Engineering Notebook

2017-2018

Revolutionary Robots #12535
TEAM SUMMARY

The Revolutionary Robots FTC team is part of the Moore Community Stem Club. We were a new team this year, so we spent a good amount of time building our team. Our notebook is made primarily of our bios, engineering notes, outreach, and business/strategic plan.

In August, our team assembled a push bot. We continued preparing for the season with several different designs until the challenge came out on September 9th. At our next meeting, we came up with the official design we are still mostly using now.   You can see some of our original designs on the following **Pages B5 to B5-d**. Although, the original design was easy to drive and turn, it was not able to get onto the balance board. This is seen on **Pages B12-a and B13-a**.

After the Chickasaw Nation qualifier we assessed our performance and decided that we wanted a more effective way to pick up the glyphs. So, we made the following changes, we added a linear slide relic arm, we changed from the chain-driven elevator to linear slides to be able to stack glyphs four high, moved the color arm to the side, and we changed our wheels. This can be seen on **Page B21-a**.

Later after the Newcastle qualifier we wanted to be able to get the glyphs faster. The relic arm was switched to an X-rail, we added a new hub, printed out new parts to make our bot more functionable and changed our wheels. These re-designs can be seen beginning on **Page B23**.

We began the season using block programming. The team later decided to try out Java, and felt like they might have more flexibility with it. Mark, our lead programmer, learned Java for this challenge. Just as our robot evolved to better fit the needs for the season, so did our code. In the beginning, our code was just one long string. Now, our code has methods and classes. You can see the evolution of our code in **Section C**.

A major skill the team learned since the beginning of the season is CAD, computer aided design. We got to meet with the Atomic Gears and they taught us how to use Inventor to not only design our own pieces but to also build our own bot in CAD. As the season has progressed we have created more pieces to fit our needs. You can see our original designs as well as other designs we have found on Thingiverse in **Section D**.

Our team has worked to find opportunities to promote our team and show off what we do. You can see these in our Outreach Section. Our favorite one, and the one where we reached the largest number of people, was when we participated in Haunt Old Town. **See Page F2**. We have had plenty of opportunities to both give and receive help this season, shown on **Pages F9-F11**. Future Outreach opportunities can be seen on **Page F12**.

TABLE OF CONTENTS

Programming   Section C

Computer Aided Design   Section D

Business/Strategic Planning   Section E

Outreach   Section F

Checklists and Forms   Section G

Reference Materials   **Section H**

Our Team Information

Our team bio

Why are we called the "Revolutionary Robots"?

Most of our team enjoys the Broadway musical "Hamilton" and for this reason, we voted on having our name as the "Revolutionary Robots". The other reason is because our team IS revolutionary, to paraphrase Lin-Manuel Miranda: Don't be shocked when your history books mentions us.

Drew Busch

Drew Busch is 13 years old and lives in Oklahoma City, Oklahoma. This will be his first year in the FIRST program, though he has past experience with building robots with his grandpa. He hopes being a part of FIRST will give him some more experience with robots and give him many opportunities to pursue engineering careers in the future.
"I have learned how to overcome the challenges we have faced with the robot."

Jackson Busch

Jackson Busch is 12 years old and lives in Oklahoma City, Oklahoma. This will be his debut in the FIRST program, and his first major robotic experience. Though, he has had some previous introductions to robotics with his grandpa, who is an engineer. Before he started FIRST, he had never considered a career in engineering but now has more interest in tech careers.
"Don't forget your safety glasses or it is a **PENALTY**"

Mark Hazen

Mark is 13 years old. He is in the 8th grade. Mark is the lead programmer on the team. He is also on the Robot Design group. Mark participated in FLL for two years as part of the Electrons (Team #15846). He decided to join an FTC team to learn more about programming and building robots. This is now his second year. Mark mentored the Electrons last year. Mark wants be a roboticist and an astronaut.

Olivia Martin

Olivia is 14 years old. She is in the 8th grade. She is on the robot construction team and is also on the outreach team and strategy. She has participated in FIRST programs for 3 years. Olivia would like to make a career as either an engineer or an animator.

 "I learned that we can solve problems by altering what's already in the box."

Ivory Moore

Ivory is the oldest team member at 15 years old and in her sophomore year of highschool. This will be her seventh year in the FIRST program, she has participated on two FLL teams for 4 years, one of those years being while she mentored the Electrons, which she still does. She leads the Strategic Plan part of the engineering notebook and assists Mark with the Programming of the robot, although she is quite versatile and tries to participate everywhere she can. While planning on going directly into FRC this year, she wanted at least one year of the FIRST Tech Challenge experience before moving up to the final level of competition.

"Though this may be my last year in FTC, it has been way too much fun! I can't wait to move up to FRC."

