, we noticed while driving the robot that if we lowered the lift down onto large balls we were trying to grab, said balls would easily go into the ball tube. End result we made a 'dance' automation function. During TeleOp the robot's lift will raise and lower while the gunner is pressing the button #7, making it easier for the drivers/robot to intake balls. - K McK

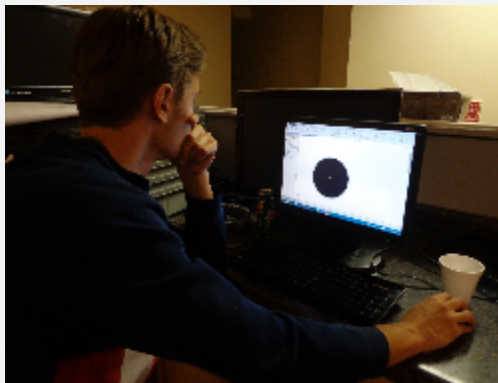


2. Today I was talking with Mr. Solomon about refining the scouting app on a software standpoint. We added proper variables to the questions that are asked in our scouting app. Doing this will insure that we are properly assessing each team properly. -MMMs
3. Currently the main autonomous mission we are working on is mission 2, a route that gives us 70 point once completed. This mission starts on ramp, drives down to the rolling goal, scores a ball into it, turns and delivers the goal into the parking zone.

We do have a secondary variant of this program that starts from the parking zone.

-K McK

4. The cone finally finished printing at 0.1mm, cone was installed. -Matthew
5. Limit switch was installed, existing hole used to mount shoulder bolt, rubber Lego connector was used as sensor padding. -Matthew
6. Drive train was repaired, shaft couplers were removed from all motors for diagnostic purposes, wheels all rotate freely. The mounting bolts for the motors loosened leading to gearbox failure, to prevent future failures all affected components have been replaced with lock nuts and tightened further. -Matthew
7. The CAD team took all the drawings they've made and reviewed them. Then, save all of them off as PDF files so everyone could access and see them. -Bo



8. Tonight I wrote the bill of materials, which consists of all the COTS (consumer off the shelf) parts on the robot it took me awhile to check all the parts on the robot it being completely custom robot and all. But I got it done.--AMP

12.10.14 Printing Extra Parts

Duration 12:00 pm - 4:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

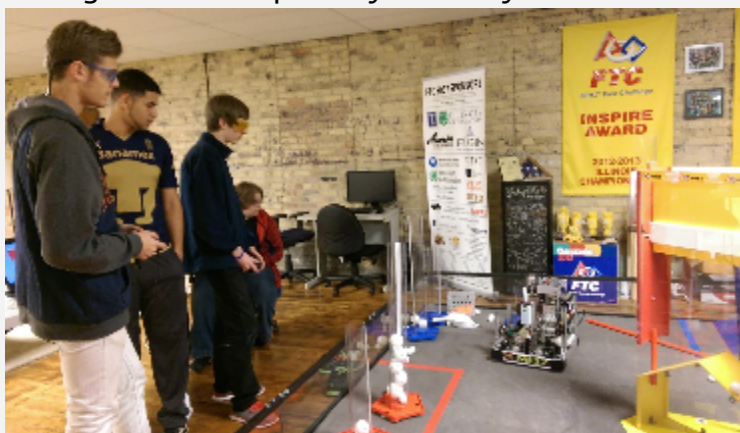
1. 3D print extra parts for competition
2. Drive team review rules
3. Drive Practice
4. Judging prep
5. Programming

Reflections:

1. We printed 3 spare foam block cages, NXT mount, and finally the Gyroscope mount. We brought the printer home after practice so we could print the new front bumpers. -Matthew
2. Today, Bo, Chris and I discussed and clarified questions and answers in the forms as well as reviewing rules. (See details.)



3. We had our first competition style drive practice of the year where we started off with just a warmup round of about 10 minutes and then moved to actual timed 2 minute matches where we developed a couple strategies we could possibly use this year. -MMMs



4. It is time to look at awards and determine the best way to present our team. (See details.)

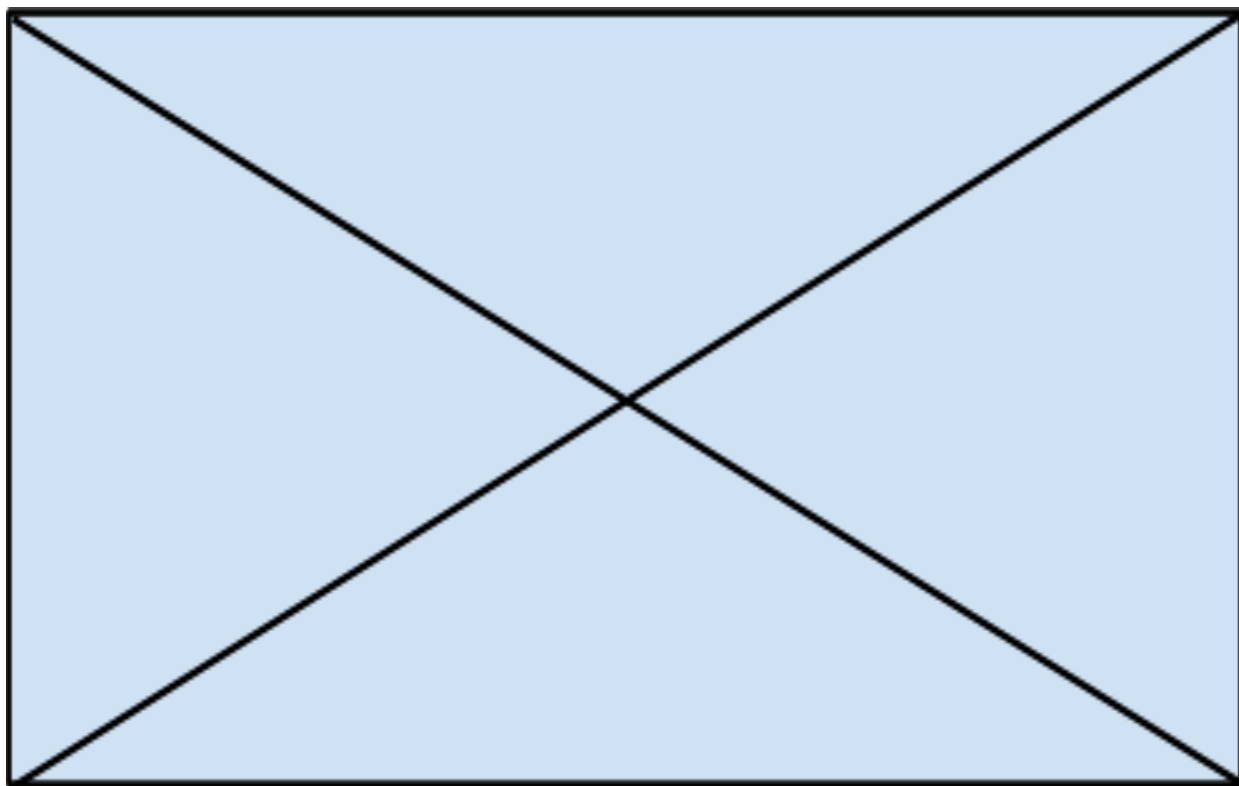


5. After finishing our original autonomous mission we started on a new one starting from the parking zone. The beginning part is simple, drive forward, turn and drive towards the rolling goal. Align with the goal the same way we do for the second mission, then continue using the same code from auto mission 2 to move the rolling goal to the parking zone. - K McK



Details:

1. No additional details.
2. One of the declarations that needed to be made was <GS8> this rule was referring to touching tube on the rolling goal. In the definition it stated the following, "Pushing a rolling goal is allowed. It also allows incidental contact with the Ball Tube. Pushing a Rolling Goal by the Ball Tube will NOT be considered incidental contact with the Ball Tube ." Now sadly this rule has been updated to following "The initial answer to this question indicated that pushing the Ball Tube would be allowed. This is no longer true. Intentional contact with the Ball Tube will NOT be considered incidental contact. The traditional definition of incidental will be applied, ie., "accompanying but not a major part". Applicable synonyms include; minor, nonessential, inconsequential, insignificant, etc. -MMMs
3. No additional details.
4. A couple of days ago our coach requested that we put down every single award on paper and see how many of them we may qualify for. After that we determine which one of the categories we may be weak in and which one we are strong in. So today we have gathered that information and determine which members on the team would speak on behalf of each category. -MMMs
5. No additional details.



12.11.14 Social Media Review

Duration 2:30 pm - 12:00 pm

Attendance:

Bo, Chris, Kristen, Matt, Marcos, PJ, Aidan, Coach, Mrs. McKellar, Mrs. Laker, Mr. Stephen

Tasks:

1. Drive Practice
2. Review Social Media Analytics

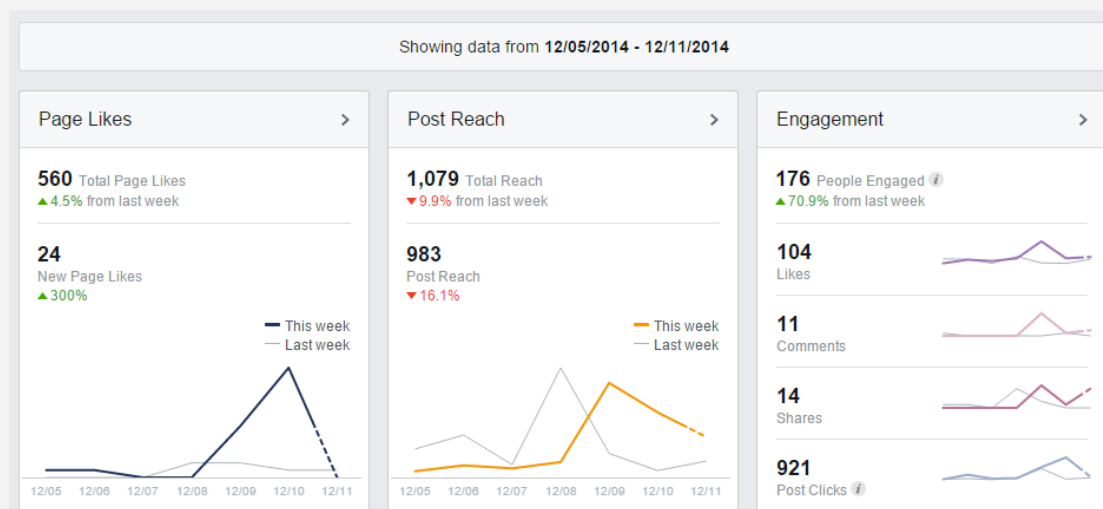
Reflections:

1. Bo, Chris, and Marcos had some drive practice to test some possible strategies for our upcoming qualifier competition. -MMMs
2. We took some time to review our social media (particularly Facebook) just to see how our pages are doing and how many new likes we have. (See details.)

Details:

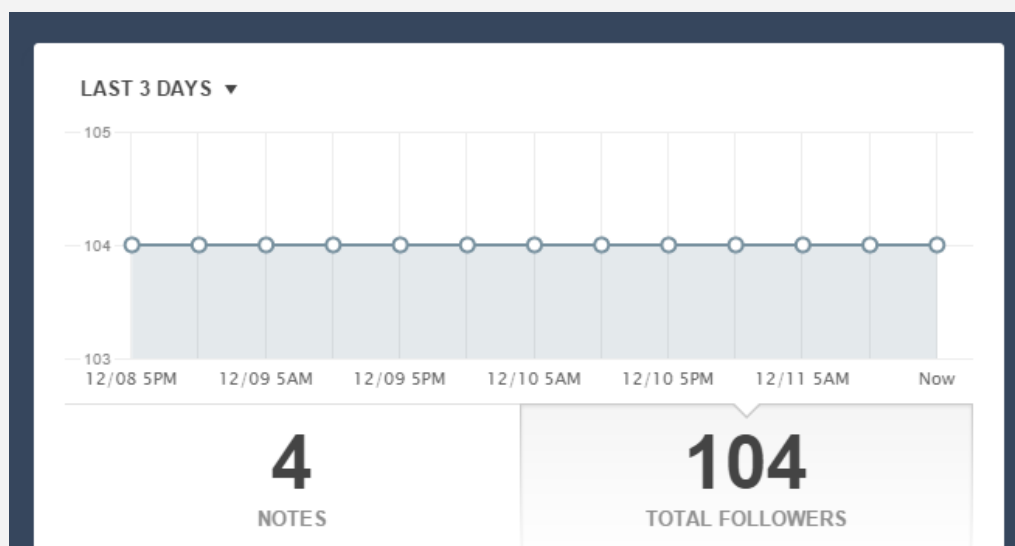
1. No additional details.
2. Marcos, Chris and I (the social media team) looked at all of our social media analytics because this we have gotten a lot of likes. Here's the results: -Bo

Facebook



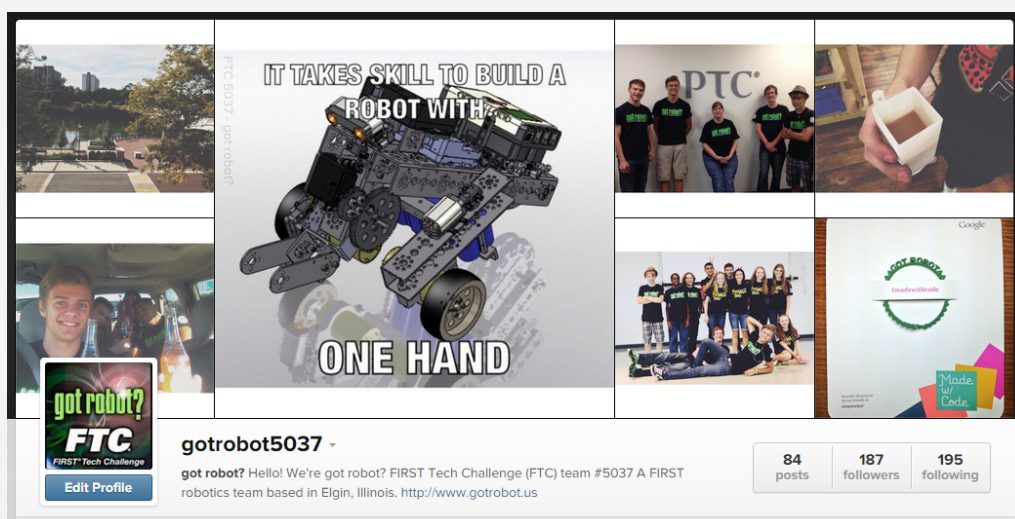
We've got a lot of likes this week on Facebook. Not quite as many viewed posts but that's because last week we had over 1,400 views due to our thanksgiving post.

Tumblr



Tumblr has remained quite still this week but we also haven't posted much recently. However, last week we finally made it 100 followers! So that's a start.

Instagram



Instagram - we have 187 followers!

12.13.14 Competing at Francis Parker Qualifier

Duration 07:30 am - 5:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Compete in qualifier
2. Determine how TARS performs in competition

Reflections:



1. We had a great day! Winning Alliance Captain & Inspire Award. (See details.)
2. We wanted to observe and see if TARS would perform during a competition like it does in practice. TARS performed great at the end of day. We had one slip up during the day, but it turned out to be a servo wire getting unplugged. After that match, we then zip tied the wire together so it would not come undone again. -Chris

Details:

1. **Francis Parker Illinois FTC Qualifier:**
Motivate Award Winner: 5928 Turing Machines
Nominated: 6459 Macrobots, 8907 Blue Box Bots
Connect Award Winner: 116 Crazy Eights
Nominated: 7286 XX-Gems, **5037 got robot?**
Innovate Award Winner: 7737 Technical Difficulties
Nominated: 7738 Vaders, 4965 Animatores Romani
PTC Award Winner: 6459 Macrobots
Nominated: **5037 got robot?**, 5928 Turing Machines

(Continued on next page.)

Think Award Winner: 4965 Animatores Romani

Nominated: **5037 got robot?**, 8907 Blue Box Bots

Judges Award for Youthful Creativity: 9017 Techno Wildcats

All-around Rookie Award: 8907 Blue Box Bots

Highest Rank Rookie Award: 9017 Techno Wildcats

Finalist Alliance: 4965 Animatores Romani, 9150 Dragon Droids

Winning Alliance Captain: **5037 got robot?**, 1st Pick: 8907 Blue Box Bots

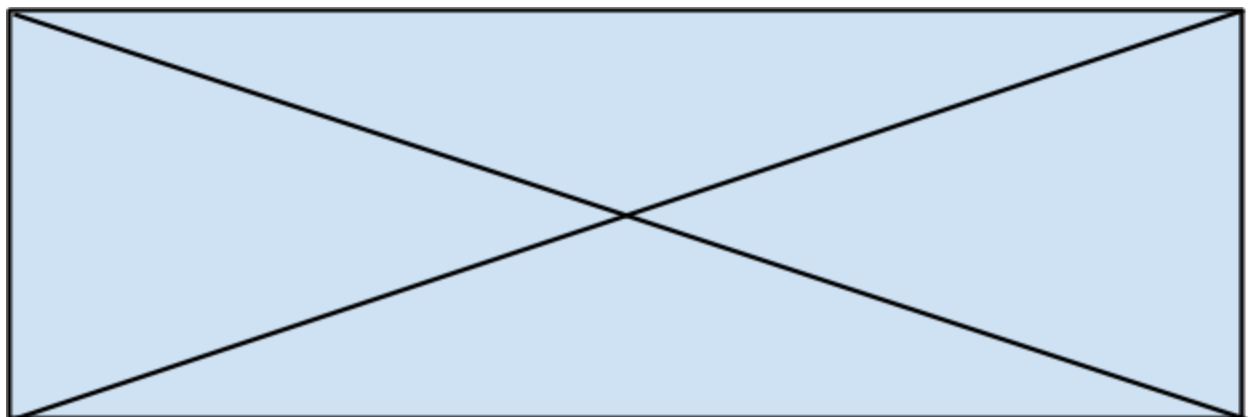
3rd Inspire Award Winner: 8907 Blue Box Bots

2nd Inspire Award Winner: 6459 MacroBots

1st Inspire Award Winner: 5037 got robot?



2. No additional details.



12.16.14 Post Qualifier SWOT

Duration 6:00 pm - 8:30 pm

Attendance:

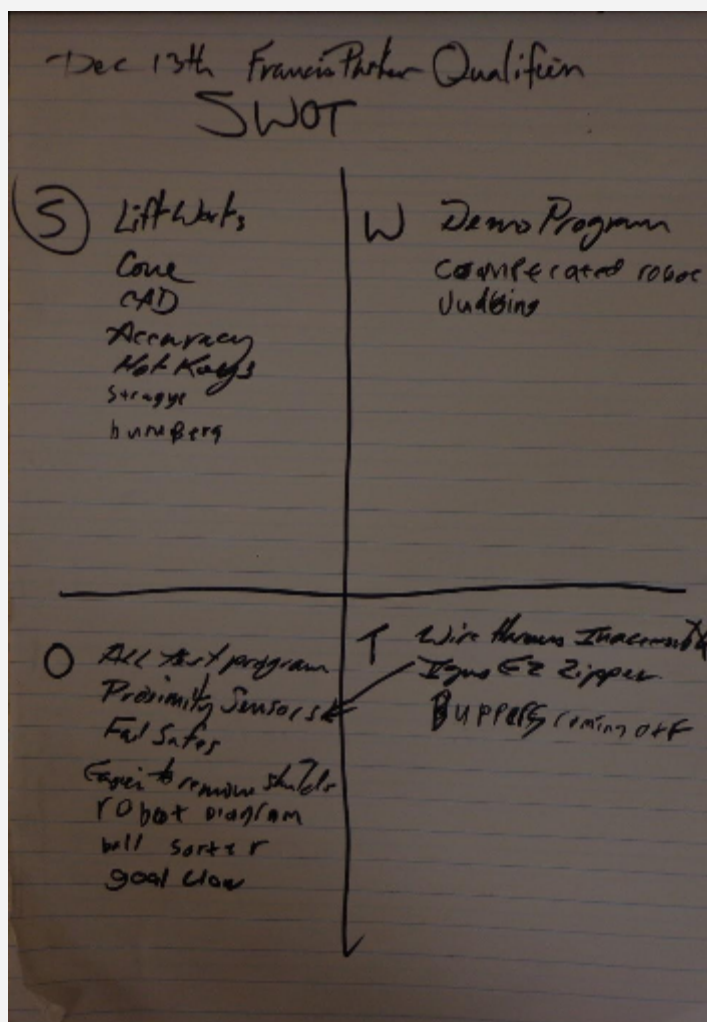
Chris, Matthew, Marcos, Aidan, PJ, Bo, Kristen, Coach, Mrs. Laker, Mrs. McKellar, Mr. Solomon, Mr. Stephen

Tasks:

1. Talk about the Francis Parker Qualifier and review judging and game video
2. SWOT Analysis of event

Reflections:

1. We did an in-depth SWOT analysis of our qualifier and talked about what we could improve more on our robot and to our team in general. Then, we watched the video of our judging and some of our matches just to recap all that happened.