Sara Moore

Sara is a 13 year old young actress in the eighth grade. She is lead in robot design who is also on the strategic plan team. Sara has been in the FIRST program for seven years and hopes to continue to participate in them. She had joined the FIRST program because she wishes to be a mechatronics engineer when she is older if her acting career goes down. She is mentoring two Jr.FLL teams this year, the Waterdrops and Fast Cheetahs.

Our Coaches

Chris Hazen

Chris Hazen is the head coach of the Revolutionary Robots. He has a bachelor's degree in mathematics and a minor in computer science/programming. He works at Dell as a manager of the enterprise storage support. (That is the big storage boxes the hold all the information, like a cloud.) He has coached FLL for two years and this is his first year coaching FTC. And he was a founding father of the Moore Community STEM Club. He brought the FIRST robotics to Dell to start the Dell Scrimmage Day.

Kristi Hazen

Kristi Hazen is the second coach of the Revolutionary Robots. She has a J.D. from the University of Oklahoma. This is her third year of being involved in FIRST. She has mentored or assisted with an FLL team for the past two years. This is the first year of working with an FTC team. She is one of the founding members of the Moore Community STEM Club.

Marty Martin

Marty is an Apple computer repair technician but his self-proclaimed vocation is Bohemian Tinkerer. He got his training at Apple HQ in Cupertino, California in 2008. Marty has been a hardware repair technician for The Delcom Group since 2011 and his current client is the University of Oklahoma. He has enjoyed working with FIRST for the past three years. This is his second year involved as a mentor. Marty also runs a technology blog called [Doctor Geek/Nerd](#).

Leads

Outreach: Jackson & Olivia
Design Process: Sara & Mark
Strategic Plan: Ivory & Sara
Build: Olivia & Drew
Programming: Mark & Ivory
Robot Maintenance: Drew & Jackson

Drew leads the Robot Maintenance team and assist with the Build team, but does not stay in those specific places. He has assisted with many parts of the engineering notebook and the coding of autonomous period.

Ivory leads the Strategic Plan team and helps out with the programming, though she has also made many contributions to the build of the robot.

Sara leads the Design Process team and helps out her sister with the Strategic Planning. She has also contributed to the Outreach team and build.

Jackson leads the Outreach team and assists with Robot Maintenance. He also helps out coding and building.

Olivia leads the Build team and assists with Outreach. She has made some of the biggest Outreach contribution, especially with recording it into the notebook!

Mark leads the Programming team and helps out with Design Process. He has done the most coding and came up with the design we are currently using.

New Leads

Notebook: Ivory & Jackson
Program: Mark & Ivory
Build: Drew, Jackson, Olivia
CAD: Sara & Olivia
Wire Management: Ivory, Olivia, & Sara

Leads changed after the first qualifier to fit the needs of the team to do better in the next qualifier. Ivory said she wanted to take personal responsibility of making the notebook and presentation as perfect as it could, others joined her. Drew took lead of the Build team, and has done an amazing job of making Hammy 2.0 what it is today. After learning CAD, both Sara and Olivia decided they would be the primary people to work on it. Mark stuck with programming, getting plenty of help from our mentor William to clean up to code. Jackson became the all around kind of guy and helps out just about everywhere he can.

Engineering

7-30-17

DB   Issue: Phones would not connect to each other
Solution: In Settings connect to R.C. controller

JB   Issue: Switching phones results in loss of data
Solution: Redo coding/
Note: take screenshot of programming

IM   Update: There's a button next to "save OP mode" called "Download OP mode". That saves the program to the computer.

MH   can't put joystick in if-to or repeat while ___ the ___

8-6-17

JB   Issue: the cage attatchment was getting in the way of the claw
Solution: we took off the cage and we could still move the tennis balls without the cage

Page B1

8-20-17

JB   Today we worked on the new rev
robotics control hub and got it up
and running. We had trouble with the
touch sensor. It worked but then we
couldn't get it to stop running. the original
touch sensor wasn't wired correctly. OM

OM   We also had some issues with the wiring,
some of the pins for Modern Robotics were not
correct. We realized this as we wired the Expansion
Hub. Building wise, the robot is being re-mantled to
fit the Expansion Hub & sensors.

8/27/17 by Ivory Moore

- Build
- Base was constructed
- Lining up the expansion hub had a bit of struggle but was finished
- Wires were reworked and everyone now knows where every wire goes
- Bottom ports are for servos
- Left side for battery and motors
- Analog for IR seeker sensor
- Digital for touch sensor
- 12C for Color-distance sensor
- Design Process
- Flaw: Base did not fit the expansion hub
- Solution: The base was adjusted to fit the hub
- "Cages" for battery, switch, and phone?
- Maintenance
- tightening of screws at beginning
- not much to do until bot is fully built
- Outreach
- Swag was decided!
- Cloth flags on coffee straws
- Logo was decided, needs to be drawn.
- Shirts were decided, goldish background with the shadowed-star
- Strategic Plan
- Budgeting was done, not all the numbers are decided.
- Need numbers for field materials
- prices of fabrics needed for both swag and coats for uniform
- Sara and Ivory need a final budget by the 7th of September for the STEM meeting.
- Programming
- Nothing to report until bot is built and challenge is dropped on the 9th of September.

9/3/17 by Jackson Busch
- We decided that we would take team notes in a alphabetical rotation "Drew, Ivory, Jackson, Mark, Olivia, and Sara
- We decided that Ivory would be the official team photographer
- Attached the "battery cage" to the robot frame
- We got new numbers for the budget
- We looked for an alternative for gaffers tape but we decided to still buy the gaffers tape "not a permanent decision"
- From 3:00-5:00 we had time to create our ideas for our team logo
- We found a safe place to put our on/off switch "we ran into trouble finding a accessible but safe place for the switch
- We discussed meeting at Mt. Saint Mary's on Saturday September 9th and then meeting the next day to discuss our ideas about the challenge
- We attached the color distance "optical" sensor
- We also started to make the arm
- We had a problem with the length of the arm so we used a shorter piece for the arm
- We decided on our official team logo Mark's design
- Mark worked on making a part for an extendable arm
- A budget has been agreed on by team members, needs to be approved by the STEM board.

9/9/17 Ivory Moore
- The team went over rules and stuff learned at the kick-off while eating delicious food.

9/17/17 Ivory Moore
- Today was design and gameplan day
- The team sat down and presented design ideas
- Mark's design was chosen, it being the most practical for the season this year.
- We all threw ideas at each other to decide on official stuff
- The design is a cube, each side serving a purpose.
- One side has a pulley system for the cubes
- The next side has a foldable/vertical slide arm for the relics
- The next side has a simple arm that will be for the jewels, has a color sensor on the tip
- The final side has a compartment for the phone so it can look at the glyph for the crypto cubes
- We discussed parts we may need for the bot that includes
- 1 Rev color sensor
- A linear slide pack, found on the facebook page,
- LEXAN/ plastic compartment for phone
- x-rails
- pulley system

- made with chains
- gears(?)
- wire extensions from Rev
- IF we decide on foldable arm
- 2 hinges
- IF we decide on vertical slide arm
- ball bearings

9/17/2017

10/1/17
- Proof of concept arm being coded and built
- Jackson learned java
- Two motors attached
- New parts needed are written down on a piece of paper
- 1 motor was attached, other is not able to attach because they are not the same brand of pieces
- Drew and Jackson are taking the bot for a few days to work on it
- THE COATS are almost done.
- It looks great
- The team discussed the parody we want to do. Song: Never Gonna Give You Up -Rick Astley