2.

(See chart in details.)

Details:

Strengths Drive train is strong Lift cone works really well CAD Accuracy of delivery Hot keys on game pads Strategy was sound Bumpers protected robot	Weaknesses Demo Program failed in judging Judging wasn't as receptive as hoped
Opportunities All test program Proximity Sensors Fail safes Easier to remove shields Robot diagram needed for pit and notebook Ball sorting for large balls needed Goal low	Threats Wire harness inaccessible Igus EZ Zipper needed to make it easier to service wires in lift Bumpers coming off.



01.06.15 Driving & CAD

Duration 6:00 pm - 9:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Drive Practice
2. Install Solidworks on other team members' computers

Reflections:

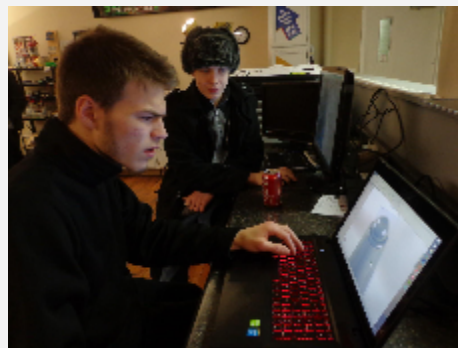
1. Bo and Chris had some drive practice by starting off doing a long "icebreaker" to get used to driving the robot again after Christmas break and then they moved onto regulation 2 minute matches.



2. Aidan and Marcos got shiny new computers for Christmas so we decided we would use some of the extra licenses our team has to install Solidworks CAD software onto them. (See details.)

Details:

1. After starting on the 2 minute matches we were going over some of our old strategies, then started on different ones which involved hitting the kickstand sooner or later then grabbing the 90cm. -Chris
2. I already had installed Solidworks on my new computer and Marcos did too, but it hadn't been working very well so we just restarted his computer and it work very well. Mr. Times taught me about the differences between parts, assemblies and drawings in Solidworks.--AMP



01.10.15 Sorting Balls

Duration 12:00 pm - 4:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Remake our drawings in a presentation format
2. Make a custom template for all of our drawings, including all the information we decided would be needed.
3. Drive practice
4. Make a prototype ball sorter
5. Get all CAD files for Aidan and Marcos
6. Test IR:
 - a. To ensure working IR sensor
 - b. To ensure got robot? IR code works
 - c. Check if IR works behind shielding
 - d. Check our center goal detection from ramp start
 - e. Take readings from parking zone
 - f. Develop parking zone IR detection
7. Go get metal to bring to the scrapyards for RoboCycle

Reflections:

1. Today the objective for the CAD team is to redesign all of our drawings in a new template. Each member of the CAD team was assigned 5 drawings each. Our goal is to polish all of our drawings in our new template at our next competition. (See details.)
2. The CAD team worked with Mr. Times on making a custom template that we will use on all our new reformatted drawings. It will include all our 'checked-by' blocks, details and title blocks, logo box, etc. This way, we don't have a ton of unnecessary blocks that aren't being used on the drawings. -Chris
3. Chris, Marcos, and I spent time doing drive practice and testing out different strategies for different scenarios that could happen. After that we then tested the prototype that Matthew made and it worked great. All it needs is a little tweaking. -Bo
4. I built a removable cardboard lip for the ball intake, by positioning it 0.75" off of the floor, small balls were unable to enter while large ones rolled right in. -Matthew (See picture below)
5. At first getting the files was a bit of a challenge because how we get the files to each person is with the Google Drive application for computers. (See Details below)



6. We started up the robot and used a combination of dummy auto missions and sample code to test different IR topics. (See details below)
7. The Kane County Coroner's Office was getting their building redone. They knew about our RoboCycle program and decided to give us multiple metal lockers, desks, wires, and light fixtures that we could pick up and recycle to help fund our team. (See details)

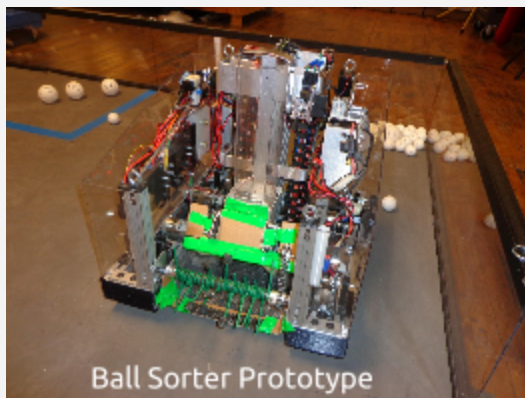
Details:

1. Our goal for today was to get at least 5 drawings done for each CAD team member, but since I had nothing else to do, I did 13 so we have a total of 20 or so drawings done today.--AMP

Our goal of 5 drawings per person was not only easy to reach but surpassed. Because of our 2 new CAD designers "Marcos and Aidan". Another goal today was to redesign all of our new drawings in a new template. We are hoping at our next competition that these new templates are easier to understand. -MMMs

2. No additional details.
3. No additional details.

4.



5. This was proving to be troublesome at first because we were having problems syncing with their computers. We did multiple tests by restarting the computers. That failed to show a change, thus led us to start looking into the syncing under the program itself, and we found a button that needed to be checked in order to auto sync. After clicking that we did not have any further problems. -Chris
6.
 - a. Using the sample code we checked the IR's working status. As in classic fashion one person watched the 'screen' (we had the debug screen up on the computer) while the other person slowly moved the IR in an arc around the sensor. From this test we determined the IR sensor was indeed giving good readings.

- b. After we made a dummy (non real auto mission selection) auto program to read the sensor value based on our version of the IR code. The conclusion of this test showed that our code was indeed working and we were ready to test detecting the center goal.
 - c. Since the IR wasn't used at our first tournament we saw no need to cut out holes in our shielding for the IR sensors. Problem is now that we are testing them again, they are behind the shielding. So we ran some tests to confirm it and it turns out the sensors work fine behind the shielding.
 - d. From previously in the season we had a function made to read the center goal as we drive down the ramp. Up to this point we couldn't read it due to a seemingly non working IR, but now we could finally fully test the function. End result: the code was working, it showed the idea was do-able.
 - e. We changed priority from scoring center goal from ramp to scoring center goal from parking zone. As such we had to find a way to determine the center goals orientation from the parking zone. Sadly there is no spot on the ground where the IR readings split. More information in topic f on how we continued.
 - f. There is however a strong tendency for two of the center goal positions to show the same reading and the third to be separate. With this knowledge and an ultrasonic sensor we should be able to detect the center goal from the parking zone start before we even move. -K McK
7. After the meeting, Marcos and I headed over with his pickup truck to load up all the metal that the Coroner's Office had for us. There was so much metal that we are going to need to come back some time this week to get the rest. We walked away with three steel lockers, four light fixtures, one heavy steel desk,



miscellaneous aluminum bar stock, and a bucket of copper wires - all recyclable. We thanked the Office so much for their gracious contribution to our team and are super excited to make our first BIG haul.
-Bo

01.13.15 Ekocycle

Duration 6:00 pm - 8:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Open and set up our Ekocycle 3D printer
2. Make a review video of the FoxSmart 3D filament for RoboTalk!
3. Read the forms and document new information.

Reflections:

1. When we arrived at HQ for our regular meeting there was a large box, when everyone arrived for the meeting I was told that I had responsibility for opening and setting up the Ekocycle. When we got it set up we received an error that would not let us print, so I took it home and contacted tech support to ask them how to fix it. (See details.)



2. Bo and Matt took about 20 minutes to make an in-depth review video of our FoxSmart filament that we mentioned in the last episode of RoboTalk! We talked about how much you get, what colors are available, and other important things you might want to know before you buy. (See details.)



3. Today I read some new information and updates on the FTC forms. I found very helpful information. -MMMs

Details:

1. After doing as they instructed I got the error fixed and then went to do a print, I had problems with the filament extruding out. I then contacted them again on what to do, they told me to try and force the filament into the machine. I did as told and observed no change in the end product. I called them back and they told me that the cartridges were jammed and I had to send them back. They sent me the paper I needed to send them. I have filled that out and sent it back and am waiting for a response. -Chris



“Waste is only waste if we waste it.” - will.i.am

Exclusively printing in post-consumer waste, the EKOCYCLE Cube 3D printer recycles what you use, so you can remake into new, meaningful, beautiful and better things.

2. The review while impromptu went well. The mentioned attributes of the filament included it's consistency and quality spooling, however the non standardised roll was listed as a con, regardless of its smaller footprint, due to potential compatibility issues. -Matthew
3. No additional details.

01.17.15 More CAD, More Programming

Duration 12:00 pm - 10:00 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mrs. Laker

Tasks:

1. Have ramp to parking zone program debugged and have one floor program running
2. Work on getting more autonomous programs functioning
3. Finish converting old CAD drawings to the new measurements
4. Finalize CAD drawings of the entire robot
5. Take existing drawings and put them in pdf format
6. Additional drive practice to test new attachments
7. Update BOM for CR Servo
8. Finish filming RoboTalk! episode

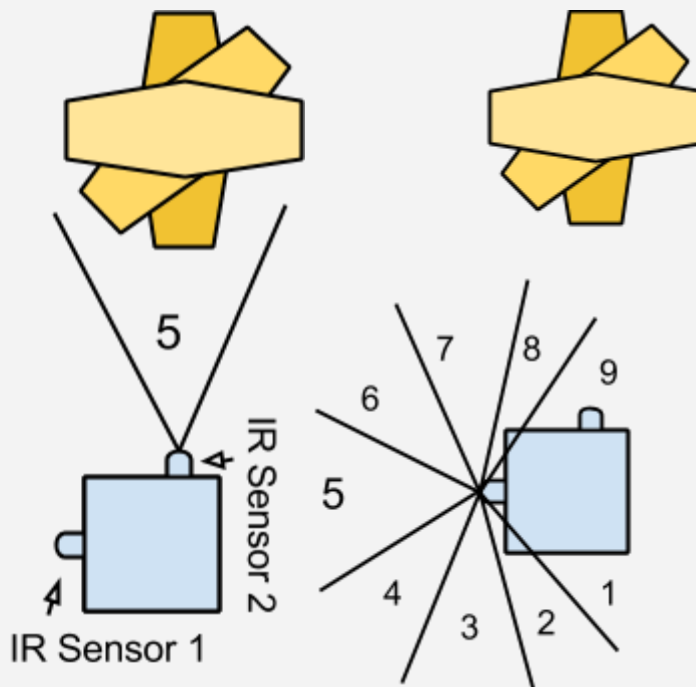
Reflections:

1. Kristen and I attempted to program the floor and ramp missions. Sadly, we weren't able to debug the dynamic speed feature in time. We adjusted the code back to a working state yet included the framework to allow us to continue debugging the dynamic speed feature in the future. -PJ
2. We added a new starting position on the field to match the new autonomous programs in progress. This is 'floor 2', and a lot like 'floor 1' starts in the parking zone with the brush against to wall. Main difference being that floor 1 starts on the right (if you are standing behind the wall facing in) of the mat seems, and floor 2 starts on the left. (See details below.)
3. Today the CAD team's goal is to have all of our drawings converted to the new template. We went full force to finish all the drawings and get them to what we wanted. -AMP
4. Another goal was to finish the robot in CAD, so we put the Ziptie intake on the front of the robot, plus the Ball Tube and foam intake. Then added the shoulder on the tube and for the final touch we added the goal clamp. With all that added everything but the electrical panel is complete on the robot. -Chris (See image in details)
5. One of our objectives for this meeting was to take all of our drawings and save them as a PDF so we could print them and put them in the book. After the meeting I started to save all the drawings as a PDF, by the end of the night I accomplished my goal of having them all saved as PDF's. -Chris
6. Bo and Chris drove the robot around to test out the new attachments that the engineering team worked on, including the modified belly pan and modified tube intake. (See details)

7. At our last competition we noticed that we did not have proper documentation for our non tetric servo motors. So we explored what we needed to have prepared for our next competition. (see details below)
8. I took a small amount of time to finish the RoboTalk! episode we started on Tuesday. I just said some quick facts about FoxSmart filament and then did the intro and outro and then I was done. Just got to edit it at home. -Bo

Details:

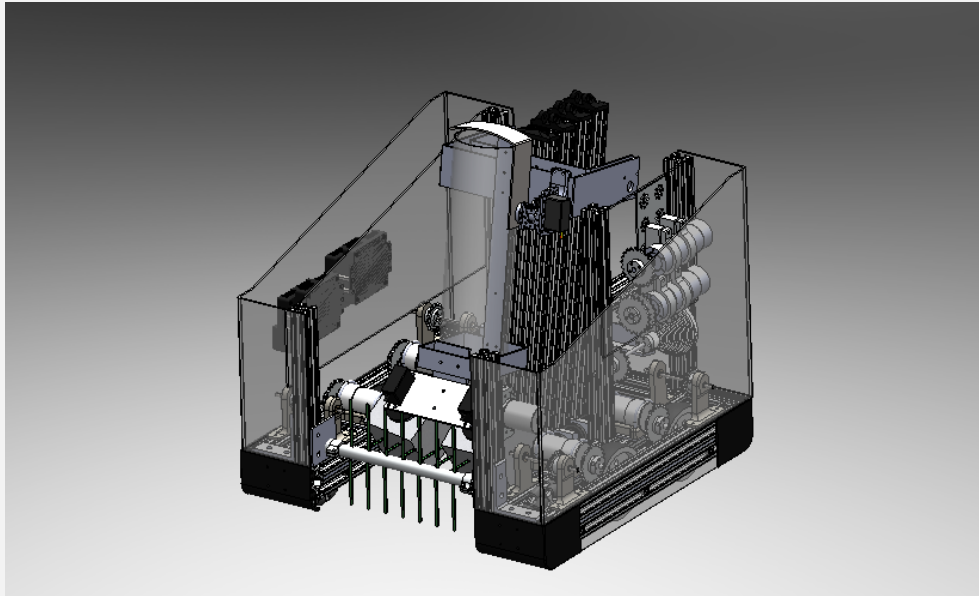
1. No additional details.
2. All of our newly planned autonomous routes from the floor depend on the ability to accurately detect the center goals orientation. Thus to solve this need we developed a system using the IR and the sonar sensors in conjunction. Strangely enough we are using IR 1, which is facing 90° away from the center goal, opposed to IR 2, which is facing towards the center. This is due to the way the IR's five internal sensors are set up. The forward facing sensor makes up a huge range that is read by the value 5. The other sensors line up in a more clustered fashion that give more, yet also smaller, zones. End result, we can accurately detect the difference between center goal orientations 2 and 3 with IR sensor 1, and detect 1 with the sonar.



With this capability to detect the center goal orientation we are now developing missions to score to the center goal and knock out the kickstand. -K McK

3. No additional details.

4.



5. After the meeting I started to save all the drawings as a PDF, by the end of the night I accomplished my goal of having them all saved in PDF format. -Chris
6. One of the attachments was a modified belly pan that was slightly higher off the ground so we could only pick up the baseball sized balls, the other was our modified ball sorter which had a top piece placed above the foam impellers so the balls wouldn't pop out while loading in the tube. Both worked great with each other as long as we didn't push a big clump of balls against the wall. -Bo
7. My coach told me that I can find some specifications on the updated servo rules on the FTC forms. After I found the form I read through the information and noted some key points that we might have missed, such as "Note that many servos are modified by the supplier or vendor to be continuous rotation or to have an extended operating range. If the manufacturer does not indicate that the servo is continuous rotation then it will be considered to be a modified servo and thus not allowed." This information proved to be very helpful. -MMMs
8. No additional details.

01.19.15 Touch Sensor Diagnostic

Duration 6:30 pm - 9:45 pm

Attendance:

Kristen, PJ, Coach, Mr. Stephen

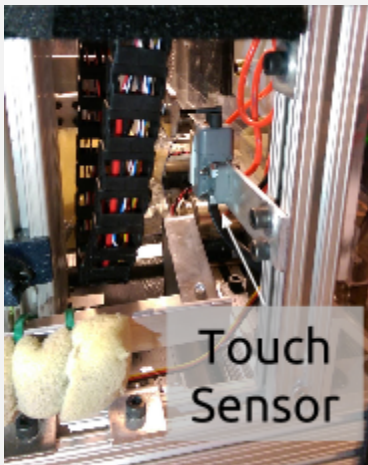
Tasks:

1. Diagnose Touch Sensor
2. Dynamic Speed

Reflections:

1. We've been having alot of issues relating to the touch sensor. This sensor directly affects the state of the lift encoder readings, the heart of the tele-op hotkeys functionality.
Due to this relevance we earlier disabled the touch sensors effect for the sake of making tele-op run properly. Although we could technically perform in this state we still wanted to try giving the touch sensor another shot for the sake of that extra layer of reliability the touch sensor gives when its working properly. -K McK (More details below.)
2. I attempted to make the dynamic speed work. The problem was that the robot slowed down and sped up randomly when driving. We went into our global variables and changed values that had to do with the speed but it just changed when the glitches happen. A way I tried to fix it is by changing the way the robot accelerates with a different algorithm. -PJ

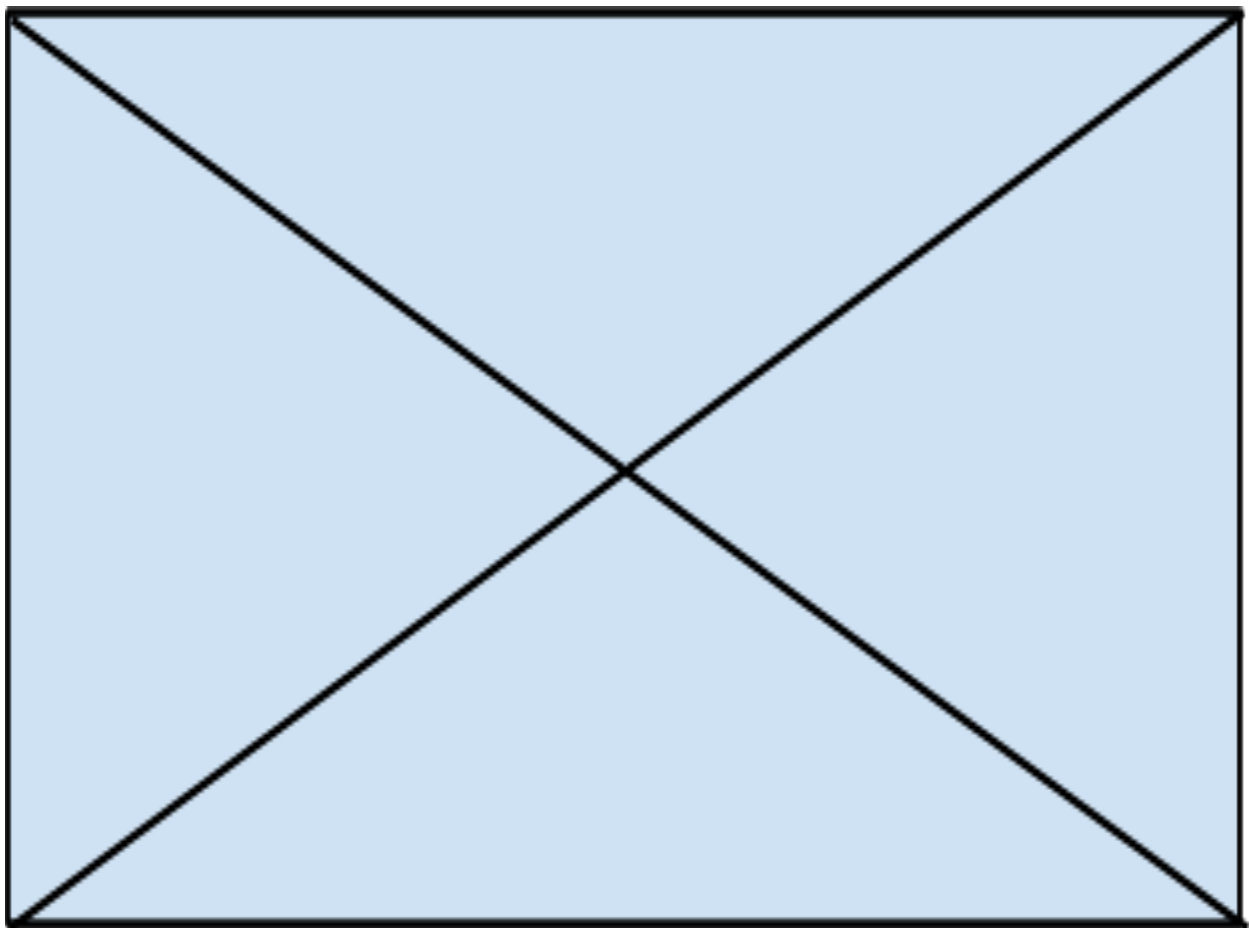
Details:



1. Normally the touch sensor resets the lift encoder when the lift hits the bottom, thus in the intake position. Problem though is that the touch sensor started resetting the encoder value at random times, crippling the drivers at many points mid game. In an attempt to debug the issue we displayed the touch sensors readings on the screen while we pressed and unpressed the sensor. It gave us perfect readings, implying nothing was wrong with the sensor, but instead the code. So we went back to the code and after quite a while of searching and still finding nothing we decided to check the sensor and the robots wiring again.