10/8/17 by Jackson Busch

- During the week Drew took the robot home and worked on mounting the expansion hub, and aligning the gears on the bot
- We upgraded the software to the newest version
- Drew worked on our new extending arm by making it to where the claw pieces would not fall off of the servos
- We reviewed what we need to have on our finished engineering notebook
- We made a place for the battery on the bot
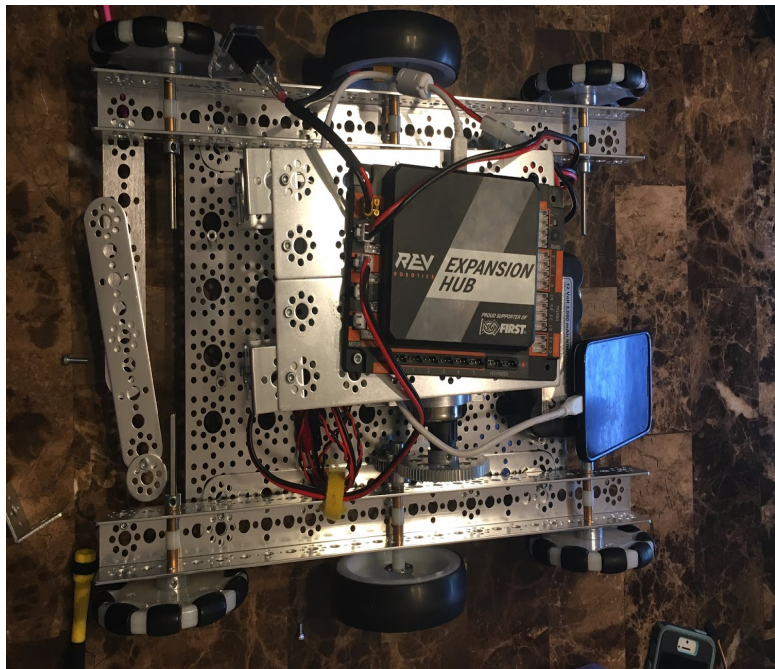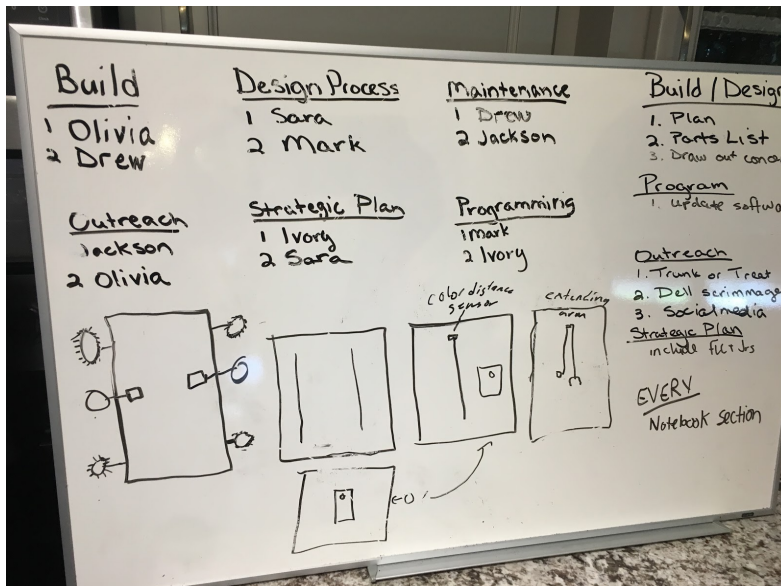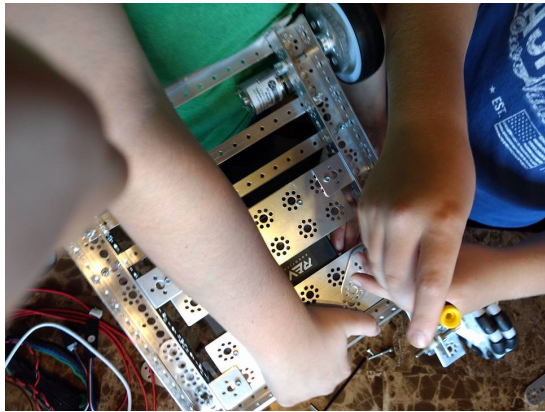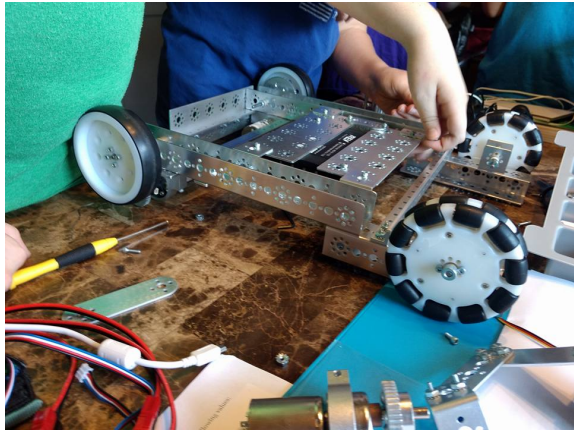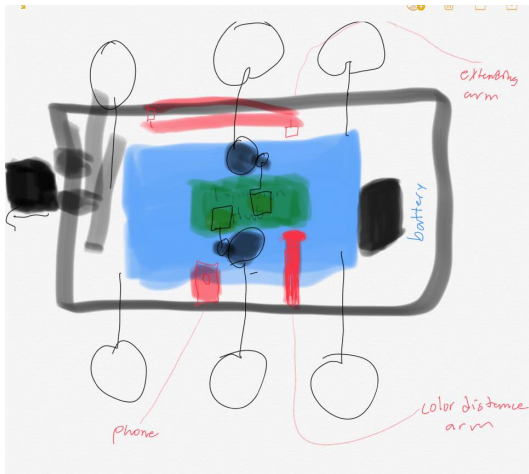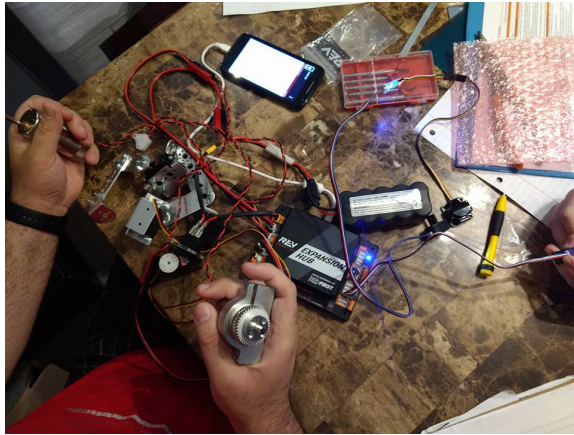
10/15/17

- Today we talked about looking into more parts, some that we ordered were not the ones we needed.
- Talked about splicing some wires for our jewel arm, that did work.
- Talking about a brace for the relic arm
- Talked about moving a few pieces to make space for holding glyphs

- The elevator has been attached and functions! All that is needed is the grippers. Trouble with the top platform, it was bending down when the piece to hold the grippers moved upwards. To fix this we built pillar type contraption to support it
- The jewel arm is built and also functions
- A linear slide was built, but is not ready for use just yet
- The relic arm was beginning to be mounted, but had issues with bracing.
- A brace was began to be built.

- We wanted to have the jewel arm done, most of the elevator done, and possibly get our relic arm put up.

- We did get the jewel arm up and it functions! The only things the elevator needs are the grippers and the linear slide. We will be able to lift all the glyphs we will need. The relic arm is not attached yet, but we need to get some pieces to finish it
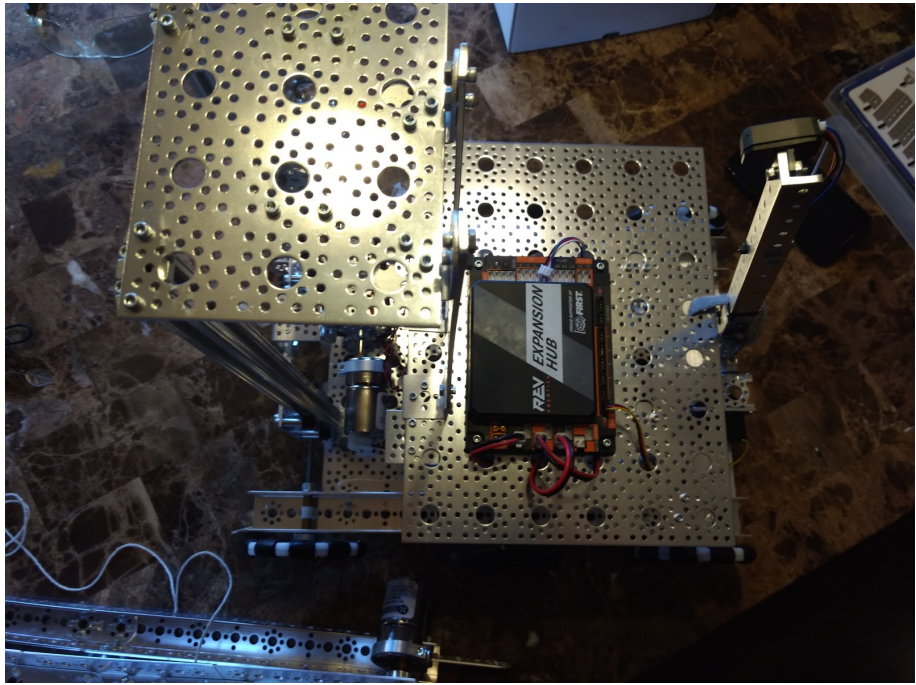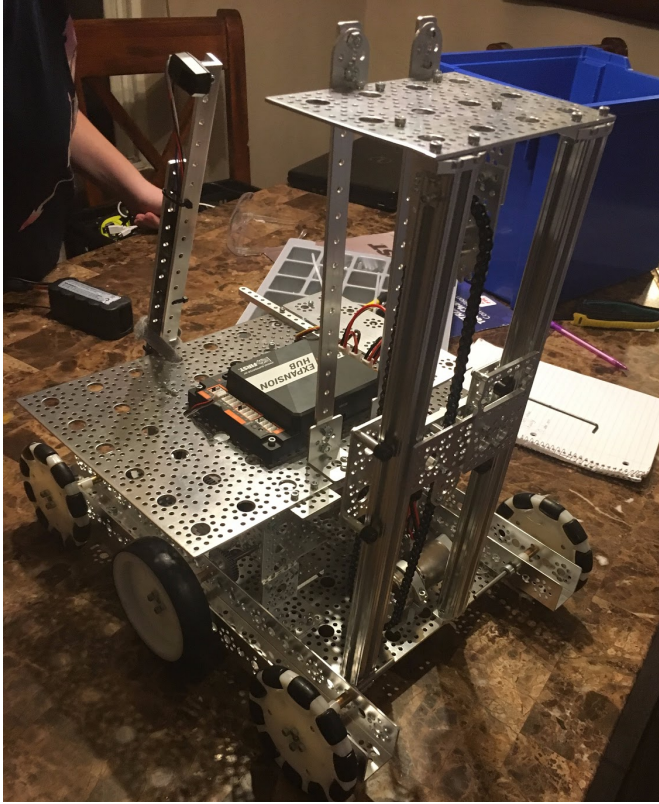
22 AWG Wire