It was in this second check we found the trouble. For some odd reason the robot will give perfect readings while the main tetrax power was off, which was how we were testing it previously, yet when the power would be turned on the touch sensor would start getting a ton of erroneous readings. Even though we now understood the issue, or at least the cause, we still couldn't fix it. Assuming that the power interference issues couldn't be fixed on the physical side of things we would need to create a touch sensor handler to normalize the sensors readings. We determined that starting on such a task would take too long for what was a relatively low priority non perfection. Thus the code returned back to its previous state with the touch sensor disabled. -K MCK

2. No additional details.



01.20.15 We got 491!!!

Duration 3:30 pm - 2:00 am

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Solomon, Mr. Times, Mrs. McKellar, Mrs. Laker

Tasks:

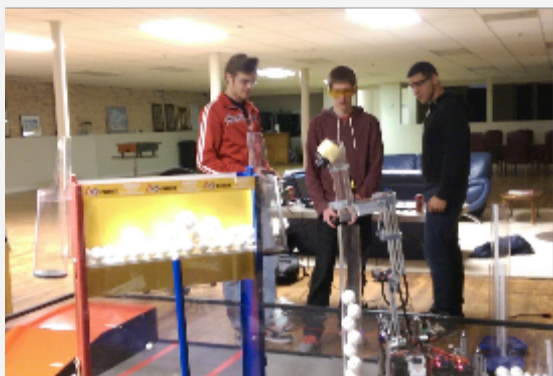
1. Have some drive practice to test out some new possible strategies
2. Debug touch sensor
3. Debug syntax errors
4. Make sure the CAD section of the notebook is complete

Reflections:

1. Today I had the drive team practice 4 different strategies. (See details below)
2. In the past we've used the touch sensor as a means of resetting the lift encoder, ensuring accurate lift movements. Since then we've had troubles with the lift glitching out due to touch sensor giving erroneous readings so we disabled its resetting capabilities. Although this fix 'worked' it also meant a layer of security was removed. (See details)
3. We had a problem with the dynamic speed so I made a dynamic speed algorithm that worked differently. When I tried to compile the code there was a compiler error that I couldn't seem to fix. After a meeting's worth of debugging, we figured out there was a character (`) right next to a macro that we were declaring in the code. - PJ
4. After making sure all the drawings were in PDF form I started printing them. After all of them were done printing I brought them over to a table where Mr. Times was organizing some of the others and he helped me get all of them in order of how we wanted it. -Chris

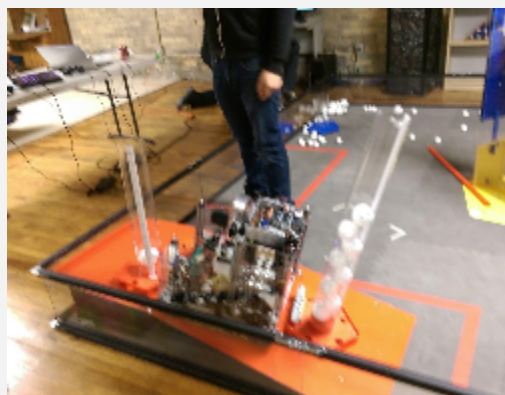
Details:

1. The 3 different strategies had several common denominators:. At the end of autonomous, our robot ends up in the parking zone. Once Tele op starts we have 5 variables that come into play. First is kicking down the kickstand, loading a set of balls, filling the 90cm rolling goal, filling the center goal, and taking 2 rolling goals on the ramp, as well as our own robot. With these 5 variables, 3 different strategies were tried.
Strategy A - the drive team kicks down the kickstand, intakes a set of balls to deliver into the 90cm rolling goal. Once delivered, bring the 90cm goal with them while they gather their next set of balls. Once that set was deployed, pick up another set of balls to prepare for end game. Once end game started, deploy them into the center goal structure, holding on to the 90cm so they can drive on the ramp ending up with a robot and 1 rolling goal on the ramp. This strategy gave us 450 points including autonomous.



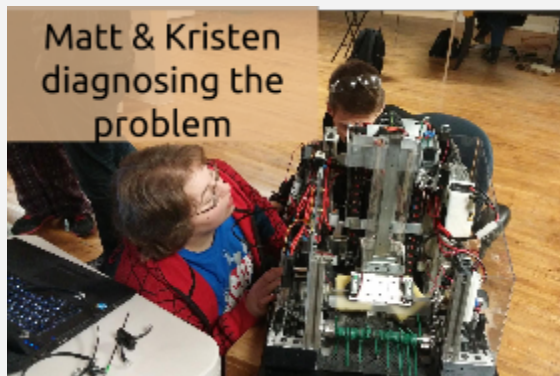
Strategy B - knock down the kick stand, get a set of balls, load them into the 60cm rolling goal, repeat with another set of balls. Then leave the rolling goal in the parking zone and reload once more. Once loaded deploy them into the center goal structure. After that, go straight for the ramp. Doing this strategy gave us 412 points.

Strategy C , by far the best, - Keep the the 60cm rolling goal, knock down the kickstand, load a set of balls and drive to the 90cm rolling goal dropping off the 60cm in front of the ramp. Doing this leans the pendulum of the game in our favor. Then hook onto the 90cm rolling goal, deliver the set of balls, load and deliver another set of balls. Get one more set and deliver that into the center structure. Once all this is completed, go straight for the ramp



taking with them not 1 but 2 rolling goals because of the rolling goal they placed from the very beginning. This strategy gave our team 491 points! -MMMs

2. In an effort to debug the touch sensor we traded out the smux, brick, each of the three nxt cables separately, and the touch sensor itself. Through the debugging we found that one of the nxt cables seemed buggy, and wanting to avoid future trouble with it we cut it in half and threw it away. Even after this the touch sensor didn't work. It was only when we compared results from the TETRIS battery on and the battery off we found the issue. For some odd reason something in the electrical in the robot is causing the touch sensor to give bad readings



when the main battery is on. We have no solution for this hardware wise, even though its a hardware problem. The only lead we have is to create a handler to normalize the touch sensor readings, but this would decrease read time, maybe even negating the sensor in the first place. So at this point in time we have to live without the sensor. -K McK

3. No additional details.
4. No Additional details.

01.22.15 120 Point Autonomous

Duration 2:00 pm - 2:00 am

Attendance:

Kristen, Matt, PJ, Coach, Mrs. McKellar, Mrs. Laker

Tasks:

Reflections:

- | | |
|--|--|
| <ol style="list-style-type: none">1. Tele-op manual lift/shoulder encoder reset2. Merge code branches3. Create more autonomous routes starting from floor position 24. Verify reliability of floor to center goal/kickstand autonomous missions | <ol style="list-style-type: none">1. This is an idea we still want to implement. We weren't able to get to the point of fully adding the feature for this tournament though. The basic idea is that in the off chance that our autonomous isn't able to lower the arm, including shoulder, into the intake position by the end of the autonomous period the drivers could manually reset the encoders at the push of one of the controller buttons. The task of implementing this feature will be handled at another date.
-K McK2. The two main autonomous routes: (1) Ramp, Rolling Goal, Parking Zone (2) Floor, Center Goal, Kick Stand - have so far been developed on two separate branches of our GitHub repository. The ramp starting routes on PJ's branch and the floor starting routes on mine. This allowed us to more quickly advance both auto options, but at the same time this means that to finish the code we will need to do a relatively big merge at the end. (See details.) -K McK3. Floor position 2 is our center goal scoring position. We can consistently score to the center ball tube and hit the kick stand. The detection for the center is all handled before the match even starts, thus making it impossible for another robot to screw up our readings. (More in details.) -K McK4. We managed to do a good job creating these new autonomous routes, they all score accurately and consistently. (See details for route diagram.) -K McK |
|--|--|

Details:

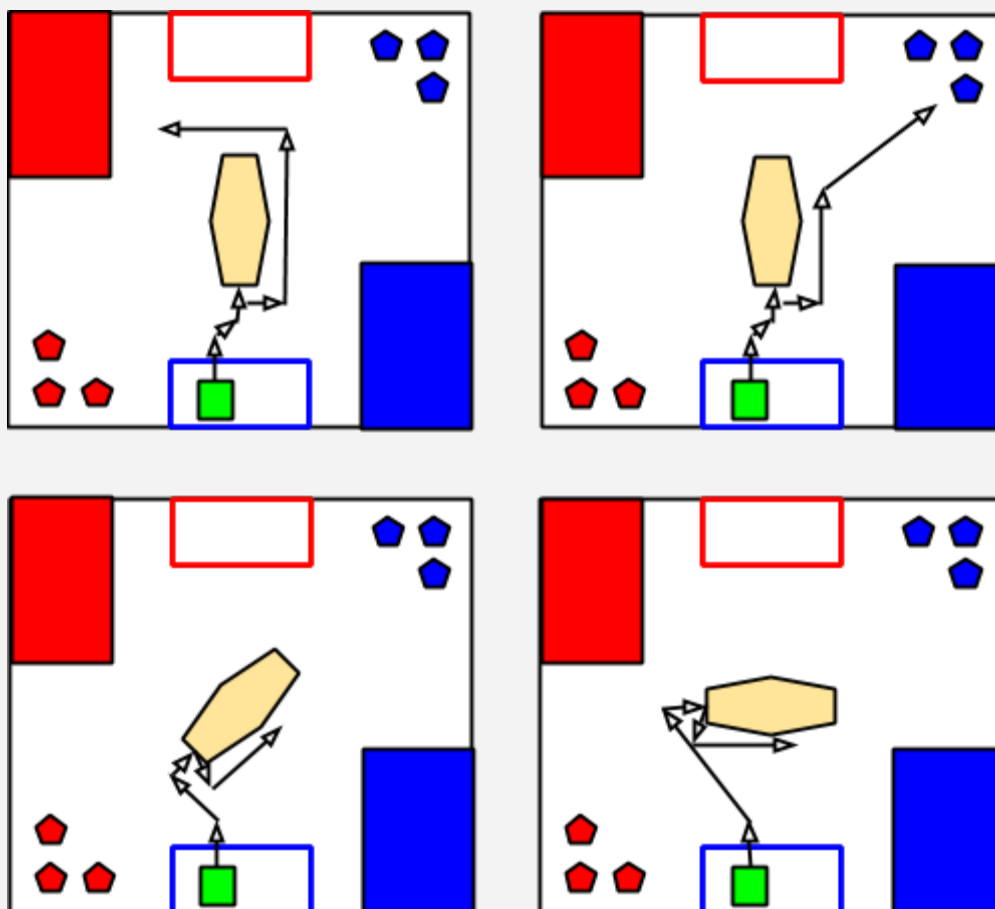
1. No additional details.
2. The biggest issue with the merge was that some of the framework had changed on one branch compared to the other, meaning both were using different auto selection option styles. In a few cases GitHub merged things weird, creating broken logic, other places case statements wouldn't exit properly. It took a large amount of debugging, which in all honesty is what we expected, but we got it working. -K McK

3. Besides our basic floor 2 autonomous routes, we have something unique added to the scenario in which the center goal is in orientation 3. If given permission from the drivers during setup, the robot will attempt to score a ball into the closest rolling goal after scoring into the center ball tube and knocking out the kickstand.

This is accomplished through special use of the ball shutter and the sonar sensor. The **ball shutter**, while scoring into the center ball tube, will only open part way. Just enough for the small ball, which was put into the robots ball tube last thus it comes out first, to roll out and score. Retaining the larger ball the robot will continue and knock out the kickstand, then drive over to the general location of the rolling goal. Once there it uses the **sonar** to detect the ball tube, aligns and scores. All with just under four seconds remaining in autonomous, scoring us 120 points with just one active robot.

Of course, this is all if the drivers choose that option. If the drivers opt out of the rolling goal the robot will instead drive around the center tower after knocking out the kickstand and sit by the opponents parking zone. This is for two purposes: **(1)** To get out of the way of an allegiance partner who might drive by the center tower trying to get to the parking zone. **(2)** It puts us in a good stop for both defense and scoring when tele-op starts. -K McK

4.



15.01.24 Competing at CMSA

Duration 7:15 am - 6:40 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Mr. Stephen, Mr. Times, Mrs. McKellar, Mrs. Laker

Tasks:

1. Game results and awards
2. Summary of robot performance.
3. Observing TARS drive and play
4. Help with general programming

Reflections:

1. It was a good competition day. We were on the winning alliance with Blue Box Bots! Plus we were awarded the Think Award and 2nd



place Inspire. We are excited that Blue Box Bots will be going to state with us. (See complete list of awards below)

- a. Chris and Bo are absolutely honored to be named Dean's List semi-finalists. (See details below)



2. We won the first 2 matches, and the 4th relatively easily. But the 3rd and 5th matches we lost because of mechanical failure due to lack of matrices. We plan to do some maintenance between now and state.--AMP
3. While driving the robot we were watching how each part would react, such as the lift and the pre sets. The robot performed just as we wanted it to with some complications. Bo, Marcos and myself were able, as a drive team, to overcome them in the spur of the moment. -Chris

4. Of all the tournaments we've attended or volunteered at this year this one had the least number of teams requesting help. Everyone had their work together and ready to go. The only notable help we gave was guiding a team that was experimenting with variable names. (See details below.)

Details:

1. ***Special Awards Presented by tournament host
Chicago Math & Science Academy:***

Team Spirit Award: 7301 Tiger Robotics

Robot Creativity Award: 5037 got robot?

Against All Odds Award: 8873 Advantage Robotics

FIRST Awards:

Motivate Nominees: 9379 Evanston Robotics

9410 Robo Galactic Corp.

Motivate Winner: 8685 Techno Tamarins, Boone County 4H

PTC Design Nominees: 9506 Quadratic Crushers

7301 Tiger Robotics

PTC Design Winner: 4965 Animatore Romani

Rockwell Collins Nominees: 5037 got robot?

7301 Tiger Robotics

Rockwell Collins Winner: 7738 Vaders

Connect Nominees: 5037 got robot?

7738 Vaders

Connect Winner: 9239 WOW Wise Old Owls

Highest Ranked Rookie: 8907 Blue Box Bots

Think Nominee: 8907 Blue Box Bots

7301 Tiger Robotics

Think Winner: 5037 got robot?

Finalist Alliance: 7738 Vaders - Captain

4965 Animatores Romani

Winning Alliance: 8907 Blue Box Bots - Captain

5037 got robot?

Dean's List Semi-Finalist: Chris Laker, 5037 got robot?

Robert (Bo) Russell, 5037 got robot?

3rd Inspire Award:
2nd Inspire Award:
1st Inspire Award:

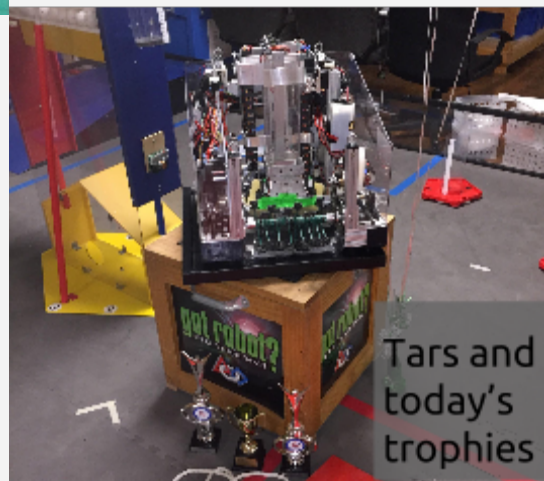
7738 Vaders
5037 got robot?
7301 Tiger Robotics

a. Chris and I grew up together and started doing robotics and FIRST at the same time six years ago. Ever since we heard about the award a few years ago, we aspired to one day be on that list. Now we wait for IL state to see who the Dean's List finalists are. -Bo

2. No additional details.
3. No additional details.
4. They had named their motors one set of names and were trying to make and set variables by the same names. This gave the error: 'out of range', referring to the motor ports and names array. Setting variables by the same names confused the compiler making it think they were trying to address a part of motor ports and names array that didn't exist. We advised them to separate the variables and once done they were good to go. -K McK



(left)
got robot? team members take time to pose for a picture



01.27.15 CMSA SWOT

Duration 6:00 pm - 9:00 pm

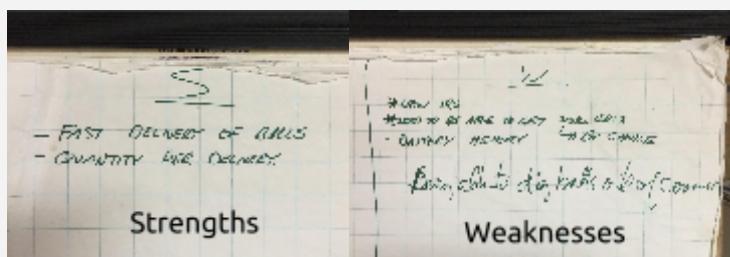
Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar, Mrs. Laker

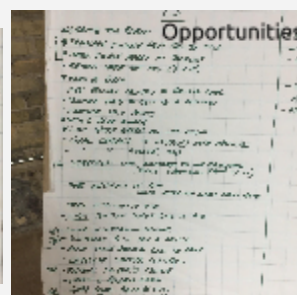
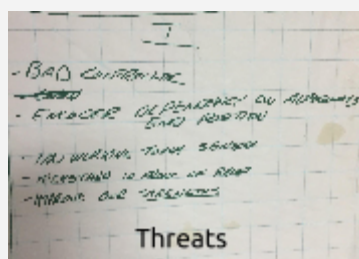
Tasks:

1. SWOT Analysis of event
2. Talk about the CMSA Qualifier; review judging and game video
3. Review the 2 different strategies we tried

Reflections:



1. We did an in-depth SWOT analysis of our 2nd qualifier to see what areas we needed to improve on so we can compete at the state competition and beyond. (See details in chart below)



2. During our meeting we went over how the day went, what we thought was the good and the bad of the day. such as if the cueing was smooth or if judging went well. After some talking about what we thought was good and bad, we watched our judging video that was recorded by one of our mentors. After watching it we decided it was one of our best judging sessions for the fact that the judges asked great questions and we were able to answer them with a good and quick answer. -Chris
3. The 2 strategies were really 2 different mind sets. The first is a set strategic approach, which is a plan that does not change. The second approach is more of a reactive goal plan. There are certain goals that we want to reach but the way we reach them is solely based on what happens in the game. The second one was significantly more effective - MMMS

Details:

1.

STRENGTHS Travel speed is good Lift is fast Deploying balls is fast We don't touch the end of the tubes! Quantity per delivery	WEAKNESSES New IR's Need to be able to get small balls by choice Being able to get balls out of corners
OPPORTUNITIES Service the robot *Transfer encoder reading from auto to teleop *Manual encoder reset in Teleop Remap the upper hot key (6&2) *Foam at back More reliable delivery to rolling goal Multiple ways to get to a position *Shield rear bumper *Limit our speed based on lift height Goal grabber to extend over obstacles Goal grabber roller mod *Strategy: use kickstand to our advantage to block access to opponent ramp More variations of Autonomous Stall detection in auto Auto: position scoring goal in auto *Lower the ultrasonic sensor *Scrimmage with Blue Box Bots Auto- move rolling goal to ramp Granular shutter control remove soldered motor Carry 2 rolling goals Grab small balls @ will Ability to score w/o shutter	THREATS Bad game controller Encoder dependency on autonomous end position Non working touch sensor Kickstand is blocking front of ramp Improve our strengths!!