The original Rev robotics wire was 18awg (can still read the print in wire on robot) and our spliced wire is 22 Awg. Spliced wire is compliant.
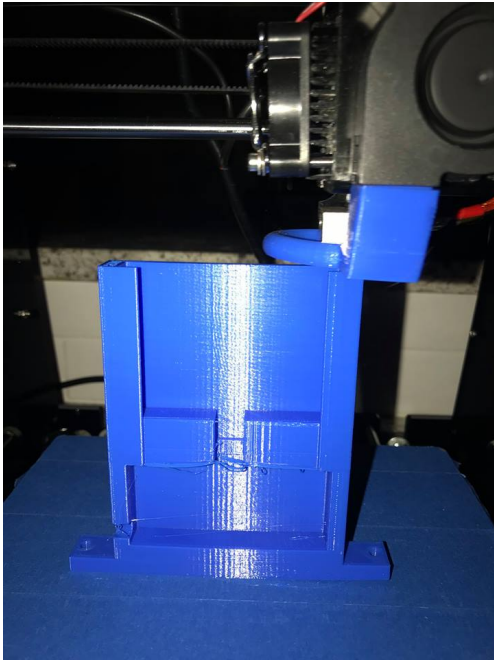
Phone holder 3d printed phone holder for the robot. It stands sideways. Mark chose and modified the design by *syborgsrobots* found on Thingiverse.