2. No additional details.

3. No additional details.

01.28.15 File Transfer Encoders

Duration 6:30 pm - 8:30 pm

Attendance:

Kristen, PJ, Mr. Stephen

Tasks:

1. Try to make the encoder file transfer work

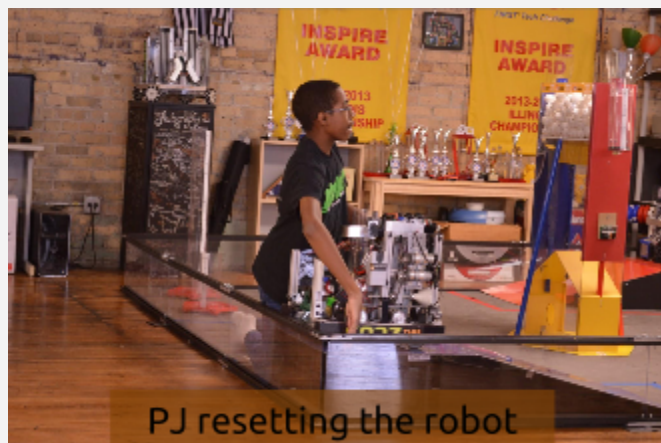
Reflections:

1. Due to our touch sensor not working we currently have a weakness in our competition code. More below.

Details:

1. The chain of events that cause the trouble are as follows:
 - If our autonomous doesn't finish:
 - Lift doesn't reset
 - If our lift doesn't reset:
 - Encoders don't calibrate correctly due to no touch sensor
 - If encoders don't calibrate correctly:
 - Tele-Op hotkeys don't work
 - If Tele-Op hotkeys don't work:
 - Drivers have to use manual lift controls
 - If drivers have to use manual lift controls:
 - We'll accidentally touch pipes in Tele-Op
 - If we touch pipes in Tele-Op:
 - We get penalties and could lose the match

The preferable solution to this problem is fixing the touchsensor, but sadly due to issues on that front that won't happen. So in an attempt to find another solution we tried to add a feature to autonomous to pass last known lift encoder values into a file right at the end of autonomous. When tele-op starts it would read those values and calibrate accordingly. Like the touch sensor, when attempting to solidify this method strange issues kept coming up. At this point although we've learned a bit we aren't much closer to the file idea working. For now the drivers will have to be smart with the manual reset to ensure working hotkeys. -K McK



PJ resetting the robot

15.01.31 Promote Planning

Duration 12:00 pm - 8:00 pm

Attendance:

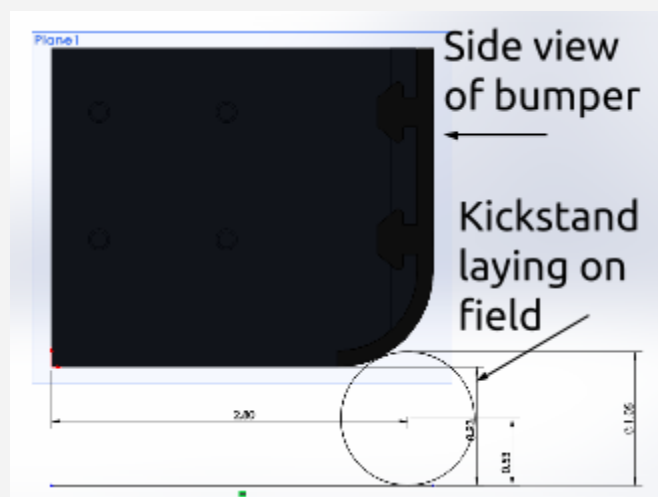
Aidan, Bo, Chris, Kristen, Matt, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Promote meeting: storyboard hour
2. Rebuild the tube clamp
3. Explore bumper shapes to aid pushing the kickstand

Reflections:

1. Bo, Marcos, Chris, Matthew, and Mr. Times went to the conference room and brainstormed ideas for the Promote Video. We spent about two hours conversing about the theme and truly why we chose FIRST. (See details below)
2. We discovered that excessive use of our goal clamp eventually led to it becoming less "grippy" and therefore needed some renovation. (See details below)
3. This illustration demonstrates the contact point of the robot bumper onto the kickstand. While there are optimizations that can be made to the height of the bumper, one of the more interesting modifications may be to change the radius curve at the lower lip into an elliptic curve. (See details below)



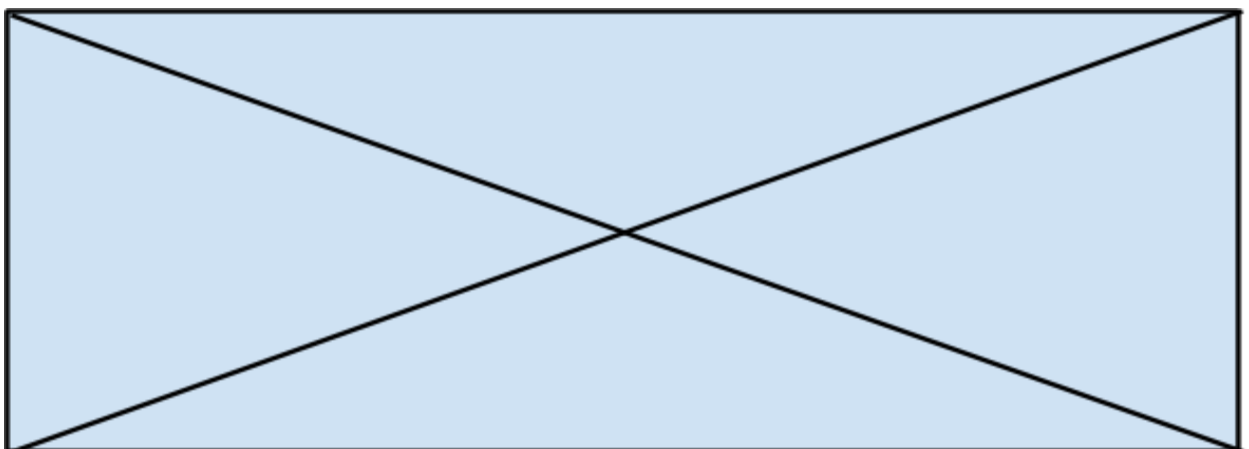
Details:

1. The promote team and I spent almost half of the meeting brainstorming and trying to come up with a general idea for a storyboard. We really tried to get to the root of why we chose FIRST and came up with the idea that FIRST has given us purpose. It's driving, motivating, and inspiring and really helps us incorporate everything we learn in our real life environment. We want the video to be captivating and be able to reach all those who watch it on an emotional level to really get the message across that FIRST is truly for EVERYONE. It drives creativity and spawns leaders in all different kinds of fields. FIRST really is a unique experience! We are going to try and capture that fact the best we possibly can. -Bo

2. The old white foam, that we use on the impellers, got replaced with a bar of rubberised black foam. This seems to work better. - Matthew



3. The reasoning behind this is that the robot is expending most of the energy into a vertical deflection angle upon contact. By steepening the deflection angle more of the energy will be expended in a horizontal plane, vs a vertically facing vector, which will allow us to move the pole easier. - Matthew



02.03.15 Storyboarding

Duration 6:00 pm - 9:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Meet about the Promote video again to discuss the storyboard
2. Rebuild ball tube

Reflections:

1. The Promote video team had another meeting regarding the promote video and actually had a "eureka!" moment about our approach to making the video (See details)



2. I dismantled the ball tube from the robot and cut out all of the pertinent components from steel. New polycarbonate was required, the old tube will be used for documentation purposes. I put in a couple extra hours, but the tube got fully rebuilt. (See photo in details below) -Matthew

Details:

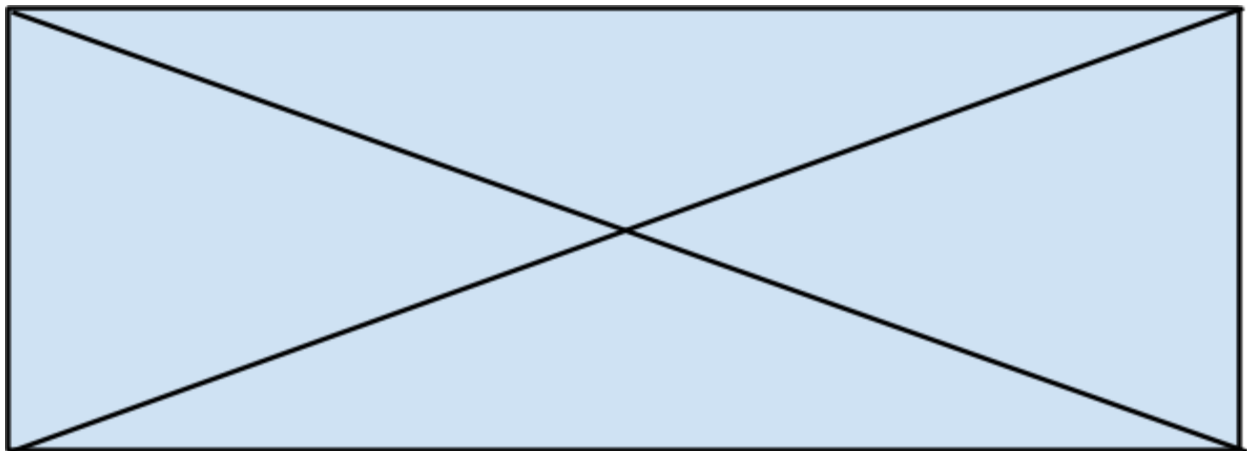
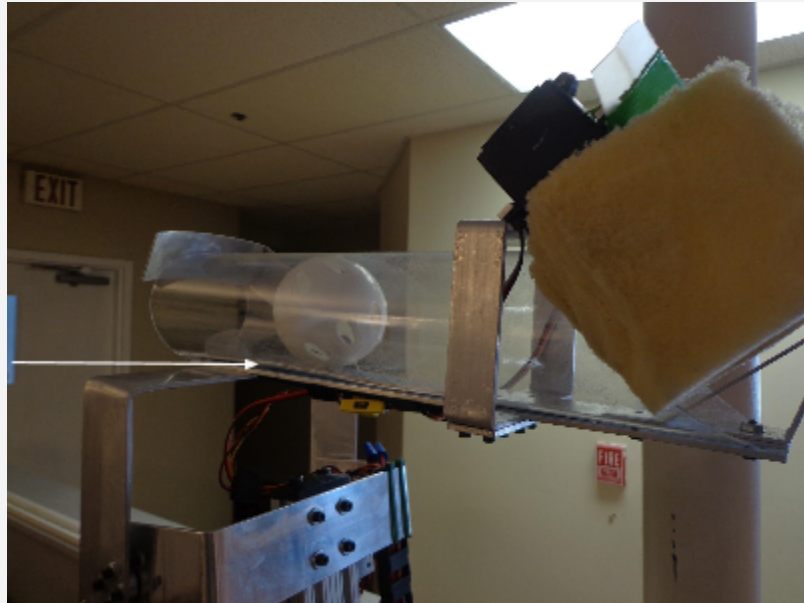
1. We met again to write down a storyboard and find out the exact way we wanted to make our Promote Video. We wanted it to be out of the box and something new that hasn't been done before. After discussing heavily on the matter we finally came up with the idea to have a chair and reach out to other teams to see if they would let us simply interview one of their members and ask "Why did they chose FIRST." We wanted to reach out to as many



levels as we possibly could (FLL, FTC, FRC, Alumni, and Mentors) to see what FIRST meant to different people at the different levels. Once we interviewed everyone we would then condense it all into the one minute limit and then do some more editing. We are super excited to film this and we're meeting on Friday to get it done! -Bo

2.

The original tube cracked at the mounting points. Because of this, the tube could have cracked open. Therefore we replaced it before it caused a problem.



02.06.15 Filming for Promote

Duration 3:00 pm - 9:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Shoot footage to be used for the Promote video
2. CAD work

Reflections:

1. We had a few members from other teams come in so we could film their experience in FIRST. We also filmed both Matt Times and Matthew McKellar as well as Coach, Mr. Stephen, and Mr. Copeland from ETC to capture what FIRST means to them personally. (See details)



2. The CAD team had found out that we had not only the pieces on the robot to do but also all the prototypes and previous iterations of items on the robot. --AMP (See details)

Details:

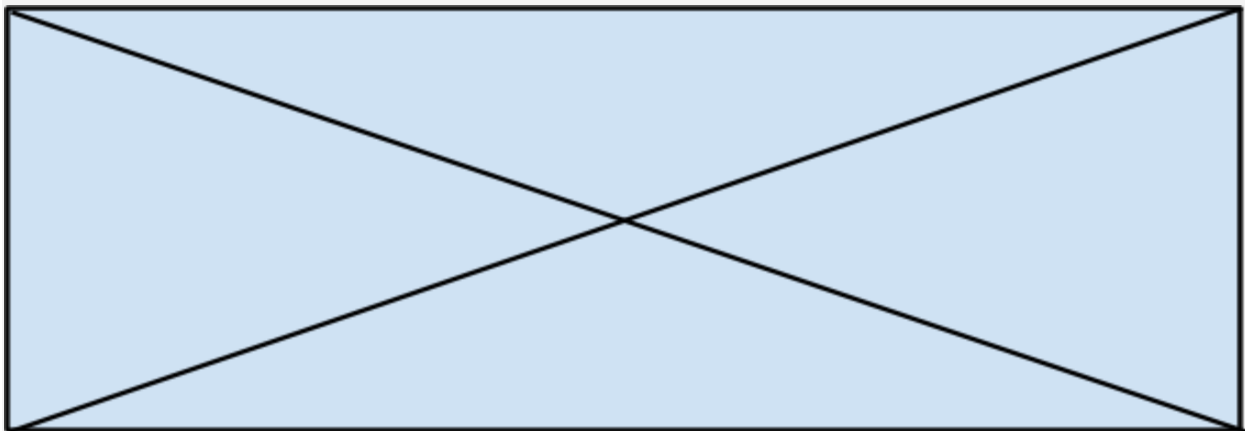
1. Finally it was filming day today. Chris and I spent the whole day filming and getting all the footage onto my computer for editing tomorrow. We got some incredible footage and we were surprised at how well everything fit together perfectly. We used two cameras for different camera angles and a Blue Yeti microphone to capture crystal clear audio. Three members from two different FLL teams (Lyndsey Tracy, Lazaro Marquez, and Darian Waits) came in so we could interview them and ask what FIRST means to the younger FLL-ers. Then we interviewed Matthew McKellar, Matt Times, Coach, Mr. Stephen, and Mr. Copeland who all shared their reasons why they love FIRST. -Bo

1. continued

One way of giving back to the students who came in and donated their time to be in our Promote video was to allow them to drive our robot TARS and teach them the secondary gunner's job. They seemed to enjoy seeing and driving a robot from the next level up in FIRST. - Chris



2. With this information, we went on to finalize and finish the robot assembly. In addition to that we started to work on the previous iterations of parts of the robot and started to do drawings of the prototypes that were not compatible with our final design of the robot. - Chris



02.07.15 Goal Grabber

Duration 12:30 pm - 7:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Mount new goal grabber
2. Start editing process for Promote video
3. Work on robot renders
4. Discuss the pit display for state

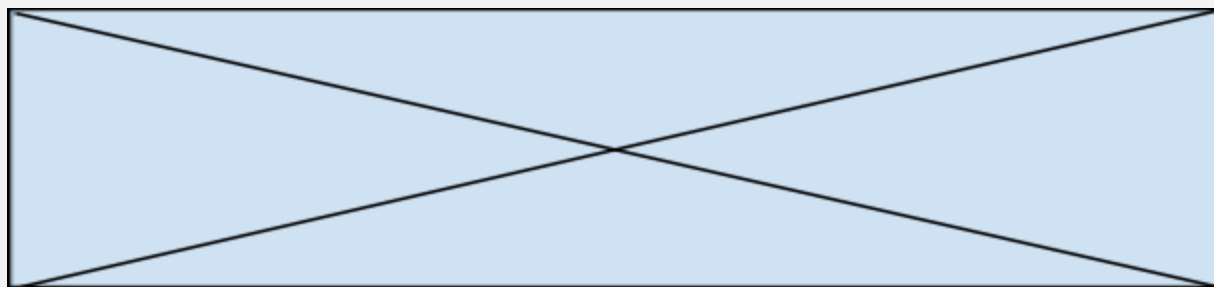
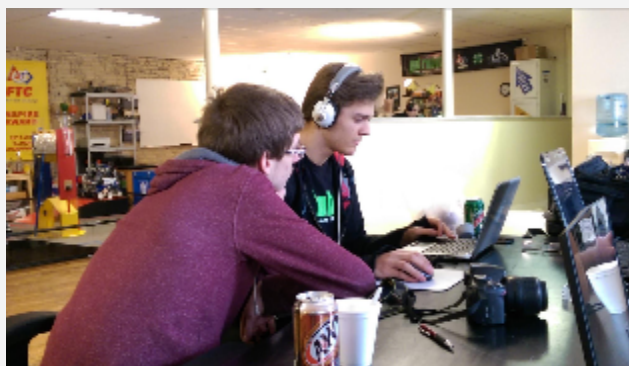
Reflections:

1. The goal grabber was largely rebuilt, and now has a better black rubber treading, with a plastic center spike. (See details)
2. Chris and Bo spent the whole meeting editing the Promote video by adding and cutting clips and then adding color corrections to give it a more movie-like quality. (See details)
3. I started the day with a messed up render of TARS and I intended by the end of the day to either have a good render or go home being able to do a good render. (See details)
4. Coach and I talked about our pit display for state competition. We want to show off our CAD drawings, outreach, including teams we've mentored and also list our sponsors. -MMMs



Details:

1. The thinner aluminum portions of the gripper had sustained repeated damage from use, so the L-bracket and rear bar were replaced with new thicker versions. The old white foam worked, but would lose its pliability with use, so I had it replaced with a new black foamed rubber material. Treading was cut into it and a plastic rivet was added to increase grip strength further. -Matthew
2. Because I've used this program more than Chris, I did the computer work, and showed him some techniques. We spent a lot of time carefully syncing the audio to video and finding the best footage to use for it. After we chose footage, we cut it down so it would fit in our minute restriction. Next, we adjusted the volume of a song so it fit accordingly. Then we did some color correction to give it a "cinematic" feel. When we were done we showed what we had to everyone else and they all loved it! I still need to do some final tweaking but the video is practically done! It was really fun and I'm glad everything worked out with very minimal problems. -Bo
3. I fiddled with different render settings and did a few renders, but they didn't turn out very well. But at the end of the day I found out what the problem was, I had set it to contour rendering so it only rendered some of a wire frame of the robot. I went home confident that I was able to do a good render --AMP
4. No additional details.