11/5/17
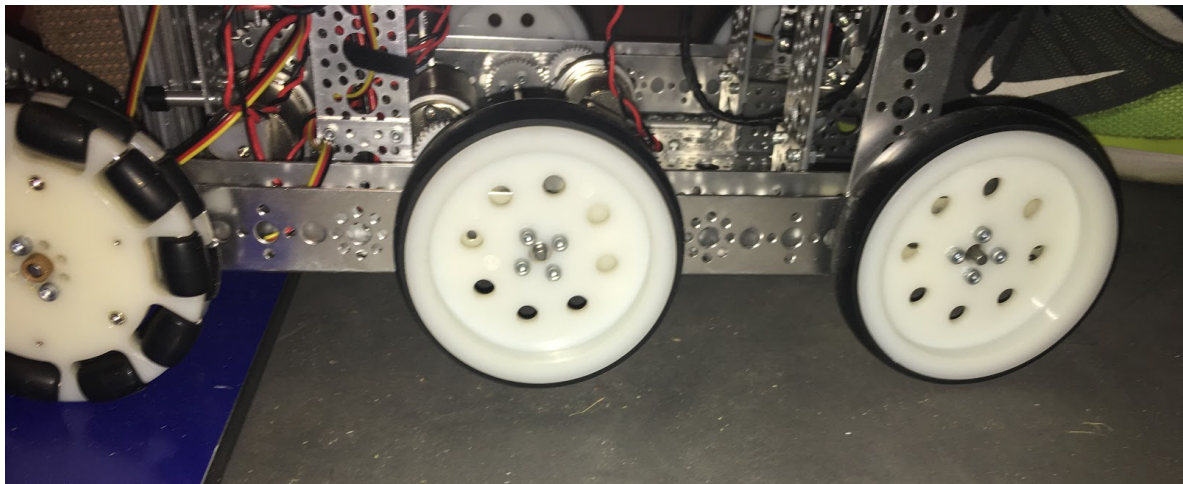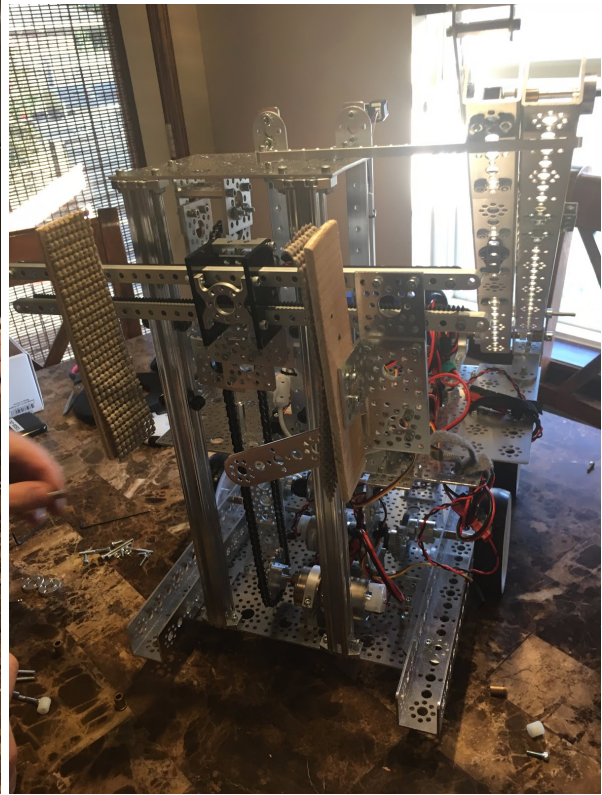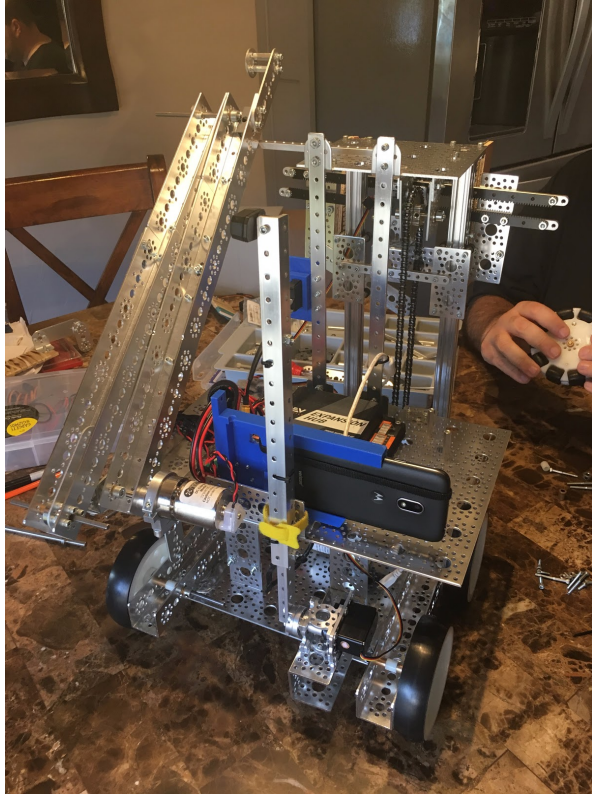
11/12/17
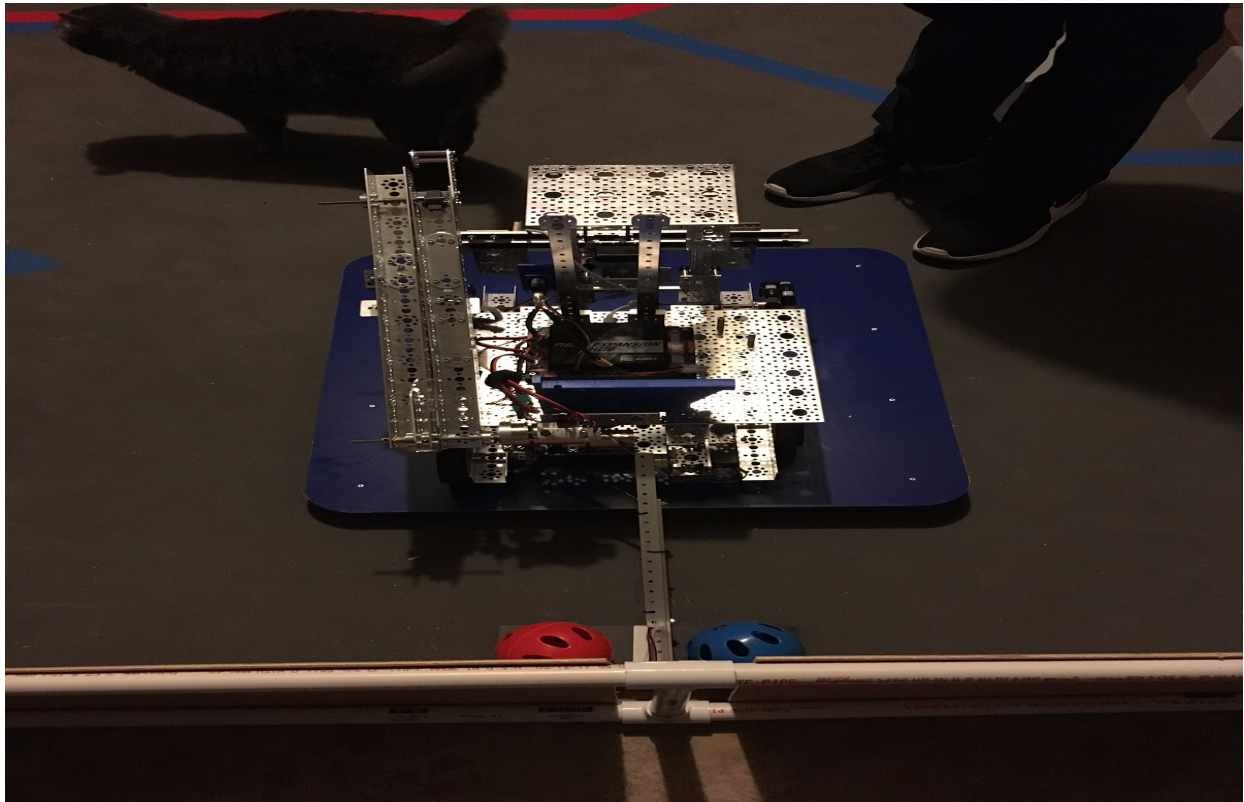
11/19/2017
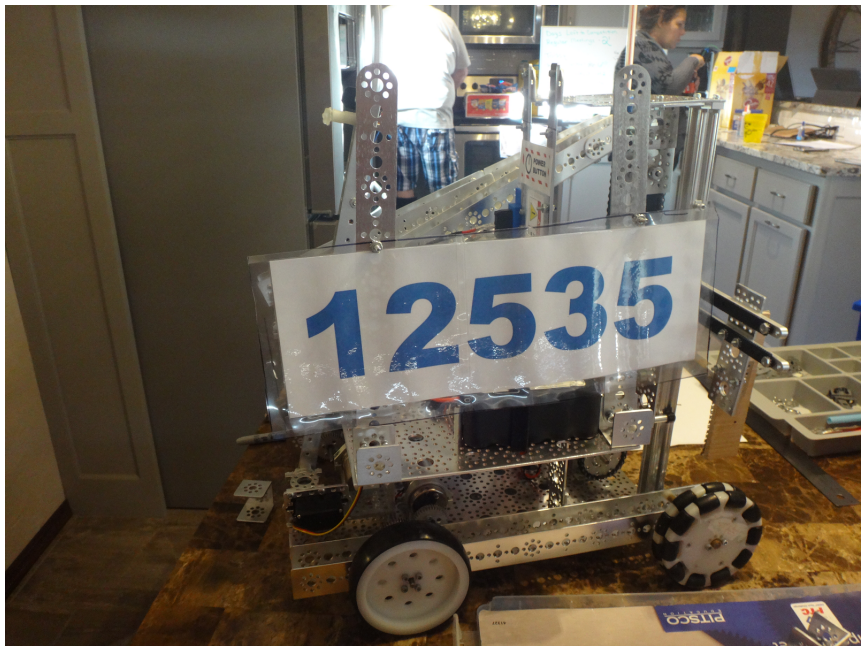
11/20/17
Used loctite to make sure screws don't come loose
CR servo wouldn't move. Got it moving. It was maybe because it was plugged in wrong