02.12.15 Ball Sorter

Duration 10:00 am - 11:30 pm

Attendance:

Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mrs. McKellar,

Tasks:

1. Program center goal detection from the ramp
2. Work on autonomous program: ramp to rolling goal #2
3. Fabricate the ball sorter

Reflections:

1. Our previous IR detection methods for the 180 beacons never quite got working. The new beacons simply don't create enough variance in IR readings to generate a distinguishing pattern. With this in mind we decided to stop using IR as our proprietary means of detection. (More details below.)
2. The 90 cm goal is clearly more valuable to score into than the 60 cm. As such we've devised a plan for a new autonomous. It will be very similar to our main auto mission from the ramp, drive down, grab goal, score, end in parking zone. But instead of grabbing the closest goal (60 cm) it will push that goal aside and re-align, and then grab the 90 cm. From that point on it will continue the same as the original, score and go to parking zone. -K McK
3. The ball pan was removed, and CAD files of it were opened as templates for manufacturing the replacement piece. (See details)



Details:

1. We had at a previous time changed out the center goal detection from the parking zone from using IR to sonar. This was due to the new beacons proving indistinguishable from the position we needed to read them from. Now the robot drives forward, and based on distance or lack there of, will determine center goal orientation. We've now taken some of this logic and applied it to ramp detection. At the top of the ramp the robot checks IR to see if center goal is in position three, the only accurate IR read position. If its not the robot will check its side facing

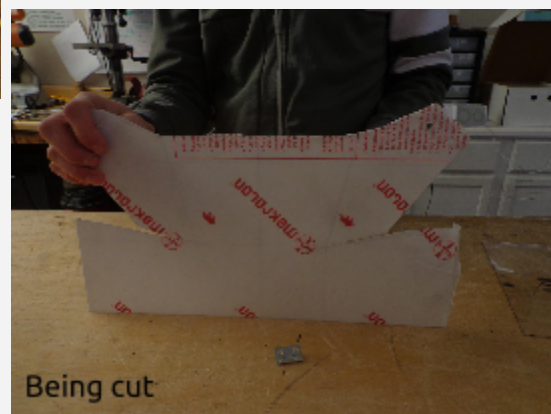
sonar as it drives down the ramp. If the robot detects an object, it now knows the center goal is in position 1, if it doesn't the robot deduces that it is in orientation 2.
-K McK

2. No additional details.



3. After the CAD sheet metal model of the intake was unfolded, it was found out that several of the dimensions were inaccurate. As such lots of cardboard cutouts and paper measurements have been made in

attempts of finding the correct dimensions of the intake pan. The dimensions are now finalized and documented, and we should be able to cut out and install it next meeting. - Matthew



02.13.15 Install Ball Sorter

Duration 4:00 pm - 10:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Coach, Mrs. McKellar, Mrs. Laker

Tasks:

1. Install the Ball Sorter
2. Update full robot model in CAD
3. Program intake shutter
4. Make CAD drawings for intake spine

Reflections:

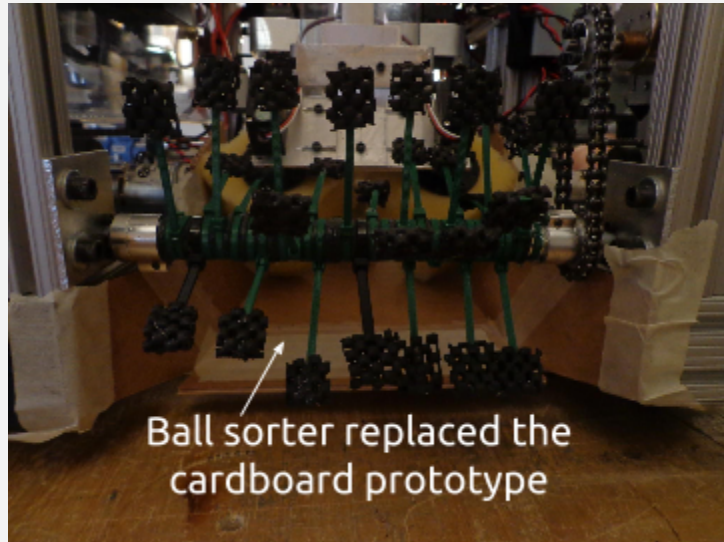
1. The ball gate (servo shutter thingy on the front) is finally installed, new polycarbonate and a second servo controller were installed. (See details below)
2. One of our objectives was to completely finish the robot model in CAD. Bo created the shielding we had, making sure all parts were there and in the correct color. (see details below)
3. On the controllers we've kinda run out of space. Technically we have another six on the four way lever base. So for the intake shutter, now dubbed 'The Gate', we coded it as a toggle onto button 10 on both controllers. Button 10 being the start button, the oval d-pad but that doesn't serve us well due to its shape and sitting a centimeter or two up from the right joystick. -K McK



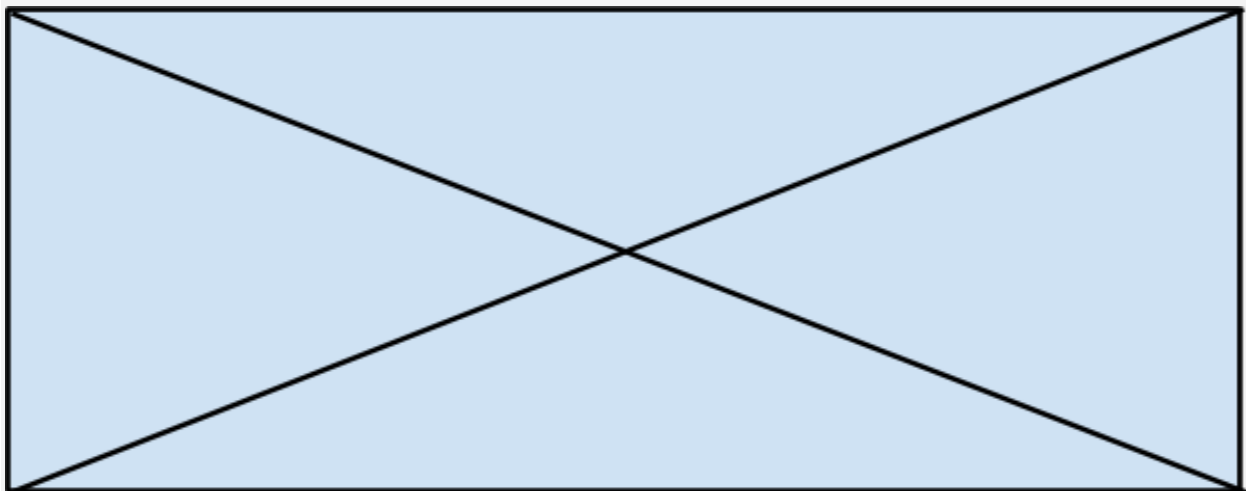
4. I received a note from Mr. Times instructing me to make the CAD drawings of the intake spine. The spine being the metal strip running along the back of the ball intake tube. I completed the task. - AMP

Details:

1. The intake sorter installation was supposed to take 3~4 hours to install. Unfortunately, bad dimensions and repeated mis-machining ballooned this timescale to the > 15 hour range for the installation. Thankfully, the installed components work better than expected, and allow full control over the dimensions of the intaked balls. -Matthew



2. This will allow us to do a rendered version to put on our display board and in the Engineering notebook. - Chris
3. No additional details.
4. No additional details.



02.14.15 Preparing for State

Duration 12:00 pm - 10:30 pm

Attendance:

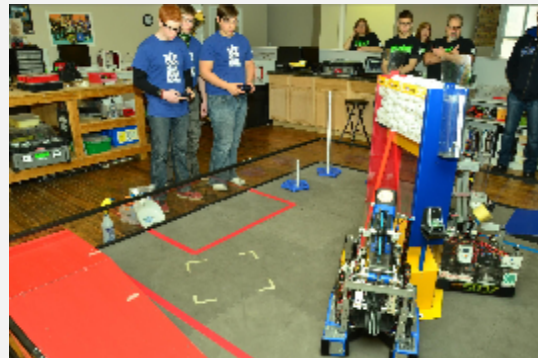
Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Scrimmage with Blue Box Bots
2. Work on CAD for pit display
3. Debug center goal position 1, 1st turn issue
4. Write autonomous program check-list
5. Test ball sorter

Reflections:

1. We scrimmaged with Blue Box Bots to practice a few matches on a 1 v 1 situation. We practiced



some new tactics as well as tested out the new belly pan gate. (See details below)

2. One thing on the list was to complete drawings for the pit display. (See details)



- a. I got the job of rendering the main robot for the main display. I went home and did it overnight, it took about 6-7 hours--AMP
- b. I made the call-outs of all our important subassemblies and custom parts including our slide lift, custom conical winch, chassis, and main scoring subassembly.
-Bo

3. At an earlier time we had experimented with a new style of approach for position of the center goal. This style basically involved approaching from the side, instead of head on. This proved to have too small of a tolerance to score successfully so we took the new style out.(See details)
4. In the efforts of ensuring accurate robot performance through the set up we wrote a robot setup checklist. A copy of the checklist is listed below (More in details.)
5. As soon as the gate for our intake device had been completed and installed we wanted to test and drive the robot around with it. To be able to test the switch mechanism we requested our programming team to put that function on a button, after it was programmed we then did a drive test. While testing the gate we figured out that it does exactly what we wanted just as we wanted it to be done. -Chris

Details:

1. It was time well spent for both teams because it gave us a chance to see what we needed to work on to be ready for state competition next Saturday. -MMMs



2. We wanted to have special CAD drawings that we would use on our display board in our pit. So we're gonna have a main robot render in the middle followed by call-outs of the different notable subassemblies and parts we've created. While I worked on getting different views for the subassemblies and parts, Aidan worked on the render settings for the full rendered view of the entire robot. -Bo

3. It appears that in that whole process the original code got affected causing it to malfunction. So we went through each move function of the behaviour returning them back to a working state. -K McKn



4.

Ramp Start

Place robot on ramp with intake brush to wall, lined up to wall. Space side of robot from side wall four (4) finger distance from the wall, or 08 cm from the wall.

If field perimeter has angle cross brace such that robot cannot setup in preferred position move the robot forward so it still maintains side spacing and try to align back of robot visually to be parallel to back wall.

Floor Start

Floor Position Right (1)

Line up robot brush to the wall with robot bumper pressed up and parallel to back wall. Align left side of robot to right most side of center mat seam in parking zone.

Floor Position Left (2)

Line up robot brush to the wall with robot bumper pressed up and parallel to back wall. Align right side of robot to left most side of center mat seam in parking zone.

Robot Setup

- Turn everything off.
- If beginning of day replace sensor batteries (9Vs).
- Turn on gyro smux by plugging in gyro battery.
- Turn on general sensor smux but switching on general sensor battery box.
- Turn on NXT, wait four (4) seconds. If beginning of day replace NXT battery.
- Check both smuxs make sure both have consent red and green lights on.
- Turn on robot TETRIX battery.
- Check that all motor and servo controllers are powered up, all having red lights on.
- Re-seat lift and shoulder. Lift touching bottom of slide not over wound at all. Shoulder barely touching slide.
- Choose program.
- Wait for gyro calibration to finish.
- Check bottom left number, if back sonar clear make sure value is 255. If value 0 re-power-cycle robot. If after cycle value is still 0 don't run autonomous.
- Once setup done DO NOT move robot, doing so will break gyro calibration

5. No additional details.

02.17.15 Judging Practice

Duration 6:00 pm - 9:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Practice Judging for State Competition
2. Work on the Engineering Notebook

Reflections:

1. Our main objective for tonight's meeting was to practice our judging routine and make sure we have it polished and ready to say it for state. (see details below)
2. The team worked together to find pictures for our different events, then worked on completing entries in the engineering notebook.. The CAD team worked with Mr. Times on getting the CAD drawings completed in new format so they can be printed tomorrow. (See details)



Details:

1. The first time we had coach McKellar, Mr. times, and our programming Coach Mr. Stephen act as judges with not many questions which put us in a harder situation to bring up topics we want to tell the judges. Then our next set was to practice with a couple parents from our sister team Blue Box Bots. With them not knowing as much about our team and our robot they were more active and were able to ask a lot of questions and keep us on our "toes" for different questions and situations. -Chris
2. While the rest of the team worked on finding photos for different events and getting some pages completed, Chris, Aidan, Mr. Times, And I reviewed all our CAD drawings. We want to be able to tell a story through the way they're laid out in the back of the book. We will start with an overall drawing of the robot, then going into our subassemblies and the parts that are in those subassemblies. -Bo

02.18.15 Final Code Check Ups

Duration 10:30 am - 9:30 pm

Attendance:

Kristen, Matt, Bo, Aidan, PJ, Chris, coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Tune up and refine code
2. Print out and organize CAD files for the Engineering Notebook
3. Debug ramp rolling goal 2 1st turn issue

Reflections:

1. We made a list of task todo and priority of those tasks. Here is the priority rating:
 - 1) Must be done
 - 2) Would be good if done
 - 3) Would be cool

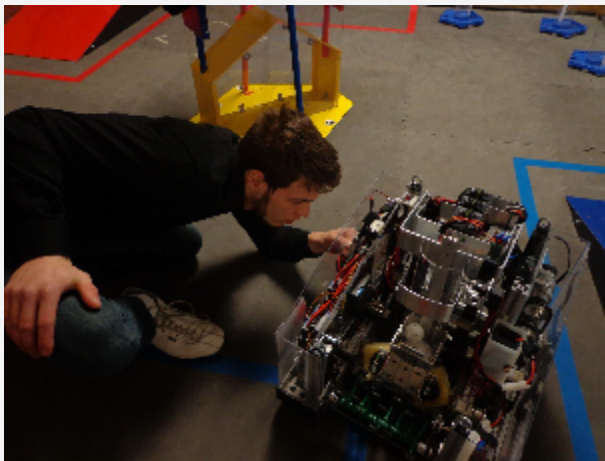
Look in the details section for the exact list.
2. Today was the final day of working on our CAD drawings, the last couple days we were focusing on getting all of our CAD drawings up to date and in the new format. (see details below)
3. We've been trying to implement a sonar based detection for the rolling goals, but so far that had proven challenging. So in efforts to get the 'ball moving' again we rethought over our detection code and redesigned the ramp route to accommodate it. Now we are successfully detecting the rolling goals with the sonar sensor, scoring accurately. -K McK

Details

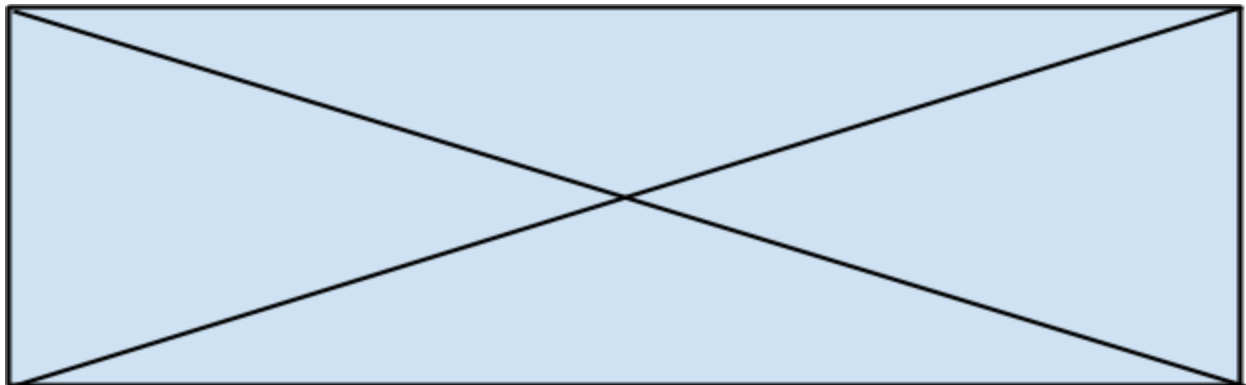
1. **Here is said list for task 1**
 - 1) Fix floor mission position 1
 - 1) Check floor missions position 2 & 3
 - 2) Time auto lower lift
 - 3) TeleOp drive speed / lift height assist
 - 1) Check ramp roll 1 mission
 - 2) Finish ramp roll 2 mission
 - 1) Check both IR detection styles
 - 2) Get rolling goal sonar detect working
 - 3) Add auto stall detect/reaction
 - 2) Check hot keys
 - 2) Increase kickstand tolerance
 - 2) In-code sensor mux power check

Details Extended

2. Making sure the created by and date boxes were filled to the best of our ability, then on top of that, the drawn by and date boxes. When all of our drawings were finished I created folders of 15 each that we could print out with the ability of windows 7 to print 15 pdfs out at once. As soon as they were done printing Mr. Times helped us organize all our drawings into assemblies and sub assemblies. -Chris



3. Matt prepares the robot for another autonomous run.



02.21.15 IL State Competition

Duration 07:30 am - 7:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Game results and awards
2. Summary of robot performance.

Reflections:

1. After a long day at probably the best IL State Championship, we managed to go undefeated through qualifying matches and only lost once in semi-finals and once in finals. We ended up being the Winning Alliance Captains, winners of the Rockwell Collins Innovate Award, and 2nd place Inspire Award! We had so much fun and we're super excited to be advancing to the Super Regional Competition. -Bo (See details below)



2. TARS performed as we had hoped which allowed us to be the 1st seed. Nothing huge happened or broke. One thing that did happen was a ball got stuck under our lift in one of the matches so we could not lower it, but we still managed to win that match with being able to push goals up the ramp. -Chris

Details:

1. *Illinois State Championship Awards:*

Motivate Nominees: 5209 Operation Bison Bots
5202 Zip Tie Fighters

Motivate Winner: 116 Crazy Eights

PTC Design Nominees: **5037 got robot?**
7129 Robo Raiders

PTC Design Winner: 5200 Robots Incorporated

Rockwell Collins Nominees: 7129 Robo Raiders
7207 M-Fusion

Rockwell Collins Winner: 5037 got robot?

This year's Rockwell Collins Innovate Award winners demonstrated that type of thinking. Here is what the judges had to say: ***Other teams may be GREEN with envy, but this team is no CONEheads. Really, they just GOT it.***

Connect Nominees: 6007 Octopi
7129 Robo Raiders

Connect Winner: 3785 Beastie

Highest Ranked Rookie: 8907 Blue Box Bots

Think Nominee: 7129 Robo Raiders
5037 got robot?

Think Winner: 5452 Robot to the Knee

Finalist Alliance: 5209 Operation Bison Bots
7129 Robo Raiders
7351 Dynamics Signals

Winning Alliance: **5037 got robot?** - Captain
6007 Octopi
3785 Beastie Bots

Dean's List Finalist: **Chris Laker, 5037 got robot?**
Hannah Lightner, 5202 Zip TIE Fighters

Today I had the honor of becoming one of the two finalists representing Illinois at Worlds for the Dean's List Award. I have truly enjoyed the 5 years I've been involved with FIRST and feel privileged to be recognized as a leader. -Chris

3rd Inspire Award: 5202 Zip TIE Fighters

2nd Inspire Award: **5037 got robot?**

1st Inspire Award: 7129 Robo Raiders



The day starts with inspections.

Programmers check the robot between matches.



The team is announced during a qualifying match.



The day ends with awards.

02.24.15 IL State SWOT

Duration 5:00 pm - 9:00 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Have our annual SWOT analysis that we have after every competition
2. Film new episode of RoboTalk!

Reflections:

1. When everyone got to HQ we sat down with white paper and a marker and did our Strength, Weakness, Opportunities, and Threats analysis of IL state. Tagged on to that we talked about all the upgrades we wanted to make to the robot. (See chart & details below)



2. Bo and Chris got to HQ early so they filmed an episode of "RoboTalk!". This episode was all about how to do defense as well as build your robot to defend against any heavily defensive robots. (See details below)

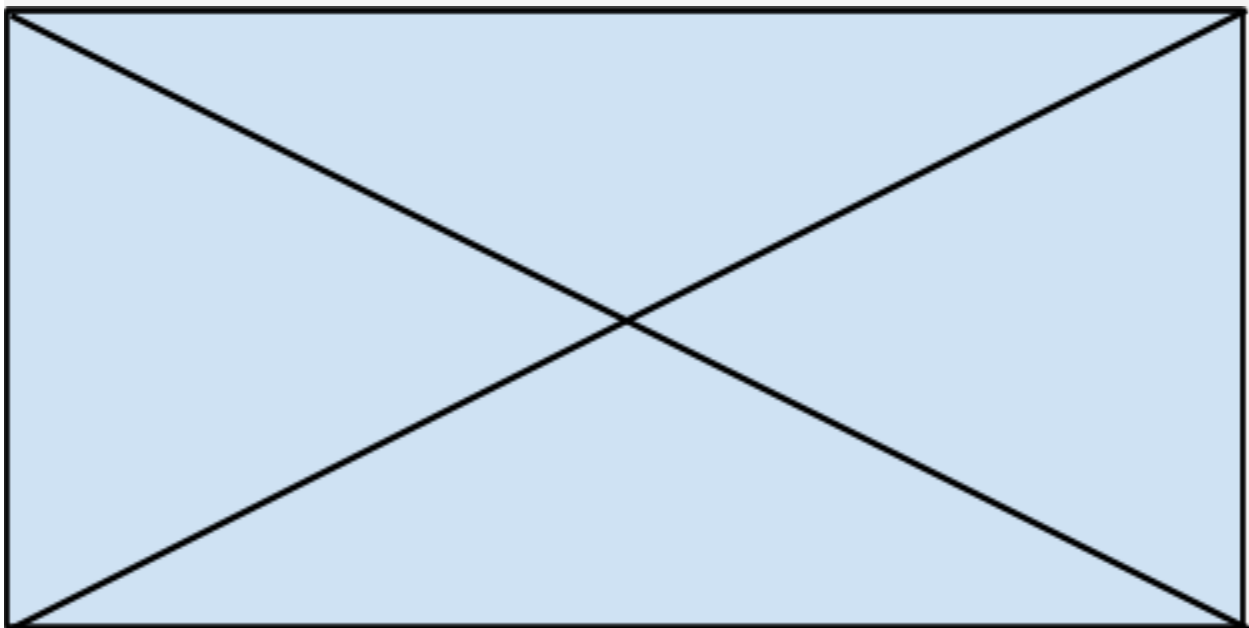
Details:

1. Some things we wanted to add, upgrade or replace are, our goal grabber, replace the cages for the foam impellers, the foam, a couple more ultrasonics for easier detection, and finally more zip ties and rubber for the tips. -Chris

Strengths	Weaknesses
<ol style="list-style-type: none">1. Scout App Works!2. Gate Works!!	<ol style="list-style-type: none">1. Tell the Outreach story better by convincing judges it's your story2. No shield behind ball intake3. Need to move US sensors to above lift column

Opportunities	Threats
<ol style="list-style-type: none">1. Safety sensors2. Qualify Outreach hours spent3. Drive Team work with Program team to solidify set-up4. Sample Slide5. better explanation of Robocycle	<ol style="list-style-type: none">1. Faulty batteries2. Faulty battery box on MUX3. Re-engineer goal clamp4.
<p>Programming Opportunities</p> <ol style="list-style-type: none">1. Battery power adjust2. Stall detect/react3. Refine Auto missions4. Add sensor checks	

2. After spending a little while on the ChiefDelphi.com forums I noticed something buzzing around was the important of defense on the field. Now of course I'm not talking about pinning and tipping over other robots, but rather being able to push them aside if they are trying to prevent you from scoring and thus winning. We talked about different important materials, wheels, and motors teams might want to consider if they are going for a more defensive robot. Then, we also talked about the different penalties that can occur if your going for a more defensive approach and made them very clear so other teams knew about them. -Bo



02.27.15 New 180 Beacon

Duration 6:00 pm - 9:30 pm

Attendance:

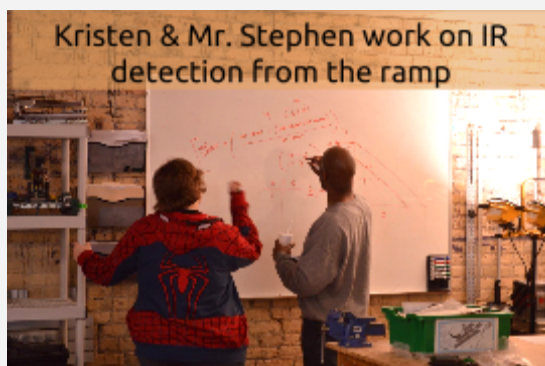
Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Finish ramp IR detection with 180 beacon method
2. Reformat CAD drawings into new Custom template
3. Install new cartridge into Ecocycle 3D printer to test
4. Get dimension from our ball intake upper lip

Reflections:

1. Previously we had taken readings manually to start to fill out the sensor value range map for the 180 beacons from the ramp. We determined two positions from which we could get a split in readings. Although not perfect these spots used in collaboration could detect center goal orientation. (More details below.)



2. During this meeting Mr Times informed us that our custom template for drawings was finished. As soon as all the computers had the file to be able to replace our old drawings template with this new one. (See details)
3. In response to the request I sent last week for a new Ekocycle cartridge I received a package earlier today containing said cartridge. When I had the chance I installed it and decided the first print, thus the quality test, should be a heart in honor of upcoming Valentine's Day. (See details below)



- We used our CAD drawings to help us redo the upper lip, a rectangle that lays right on top of the foam intake squares. Having this there helps balls pass through the foam beater. Without the lip balls would be squeezed out which we have experienced in the past. MMMs

Details:

- Here's what the readings looked like:

<i>Readings Taken 13"</i>	<i>From Ramp Ridge</i>	
Center Goal Position	IR 1 (side facing)	IR 2 (backward facing)
1	7	3
2	7	3
3	5	2
<i>Readings from Bottom</i>	<i>of Ramp</i>	
Center Goal Position	IR 1 (side facing)	IR 2 (backward facing)
1	5	0
2	5/6	2
3	5/6	0/3/4

- (Continued)

At first reading point (13" from ramp ridge) the robot detects whether or not center goal is in position 3 using IR 1. If not the robot temporarily assumes the goal to be in position 1. When the robot reaches the bottom of the ramp (second reading point) it reads IR again this time with IR 2. With the previous knowledge whether or not the center is in position 3 the robot now detects between center goal positions 1 and 2.

When taking sensor readings manually this detection method seemed to work. But when implemented we didn't get the same results. As a debugging means we coded the robot to log its sensor readings when it tries to detect. Our first test was done with center goal in position 2 and we saw the results we expected. The next test, done in position 3, proved different from our previous manual readings. Here is one of the logs:

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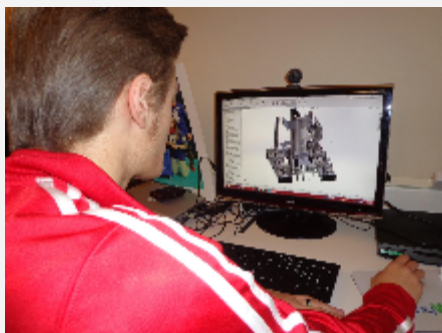
00000.130    rel-g    0    cnst-g    0    auto.c Program start    Start time:: 130
00011.111    rel-g    0    cnst-g    0    abs_initialize.h    auto start    timestamp: 11111
00011.153    rel-g    0    cnst-g    0    abs_drive.h    angle enter    : 30    : 430    : 2    : 0
00011.204    rel-g    0    cnst-g    0    abs_drive.h    reset angle    : 30    : 430    : 2    : 0
00012.478    rel-g    0    cnst-g    5    abs_IR_center_read.h    13inch read    Angle: 0    IR: 6    center pos: 0
00013.720    rel-g    -1    cnst-g    -14    abs_IR_center_read.h    bottom ramp    Angle: 331    IR: 3    center pos: 0
00014.515    rel-g    -1    cnst-g    -17    abs_drive.h    angle break    : 30    : 430    : 5610    : 432
00014.539    rel-g    -1    cnst-g    -17    abs_drive.h    exit    : 30    : 430    : 5641    : 314
00014.561    rel-g    -1    cnst-g    2    abs_drive.h    angle enter    : 25    : 45    : 5684    : 438
00014.598    rel-g    0    cnst-g    2    abs_drive.h    reset angle    : 25    : 45    : 11    : 1
00015.006    rel-g    0    cnst-g    3    abs_drive.h    angle break    : 25    : 45    : 612    : 48
00015.027    rel-g    0    cnst-g    3    abs_drive.h    exit    : 25    : 45    : 642    : 36
    
```

Rather than reading 5 with IR 1, we read 6. If it read 7 the IR would have taken a guess at center goal positions 1 or 2 at the second reading point. 6 though, fell right into place confusing our detection method. This resulted in the robot not determining center goal position, '*center pos: 0*'. We adjusted the code to match these new readings and tested. At first things looked good, position three was the broken option, and now it was fixed. For good measure though we tested the other two options, this is where the issues arrived. We could no longer accurately detect the difference from 1 and 2. After some tinkering we found a new range (210 TUs* from back wall of ramp, *Tars Units of distance) from which we could distinguish 1 and 2 based on how early the robot switched from IR readings of 7s to 6s. Hopefully this new detection style will hold true in the future.



Just in case a tournament we compete at has the classic beacons we added a selectable feature in the autonomous options menu to change center goal detection method from 180's to classic. - K McK

2. The new template consists of a box for who made the part and when they made it. Then a box for who drew it and



when they drew it. And a final box to say it was checked and done and when they checked it. With our team number and a place to put the name of the part. - Chris



3. At first things ran well, but unfortunately we soon found that the new cartridge was experiencing the same issues as the old ones. The new cartridge was also getting jammed. On further inspection we discovered that the teeth that feed the filament into the Ekyocycle were shredding the filament, causing it to get caught and not progress into the printer. -Chris
4. No additional details

02.28.15 Visit from Klapperich Tools

Duration 12:00 pm - 4:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Make a list of materials needed for new part ideas
2. Show Mr. Klapperich and his son around HQ and drive TARS for him
3. General cleaning of TARS

Reflections:

1. Parts all listed down, items such as shims and delrin 80/20 bearings,
2. Today we were given the opportunity to show our space to Mr. Klapperich one of our sponsors. (See details)



3. After Mr. Klapperich left, the robot needed some general cleaning of the drive train. Marcos did this while the Programmers worked on auto and the CAD team checked to make sure all the drawings were updated. (See pictures below in details)

Details:

1. To improve the performance of the shoulder, the gear slop in the worm drive must be removed. Two potential solutions we are hopefully going to use include newer wear free gears, and steel shims for the gearbox. Among other things, we are purchasing new delrin bearings so we can reimplement the lift design, eliminating several components. -Matthew
2. Today was a very eventful day. We were not only able to share FIRST and what it means to us at the closing of the U-46 STEM Expo , but we also had a visit from Mr. Klapperich, CEO of Klapperich Tools. We showed him how to drive our robot and explained the game this year. His son was also there and was wondering how he could join a team as well. We gave him some suggestions of how to find/or start a team. - MMM



3.



03.03.15 Holding Our Horses

Duration 6:00 pm - 8:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Prototype new ideas for goal grabber
2. Watching videos of teams playing and learning their strategies.

Reflections:

1. One thing we noticed at the IL State Championship was that our goal grabber, although it was simple in design and got the job done, slipped quite a few times due to a ball being stuck on the actual base of the goal. We decided to try using horse grooming brushes to see how well they worked at grabbing the goal. (See details below)
2. Today I wanted to expand my mind through learning new strategies teams are using. I learned 3 new things through watching these videos. See details below)



Details:

1. We came up with several ideas for the grabbing device; among which included rubber curry brushes and a shingled silicone foot. Among the tested curry brushes, those with longer bristles worked better. And for the shingled design, Mr. Times and I were able to figure out mounting methods for the silicone shingles. -Matthew
2. One new strategic strategy I learned was the ability to use your alliance partner for defense for the first 7sec in the beginning of tele op. -MMM



03.07.15 Setting Up the Pit

Duration 12:00 am - 4:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Set up the pit
2. Research judging video
3. Stall detection
4. Rolling goal detection
5. Keep prototyping goal grabber

Reflections:

1. Our new curved pit display wall came in so the whole team worked together

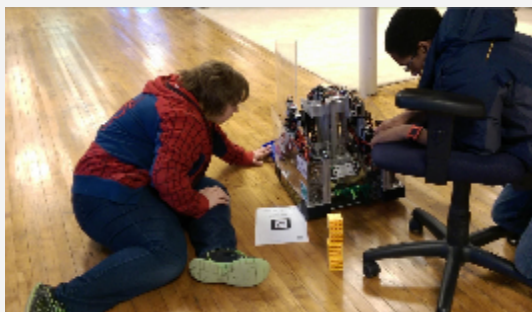


to get it set up. It got opened and assembled in only 10 minutes! Then, we taped off a 10' x 10' area and started putting everything we are taking to super regionals so we knew exactly how everything would fit together. (See details)



2. Today we talked about making the Judging Video. We talked as a team about what important milestones and accomplishments we want to include. However, we didn't get very far because we were notified on Facebook that Judging Video were in fact cancelled. -Chris
3. I finally got the stall detection working. Now when a robot blocks us or we get stuck we will stop the robot in autonomous so we don't break the robot. -PJ

4. We've worked in the past trying to develop rolling goal detection with the sonars.



Problem

being that the rolling goals having round surfaces makes it troublesome to get a good read from the sonars. So we tried a new approach, rather than looking for the goal, why not gage distance from the near by wall. (See details)

5. Matt and Bo worked on the new goal grabber idea which used a custom 3D printed clamp with



silicon strips secured horizontally and parallel which, in theory, would have a very sticky surface perfect for grabbing the goal's plastic base. We designed and printed a hollow prototype that we tested today. (See details)

Details:

1. It was a good exercise because it started to get too crowded, so we worked on taking anything that we don't need out. Finally, we tested out several set-ups so no matter where we are put we know exactly how to set it up. -Bo
2. No additional details.
3. No additional details.
4. The wall adjustment concept seemed like a reasonable idea, but the slow adjustment rate means the robot wouldn't be able to adjust and straighten out in time. To compensate for this we changed the sonar drive option to start out adjusting to sonar wall distance but then switching to gyro to straighten out by the end. This seems to work the best yet of any other detection means. - K McK

5. The fantastically short and hollow prototype (3" wide) and the silicone strips we cut successfully demonstrated the potential of our new goal grabber design. Between meetings I will need to print out a full length goal grabber for us to try.
-Matt



03.10.15 Planning New Judging

Duration 6:00 pm - 9:00 pm

Attendance:

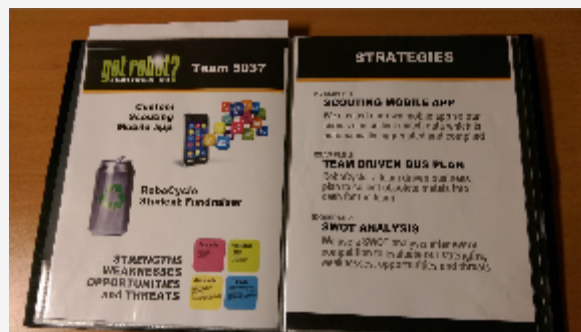
Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Plan new format for judging
2. Continue to work on new goal gripper

Reflections:

1. For Super Regionals we're going to try a little bit different form of judging, a scripted presentation followed by Questions and Answers. During our scripted presentation we're going to have a board/visual aid so we can more easily show the judges what we have accomplished this season. (See details)

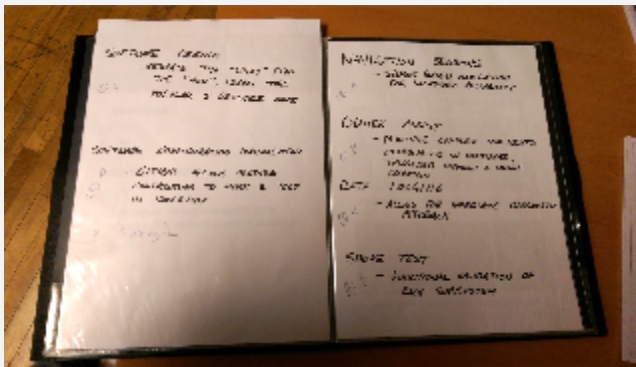


2. A printed goal grabber prototype was brought to the meeting, work on cutting the silicone shingles started today. (see details)

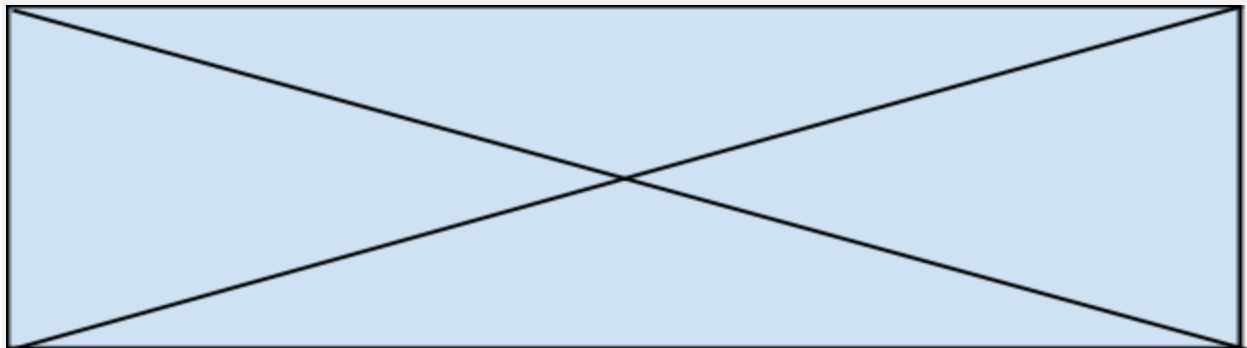


Details:

1. We decided as a team on the visual aid because we wanted the judges to not only see awesome pictures of some of our favorite moments from this season, but also since everything is color coordinated with the specified category and is in parallel with our engineering notebook, everything can be found easily in our notebook after our judging session. -Bo (See additional photo on next page)



2. The goal grabber prototype is interesting, I brought versions at two different mounting angles, 45° and 55° respectively. these seem to work well, but the physics involved may actually work better with an inverted grabber. At some level, when the shingles are super sticky, they latch better in reverse. We have yet to see how they will behave when dirty, but that may be important to the final design. The mentors are a little critical of small mounting point on the right side, so I will have to add chambers to the part to increase strength. -Matthew



03.14.15 Long To Do List

Duration 12:00 pm - 7:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. CAD Renders
2. Mount Goal Gripper
3. CAD the new Goal Gripper
4. Icon for Scouting App
5. Harden Programming
6. Worm Gear for Shoulder, Shims

Reflections:

1. Aidan updated the aesthetics of the TARS CAD model, and initialized a render of the main assemblies. (See details)
2. Matt mounted the new goal gripper on the robot (See prototype & fabrication photos in details)
3. Chris took the job of creating the Silicon sheets for the new goal grabber. (See details)
4. Bo worked quickly getting an icon made for the scouting app so it looks more professional. (See details)
5. I added a new correction type into abs_drive called WALL_SONAR. This new correction type uses the left wall sonar, g_sonar3, to adjust the robot's orientation based on distance from the wall. Due to low refresh rate of the sonar this adjustment will get out of hand fast so the robot switches over to normal gyro driver after the first third of the desired distance is traveled.

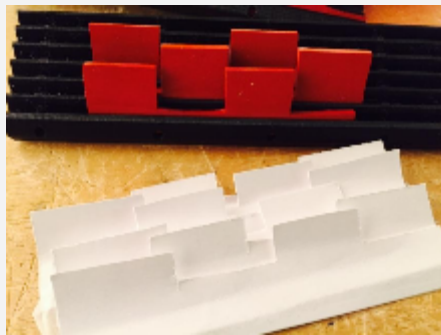


6. The shoulder rebuild was postponed for other repairs. -Matthew

Details:

1. We discovered what was producing the annoying outline on PhotoView360 renders, there is a cartoon outline option for easier viewing that we accidentally activated, this has happened to both Aidan and I separately, and should be checked to make sure it is off before initialising any serious renderings, -Matthew

2.



3. I accomplished this by making a rectangle, then I created a box on the edge of the line and used the linear sketch tool to move it along the line with the correct spacing and amount of items. Once that was done I took the silicone and the goal grabber and created the assembly and mated them at the points needed. -Chris
4. Look!! We have an Icon for our scouting app!!



5. No additional details
6. No additional details

03.17.15 Judging, Judging & More Judging Duration 6:30 pm - 9:00 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Practice Judging Presentation
2. Tune up on TARS
 - a. Restrung Lift
 - b. Replace temporary zip-ties

Reflections:

1. We spent pretty much the entire meeting running through judging and practicing with the new style of judging. Then we practiced answering questions after and even during the presentation. (See details)



2.

- a. Because restringing the lift requires full disassembly of the mechanism, we decided to retrofit of the old pulley brackets and bearing mounts. The original design for the delrin bearing mount required a large recess and hole to be cut through the bearing, leading to eventual side wall failure, and looser tolerances. (See details)



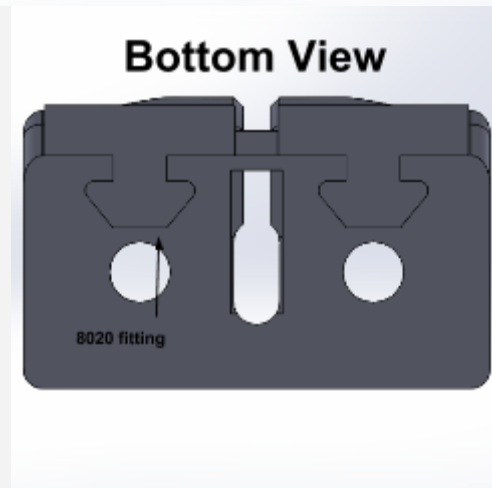
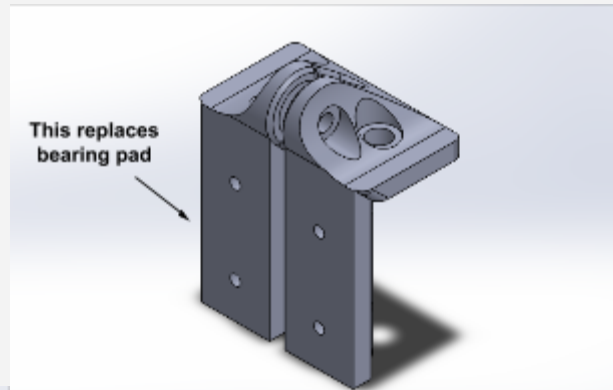
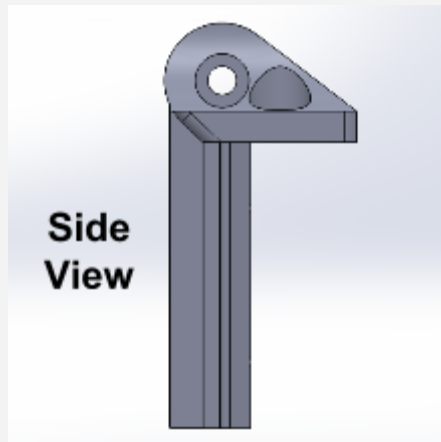
- b. The old zip ties were cut off and replaced, and the lift pulley retrofit and restringing was finished. (See details)

Details:

1. One of the things we wanted to be prepare ourselves for is how to answer a question directly instead of sort of “weaving” around them (which we found out we do unintentionally.) So we practiced giving short direct answers and also just general judging practice. -Bo

2.

- a. To circumvent this issue, the pulley mount and the bearing mount have been combined into a single piece. 6-32 screws now thread into the delrin bearings from behind, and slot into the channel for mounting. -Matthew



- b. I started by cutting off the old broken zip-ties and hot gluing a new foam pad around the axle then I proceeded to hot glue foam pads to the tips of the zip-ties and started zipping them to the axle.--AMP



03.18.15 RoboTalk, Drive & Program

Duration 2:00 pm - 9:30 pm

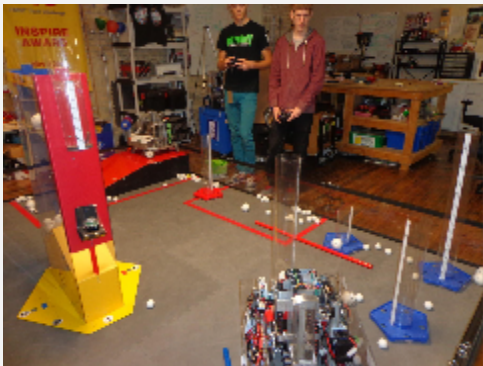
Attendance:

Bo, Chris, Kristen, Matt, PJ, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar

Tasks:

1. Film RoboTalk regarding new micro-controller platform
2. Drive Practice
3. Get Ramp mission, rolling goal working
4. Get floor mission, not including rolling goal working
5. Insure Kickstands are working
6. Adjust lift lowering timing
7. Merge programming files
8. Test merged code

Reflections:

1. While Kristen was teaching her class Bo, Chris, and Matt worker together on making another episode of RoboTalk!. This week we received some questions, most were about the new FTC Android-based platform. So that was what the whole episode was about. (See details)
2. Chris and Bo spent about 2 hours just driving the robot around. Not too many strategic maneuvers but just driving and testing out the new goal grabber and a few tests to see how we could more effectively drive around the field. (See details)
3. It seems we have finally landed on our final alignment method for the 60 cm rolling goal. Rather than trying to maneuver as we drive down the ramp we just tell the robot go as straight as you can. When Tars reaches the bottom it detects its distance from the side wall and turns appropriately to line up with the goal. -K McK (More in details)
4. Our floor missions have been the reliable ones. With the center tower orientation detected with the sonar instead of the IR we've been scoring consistently without trouble, well almost.)See details)
5. For the most part things are going our way on the programming front, every once and awhile though we have trouble with the kickstands. We went in and tweaked the code, at this point things seem to be working. -K McK

6. In some of our floor programs, specifically quick select missions 4-5, the robot originally didn't lower the lift until the end of the program. (See details)
7. For about a week PJ and I had been working on two separate branches of code, it was time to merge. (See details)
8. We merged and tested the code to make sure it was working and no merge errors occurred. None occurred but, we realized that we needed to work on making the robot more reliable.
- PJ

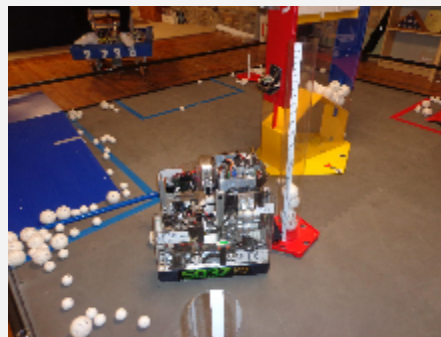


Details:

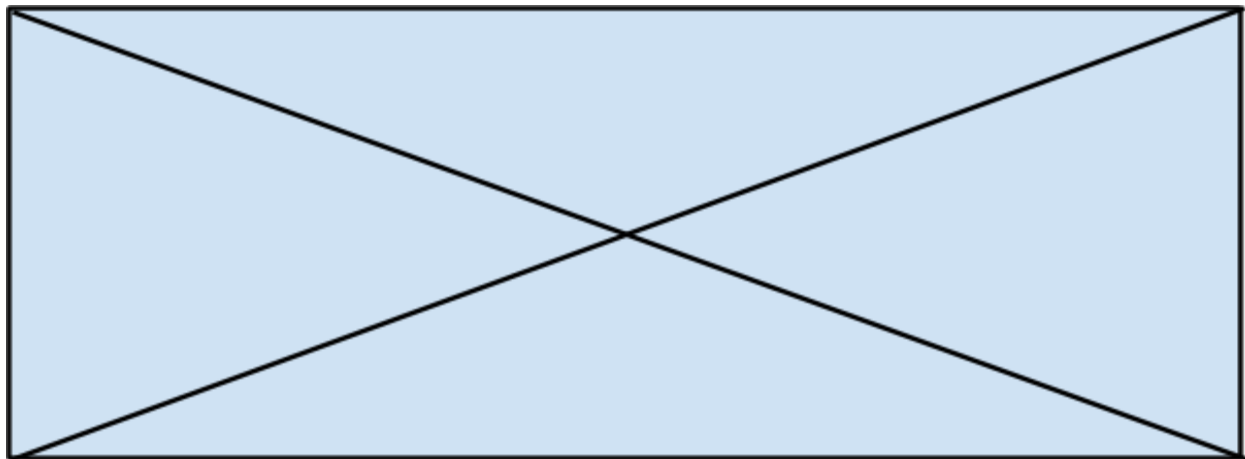
1. Chris filmed me in the media studio doing the typical intro sequence and then we moved to the side room while Kristen was teaching. After reviewing the questions and doing extensive research, we set up the scene. Matt answered the questions we had about the new platform including the what we think the actual devices will be, the new Java programming, and our general thoughts on the switch over. After that we filmed the end sequence and its ready for editing. I'll do that at home. -Bo

I did research into the microcontroller we are using now and will be using in the future. The current chip, ARMv4 and selectable 8~16~32bit, includes advanced UART accessible debugging tools. This may actually explain some of the features in the NXT's USB debugging suite, but that is irrelevant next year . The new Snapdragon 410 is a first generation 64 bit ARMv8 chip, in the ARM-A18 Krait family. Besides a quad core and DDR3 memory, it also sports a Mali GPU, compliant with both OpenCL and OpenCV. This will make vision software significantly more accessible.
-Matthew

2. While driving we found a new way to push the kickstand out of the way if it is close to the centre goal, by taking the rolling goal and pushing it between the rolling goal and the center goal then swinging out and pushing it away, this will serve to be useful when a rolling goal in our way. -Chris



3. This turn distance is recorded and subtracted from later movements so the remaining actions of the mission are reliable despite the changing initial turn. With this accuracy the robot continues and moves the rolling goal to the parking zone. After delivering to the side of choice robot turns about and hits the kickstand. -K McK
4. There was one hiccup, we discovered that our practise field had been used enough that the center tower ended up pushed slightly farther away than normal. Thus our program for orientation 1 was a bit off, once that was adjusted we're all good to go. -K McK
5. No additional details.
6. This potentially could cause problems since if the lift didn't lower/re-seat precious time would have to be taken from tele-op to reset manually. To lower the chances of this scenario the timing of lowering the lift was changed to directly after the robot scored. -K McK
7. As always we sorted out the code and tested the merged version. When we determined it viable we copied the new code back to our branches and continued work. -K McK
8. No additional details.



03.20.15 Strategy/Driving Practice

Duration 12:00 pm - 10:30 pm

Attendance:

Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Practice driving in different scenarios and with different strategies
2. Continuing finalization of autonomous program
3. Goal grabber & intake

Reflections:

1. The drive team spent around 3 hours just practicing every scenario they could think of. From tipped over tubes and kickstands getting in the way, to a major shortage of baseball sized wiffle balls, they tried a lot of different scenarios that ranged from realistic to complete insanity. (See details)

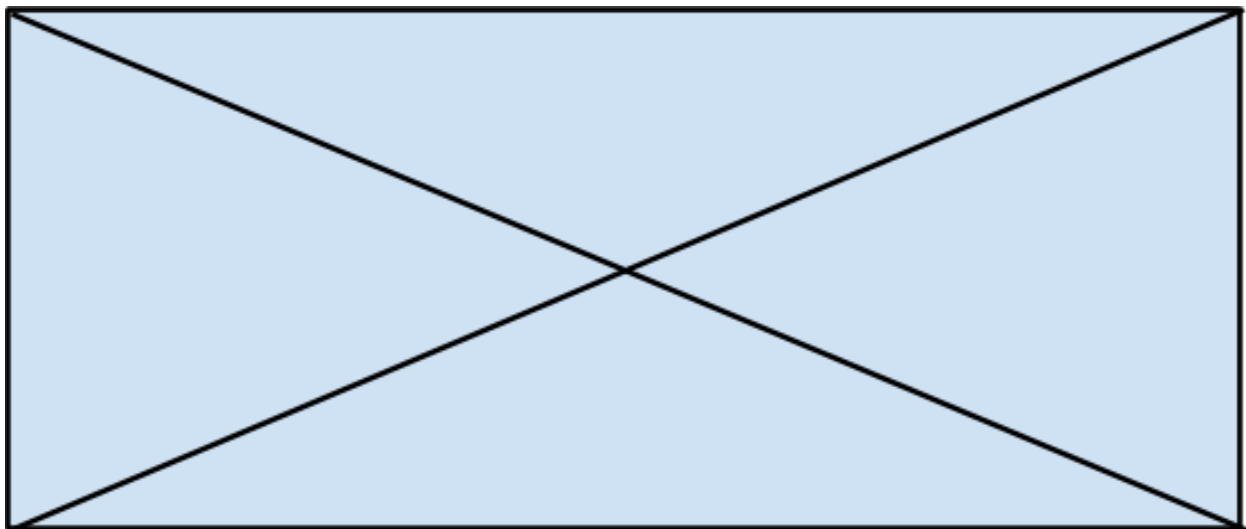
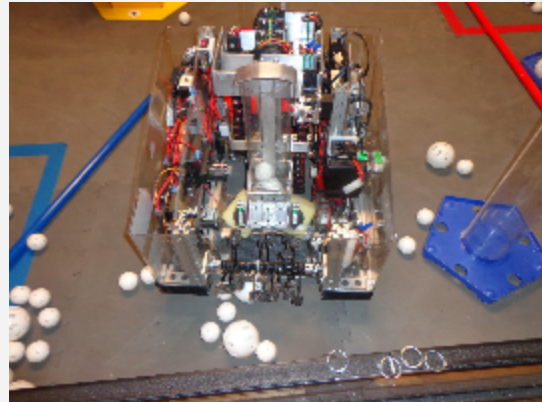


2. Same as practices before we worked to slowly refine our autonomous program finishing it up for tournament. - PJ
3. We replaced the zip ties with new stronger ones, and the goal grabber was remounted using a steel bracket instead of the aluminum one. (See details)



Details:

1. After watching some of the East Super Regional live stream earlier today, Marcos and I took note on some of the matches where things went wrong so we could practice dealing with it during our own matches if it happens. This ranged from robots who break down right in front of the center goal, to tubes falling over and blocking our path, and to the center goal completely falling off rendering it useless. Some of the matches we also removed a substantial amount of baseball sized wiffle balls because we noticed especially at different Super Regional Competitions, those went away quite fast. And so we practiced opening up the front gate of the robot to pick up the smaller ones cause any ball is better than none. -Bo
2. No additional details.
3. All of the zip ties were replaced with new ones in a pinwheel formation, this seems to make alignment easier. As usual, trimming was required to calibrate the depth of the brush, but it seems that it is in working order now. The old prototype goal grabber was replaced with a newer steel one. Bending was as usual done on the vice with a hammer. Concerning retaining the silicone sheets, steel pins were cut and bent. The pins were inserted into holes in the grabber, and skewer the silicone sheets on the grabber -Matthew



03.21.15 Getting Ready for Iowa

Duration 12:00 pm - 10:30 pm

Attendance:

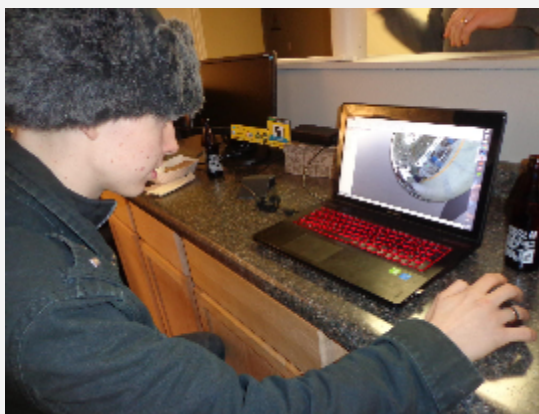
Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Judging practice
2. Build internal shielding
3. Get custom waits, custom selections & second rolling goal program working
4. Make CAD drawings for new parts

Reflections:

1. We did even more judging practice at random times throughout the day using the new style and worked on trying our hardest to condense it down to 10 minutes. (See photos in details)
2. Internal shielding was cut from 0.04" polycarbonate sheet. it spans the throat of the robot, and prevents errant balls from getting lodged in the chassis. (See details)
3. One main feature in autonomous we wanted to add was custom waiting time selection. To accomplish this we needed to fix custom mission select, so as such that became our main priority. After quite a bit of rewriting and cleaning up we achieved our goal and were ready to work towards our other goals. (See details)
4. Since we had made new parts we decided to make dimensional and exploded view drawings of them so they can more easily be explained and presented. The parts included the new goal grabber (Gecko foot), the new slide lift pulley mounts, and the updated full robot.

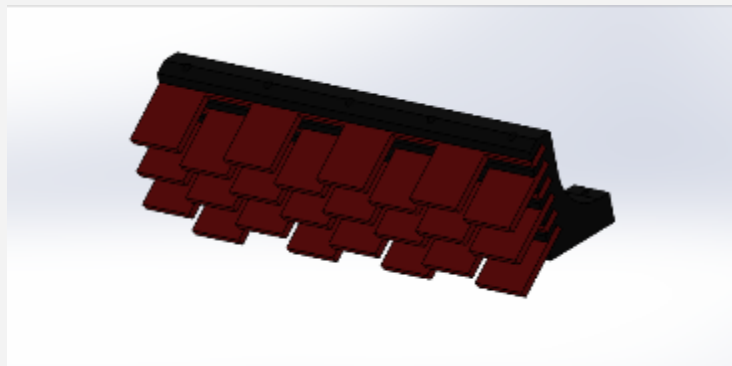


Details:

1.



2. One foamboard prototype was made of the shields. The material of choice became 0.04" polycarbonate because of the ability to score and crack it into shape. Though the material is quite flexible, velcro is used to secure it away from it's mounting point, preventing wobbling. -Matthew
3. Mainly we had a new autonomous route we wanted to make. Like our other ramp based missions the robot will drive off the ramp and score into the 60 cm goal, after that the behavior changes. Rather than just moving to the parking zone the robot now has the ability to grab the 90 cm and return with it to parking zone, saving 18 seconds for the drivers in teleop. -K McK
4. Chris, Aidan, and I worked on getting some dimensional drawings and exploded views of the gecko foot and new slide lift pulley mounts. Once they were made they were printed, checked by Mr. Times, three-hole punched, and placed in the back of the notebook. -Bo



03.26.15 North Super Regional

Duration 3/26/15 - 3/28/15

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Our competition
2. Engineering
3. Programming
4. Awards for the Competition

Reflections:

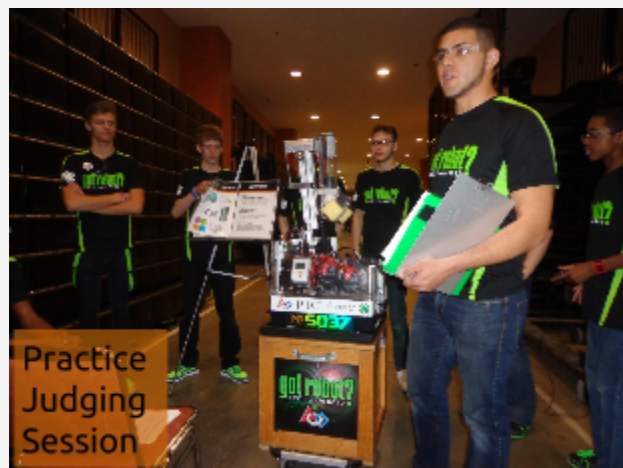
1. For the competition "TARS", our robot, performed as we were expecting. Any errors that occurred were either human or our alliance partner having connection or mechanical problems. This resulted in losing the match and overall we finished the week with 5 wins and 3 losses, Sadly we were not picked for finals. -Chris
2. TARS had no mechanical issues all day. Exceptionally low maintenance. -Matthew
3. For the most part things ran well. As is Murphy's law somethings weren't perfect, but now we have a goal for Worlds. A list of desired future changes is listed below.
4. See details below



We won 2nd Place Inspire!

Details:

1. The last day of North Super-Regional was a day filled with compound emotions and collective excitement throughout the whole team. Like all teams this competition would determine the end of our season or begin the last phase of it. Our team was thrilled and honored to receive 2nd place Inspire. Now we are ready for our new challenge. MMM



Filling the 90 cm goal during a qualification match.

2. No additional details.
3. Our programs were effective, even to the extent of pushing an opponent robot across the field in order to complete our own autonomous mission. The one weakness we did notice though was that our floor missions all seemed a bit misaligned. After some diagnostics we realized that our HQ practice field was set up with the center goal moved further to one side than on the competition fields, causing the issue. We adjusted the code so the robot keeps the ball shutter open after delivering into the center, although not perfect it definitely helps. - K McK

4. **2015 FTC North Super-Regional Awards:**

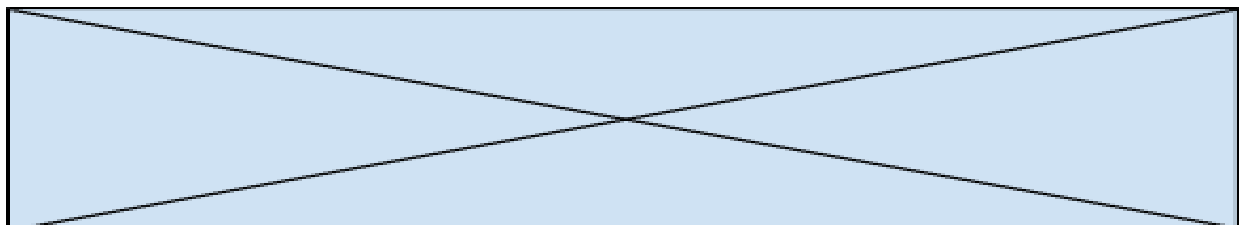
Judges STEAM Award:	4272 MechaMETROZilla
Compass Nominees:	Supposeable Thumbs, Mr. Keup Lazybotts, Roy Davis
Compass Winner:	Girls With Attitude, Belinda McMurray
Promote Nominees:	4251 Cougar Robotics 4969 Robot X
Promote Winner:	8686 Height Differential
Control Nominees:	5037 got robot? - 2nd place 4324 Lost in Time
Control Winner:	4150 Dark Matter
Motivate Nominees:	5972 Patronum Bots 7006 RoboTitans
Motivate Winner:	6134 Black Frogs
PTC Design Nominees:	4530 Infinite Resistance 5975 Cybots
PTC Design Winner:	7190 Green Girls Robotics
Rockwell Collins Nominees:	3631 Middle Earth Mechanics 5975 Cybots
Rockwell Collins Winner:	8231 SkyHawks
Connect Nominees:	7152 Robot Squad 7190 Green Girl Robotics
Connect Winner:	5455 Combustible Lemons
Think Nominee:	8911 Da Vinci Decoders 5037 got robot?, 3rd place
Think Winner:	7129 Robo Raiders
Tinker Finalist Alliance:	5972 Patronum Bots 7138 Mechanical Mayhem 8935 Twisted Metal
Tinker Winning Alliance:	4443 Sock Monkeys 5466 Combustible Lemons 4150 Dark Matter
Smith Finalist Alliance:	6389 LazyBotts 4530 Infinite Resistance 5250 Loading...

Smith Winning Alliance: 4251 Cougar Robotics
 6133 The NUTS!
 5975 Cybots

3rd Inspire Award: 4251 Cougar Robotics
2nd Inspire Award: **5037 got robot?**
1st Inspire Award: 6389 LazyBotts

Advancing to Worlds:

- | | |
|---------------------------------------|-----------------------------|
| 1. 1st Inspire: | 6389 LazyBotts |
| 2. Winning Alliance Captain: | 4251 Cougar Robotics |
| 3. 2nd Inspire | 5037 got robot? |
| 4. Winning Alliance, 1st Selection: | 6133 The NUTS! |
| 5. Winning Alliance, 2nd Selection: | 5975 Cybots |
| 6. Think Award: | 7129 Robo Raiders |
| 7. Finalist Alliance Captain: | 4443 Sock Monkeys |
| 8. Connect Award: | 5466 Combustible Lemons |
| 9. Rockwell Collins Innovate: | 8231 Skyhawks |
| 10. Finalist Alliance, 2nd Selection: | 4150 Dark Matter |
| 11. PTC Design: | 7190 The Green Girls |
| 12. Motivate: | 6134 Black Frogs |
| 13. Next Highest Ranked Team: | 4530 Infinite Resistance |
| 14. 2nd Think: | 8911 DaVinci's Decoders |
| 15. Next Highest Ranked Team: | 7138 Mechanical Mayhem |
| 16. Next Highest Ranked Team: | 7655 The Q is Silquent |
| 17. Next Highest Ranked Team: | 7006 RoboTitans |
| 18. Next Highest Ranked Team: | 5140 WACO Aerobotics |
| 19. 2nd Motivate: | 5972 Patronum Bots |
| 20. Next Highest Ranked Team: | 7023 Hexasonics |
| 21. Next Highest Ranked Team: | 5200 Robots Incorporated |
| 22. 3rd Connect: | 7152 Robo Squad |
| 23. Next Highest Ranked: | 6007 Octopi |
| 24. 3rd Rockwell Collins Innovate: | 3631 Middle Earth Mechanics |
| 25. Next Highest Ranked: | 5391 Enigma Puzzlers |



03.31.15 North Super Regional SWOT

Duration 6:00 pm - 9:00 pm

Attendance:

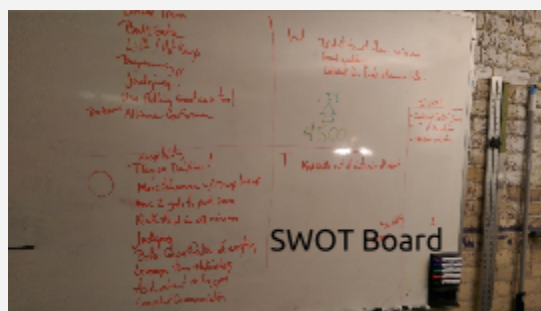
Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Perform SWOT
2. Celebrate

Reflections:

1. The Tuesday after North Super Regional we held our SWOT analysis as we do after every competition. (See details)



2. We ordered shakes and malts from Al's Creamery to celebrate 2nd place Inspire and advancing to Worlds.



Details:

1. As you see below, we observed a decent amount of opportunities. Most of them being very minor things that would "harden" what we already do or have. -Chris



<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> ➤ Drivetrain ➤ Ball Gate ➤ Lift Hot Keys ➤ Programming ➤ Strengths (cont) ➤ Judging ➤ Use rolling goal as a tool ➤ Pre-match alliance conference 	<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> ➤ Hospitality ➤ Play on DaVinci! ➤ More tolerance with ramp line-up ➤ Move 2 goals to parking zone in autonomous ➤ Kickstand on all missions ➤ Judging ➤ Better quantification of everything ➤ Leverage team relationships ➤ Ask about rolling goal ➤ Consistent communication of drive team
<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> ➤ Didn't trust floor missions ➤ Goal Grabber ➤ Lobbied for finals alliance late 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> ➤ Keep balls out of interior of robot

2.



SWOT discussion and shakes from Al's.

Time for a Group Hug.



04.03.15 Driving Blind

Duration 4:00 pm - 6:00 pm

Attendance:

Bo, Chris, Kristen, Matt, Marcos, Coach, Mrs. McKellar, Mrs. Laker

Tasks:

1. Have some drive practice

Reflections:

1. For this drive practice we wanted to try something different and blindfold Chris so he and Bo could work on their communication during a match.

Details:

1. After our Super Regional Competition we noticed some problems in our strategy and communication in our drive team. We were able to correct these problems, which lead to us winning more matches. We feel better defining these two areas will help us at World's. In regard to strategy, always go with what you know, second is go with what you can get right now, meeting the right threshold, confirm and act. In regard to communication, we noticed that as we became more nervous we started to act impulsively and not communicate with each other. We agreed one of the best ways to fix this problem is practice, practice, practice. MMM
 - a. We decided to blindfold Chris so we could work a little more on communication during a match. We tried out several strategies we thought of after watching some matches of the North Super Regional. They included leaving our rolling goal while we harvest balls then come back to score, knocking over the opponents kickstand if it wasn't already knocked over in autonomous, and running several autonomous programs before every match. -Bo
 - b. Being blindfolded was very disorienting. Not having my sense of sight I had to rely on commands from Bo. As such I could tell where and which rolling goals I was delivering to. He informed me on game variables such as when to open the shutter, and if I had to make any changes to the angle of the ball tube. Amusingly I found it very fun experience, working without sight. Beyond this it was a very productive exercise - improving the communication between myself and bo. -Chris



a

04.04.15 Pink Glasses for Worlds

Duration 12:00 pm - 4:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mrs. McKellar, Mrs. Laker

Tasks:

1. Paint some hot pink glasses a "got robot?" green
2. Judging practice

Reflections:

1. We ordered 12 hot pink glasses last week that we planned on spray painting green. They finally came in today, so after we bought some neon spray paint and some primer we covered up the lenses with masking tape and sprayed away. They came out really good and we're all happy to have some special team color glasses that we can all wear. -Bo
2. With only a couple weeks left until world competition we have been doing mock judging sessions more often. At today's meeting, our mock judging was one of our more rough times so it was a good practice. One reason we have mock judging is improve our skills so this kind a situation would not happen. -Chris



Details:



04.07.15 TARS Dental Check-up

Duration 4:00 pm - 9:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

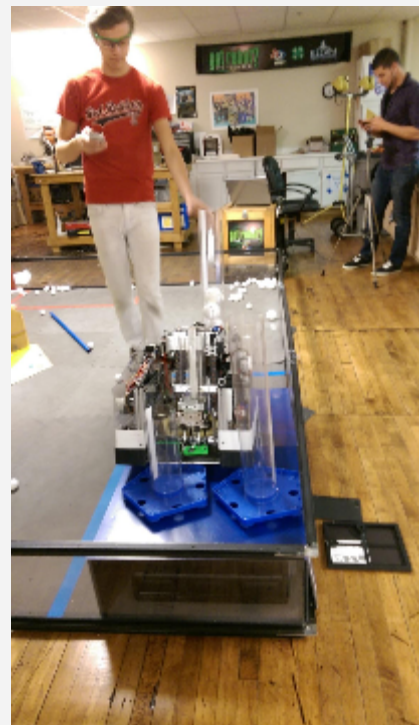
1. Drive practice
2. Figure out a way to more efficiently use the front beater brush.

Reflections:

1. When driving, the zip ties that we had on our intake were very worn and used. This lead to them snapping and us having a fun time trying to intake with 5 zip ties at the end. (See details)
2. While we were at Super Regionals we noticed that after every match we lost about 4-6 zip-ties on the front of our robot due to reversing the intake to let go of unwanted balls. This forced the zip-ties to go in the opposite direction causing many of them to snap off and therefore needing to be replaced. We need a more efficient way to use/build them without losing so many. -Bo

Details:

1. This also led to us seeing if we could still score and we can, with some very fun movements and timing. but overall this was just a fun drive time to get even more familiar with "TARS" our robot. -Chris
2. We tried using paddles of foam matting on the zip ties to intake the 3" balls. This stiffened them up, allowing us to shorten them, preventing accidental intake of 1.5" balls. With the shorter brush, pushing balls into the impellers is unreliable, so we experimented with longer unpadded zip ties. Theory being that without the padding they wouldn't grip, but they would push them into the impellers. We will be driving the robot in this configuration to check for wear characteristics, hopefully this solves the issue. -Matthew



04.10.15 Smaller Pits for Worlds

Duration 4:00 pm - 8:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, Coach, Mrs. Laker

Tasks:

1. Drive Practice
2. Figure out new floor plan for our pit
3. Take the field apart and pack it up for our Demonstration/Scrimage tomorrow

Reflections:

1. The drive team came to practice two hours early to practice some driving techniques.



2. It was just released today that the pit sizes were going to change from 10' x 10' to 9' x 10'. So we looked at our pit and figured out how much we could condense the display and everything inside to make it fit within the new regulations. (See details)
3. We started to disassemble the field by removing the ramps, tiles and removing the center structure as well as to disassemble the side protectors.--AMP

Details:

1. No additional details.
2. We had to put our brains together to figure out how we could make our pit fit within the new size, so we tried several different ideas. First, we tried putting the wall at an angle so it would fit lengthwise. This worked however it left a very small amount of room to put things like our cart/workstation and a table for other displays pieces. So we then removed the curved side pieces which extrude about 1' out each. When they were removed the wall just barely fit within the size and seemed to do the trick. So for Worlds we are just going to need to remove the sidewalls on the display in order to meet the new guidelines. -Bo
3. (no additional details)

04.14.15 Reassembling the Field

Duration 4:00 am - 9:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Times, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Set the field back up
2. Drive practice
3. Practice judging
4. Create electrical diagram of the robot

Reflections:

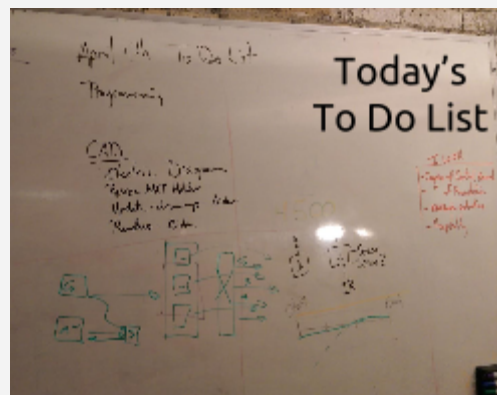
1. We had to set the field back up in order to have drive practice. We assembled all the walls, put down the tiles in order, then the center goal and all the scoring tubes and balls.
2. Today I had Bo and Chris practice several exercises followed by the regulation 2 minute matches. - MMM
3. We had a casual judging session focusing on the content. We want to get the important information to the judges in a short amount of time. --AMP



4. Today coach ask me to us Solidworks Electrical to create an electrical diagram of the robot. (See details)

Details:

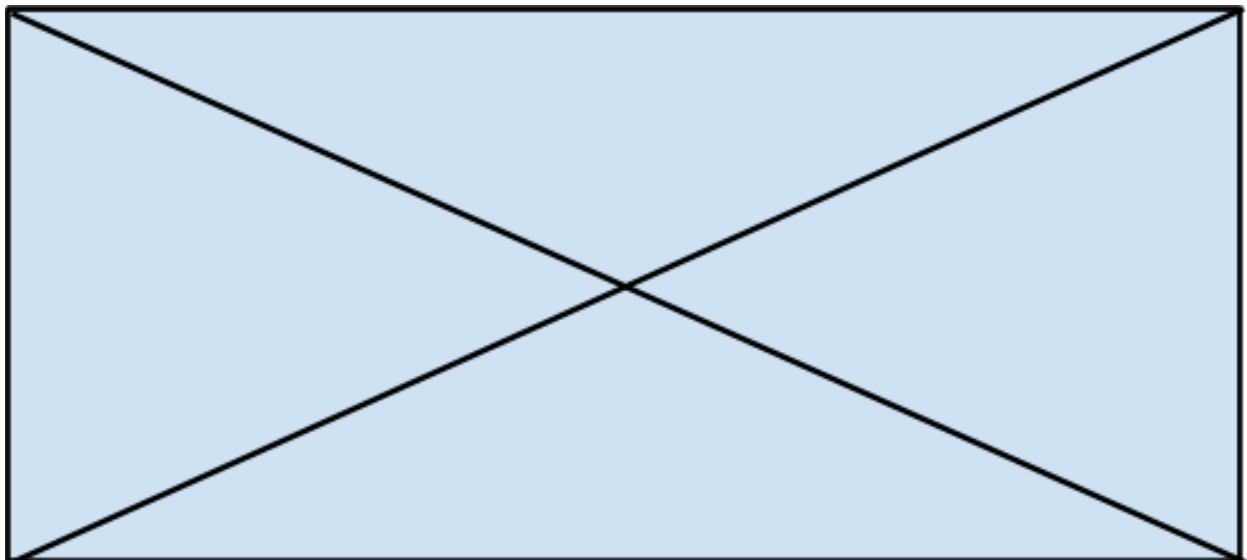
1. Chris and I tried out some new exercises to help us score faster and more efficiently. We set up the goals in a line on the opposite side and worked on grabbing the tubes so that we could grab the tubes the first try consistently. Then, we practiced intaking balls from the opponents side of the field so we could consistently collect balls from both sides. -Bo
2. No additional details.





3. No additional details.

4. I did a lot of exploring to understand how to use Solidworks electrical. Once I understood how to use it, I had lots of fun learning the minute areas of our robot. -MMM



04.17.15 Stabilizing the code

Duration 4:00 pm - 10:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Drive Practice
2. Add two more end options for floor missions
 - a. Opponent's side
 - b. 90 cm
3. Work on the new ramp mission, which will be called mission 4.

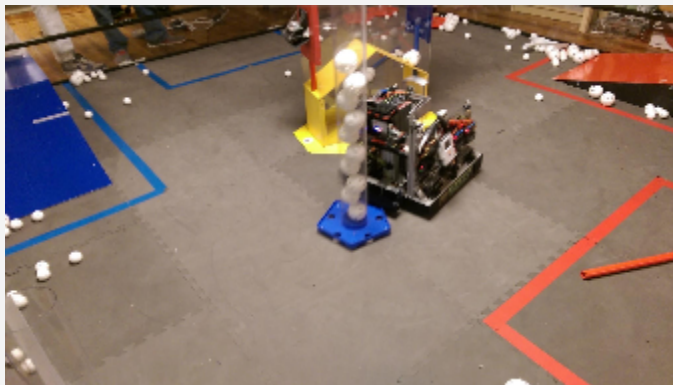
Reflections:

1. This practice we had to come up with a strategy to try and score as quickly as we possibly could. So we worked together to figure it out while we did "1 minute madness" matches.
2. We wanted to add a mission that goes on the opponent's side so that when the tele-op period starts, we're in their way immediately. Here is the robots objectives:
 1. Drives out of the left side of the parking zone
 2. Scores into the center goal
 3. Hits down the kickstand
 4. Drives between the opponents parking zone and the opponents kickstand
 5. Stop program-PJ
3. We added a new mission (4) that is probably the craziest ramp mission yet.
 1. Drives down the ramp
 2. Scores into the 60 cm goal
 3. Places the 60 cm towards the parking zone
 4. Grabs the 30 cm
 5. Drives to the parking zone with both goals
 6. Delivers goals
 7. drives back to the 90 cm

Details:

1. We started doing some one minute matches so we could practice scoring as fast as possible into the 90cm goal. After a while, we decided to shake things up a little bit and try a new strategy of raising before we get to the rolling goal (granted we are leaving it behind). Doing this maneuver allowed us to quickly score balls by

raising the lift while moving the robot and eliminating wasted time stopping and raising. We were able to fill the entire 90cm goal in 1 minute and 30 seconds which left a lot of time to score into the center goal and get onto the ramp. The only draw back with this strategy is that if a robot hits us while the lift is extended it could possibly damage the lift assembly after time. So we'll have to be careful when we use this particular maneuver. -Bo



2. While I was making the program, we had a problem where the robot would turn into the center goal after it hit the kick stand. To fix this we made the robot do a swing turn instead of a point turn when turning onto the opponent's side. Not only did this fix us running into the center goal but also made us get in between the center goal and the opponents parking zone faster. -PJ

3. It took some work but its working, and well too. At first we had some trouble with the robot jumping onto the 60cm goal while the robot was pushing it to the parking zone. To fix this we programed the robot to slowly increase in speed, that way it wouldn't jump. Like anything though there is a chance things might not work perfectly, and the cause is the orientation of the 30cm goal. If the 30cm has it's point facing to the robot there is a chance the robot won't be able to hold onto the goal through the whole movement across the field. The engineers are working on improving the success rate of the goal grabber, no matter though things are still working acceptably well. -K McK

04.18.15 Final Prep for Worlds

Duration 12:00 pm - 10:30 pm

Attendance:

Aidan, Bo, Chris, Kristen, Matt, Marcos, PJ, Coach, Mr. Stephen, Mr. Solomon, Mrs. McKellar, Mrs. Laker

Tasks:

1. Print out and organize CAD drawings for Engineering Notebook
2. Confirm programs are functioning properly
3. Debug angle sensor
4. Adding kickstand option to mission 3 creating mission 6
5. Judging Practice
6. Final tune-up on TARS
7. Complete electrical diagram
8. Install new goal grabber

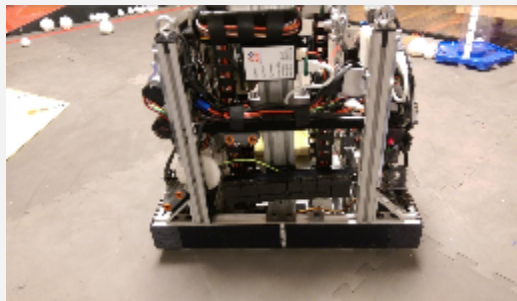
Reflections:

1. After Chris reprinted all the updated CAD drawings, Bo worked on sorting, 3-hole punching them, and placing them in the correct order in the Engineering Notebook. (See details)



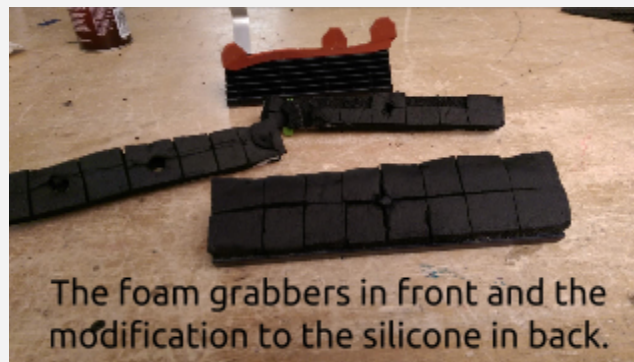
2. We did a lot of stability testing and programming to make sure everything was perfect for worlds. There were some problems with perfecting the programs due to troubles with the angle sensor and the battery level. (See details)
3. Our angle sensor is acting a bit weird. Due to the short timeline till Worlds we aren't able to debug to the full extent, but we still found a workable solution. If the drivers power cycle each run we can avoid the issues we see otherwise. -K McK
4. Mission 3 has us score into the 60cm from the ramp, grab the 90cm and drive it to the parking zone. (See details)
5. For this judging practice we did a normal run through and notes from mentors and some questions, but then came a twist none of us saw. (see details below)
6. We replaced the zip ties on the intake system with a new idea of longer zip ties in the middle and shorter zip ties with foam matting on the tips this would maximize our effect on the pick up of the balls and prevent the loss of zip-ties--AMP

7. Marcos worked on finishing up the the electrical diagram of the robot.



8. We tried out the foam based goal grabber, and unfortunately it was unable to maneuver the goals up the ramp. As

such, we decide upon modifying the old grabber to maximize its effectiveness. For us this meant trimming the flaps into teeth, allowing it to mesh onto the goal more effectively. - Matthew



Details:

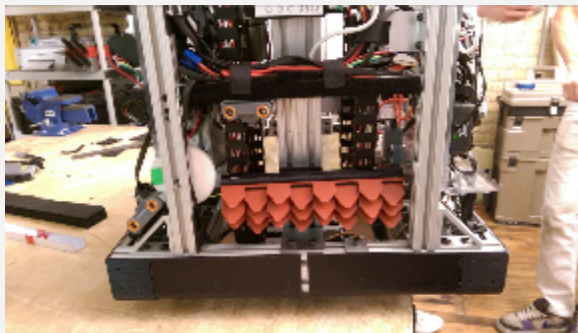
1. Chris decided to print all the drawings at his house to save time. So once I got them all laid out, I started going through one at a time replacing the drawings making sure to keep them in the same order. Then, I put them in the book. Finally, we decided that we wanted a "discontinued" section in the back of our book just so everyone can see some of the important iterations of certain parts, or ideas that never made it to final production. -Bo
2. Soon we realized we needed to power cycle the robot every time we ran in order for the robot to perform correctly. We tried installing a new angle sensor but that turned out not to be the miracle fix we hoped for. Eventually we got the programs solid near the end and we believe we are ready for worlds- PJ
3. No additional details.
4. So far we've always stopped at that point in the program, now thats no longer the case. Now if the drivers select mission 6 the robot will run the same as for mission 3 but now it will go and knock down the kickstand. -K McK

5. The twist our coach pulled was another run through but we had to be 20 ft away from who we were presenting to. this was a fun exercise, because some of our members have a more quiet low voice, and this gave them a chance to be able to prepare for the pipe and drape judging rooms at World's. -Chris

6. No Additional details.

7. No Additional details.

Enjoying the warm weather by having dinner on the deck.



8.