11/21/17
Moved phone to be able to use vuforia
Adjusted jewel turn on autonomous to not go off balance board
CR servo won't move isn't a wiring problem because change extension and made sure it was plugged in right
Having problem to code motors precisely won't stop moving when planned

Solution for the cr servo is turn the potentiometer on the cr servo with the CR center program until it stops and the other we don't know but we rewrite it and then it worked

11/25/17
Finished autonomous on one of the balance boards
Added some styrofoam to increase grip

11/26/2017
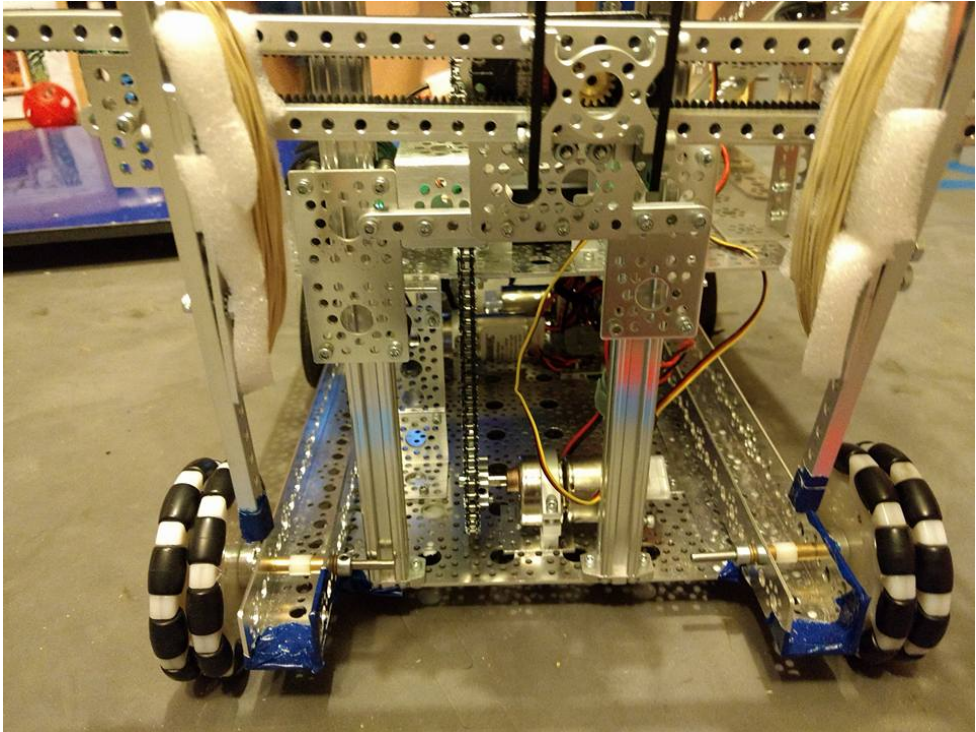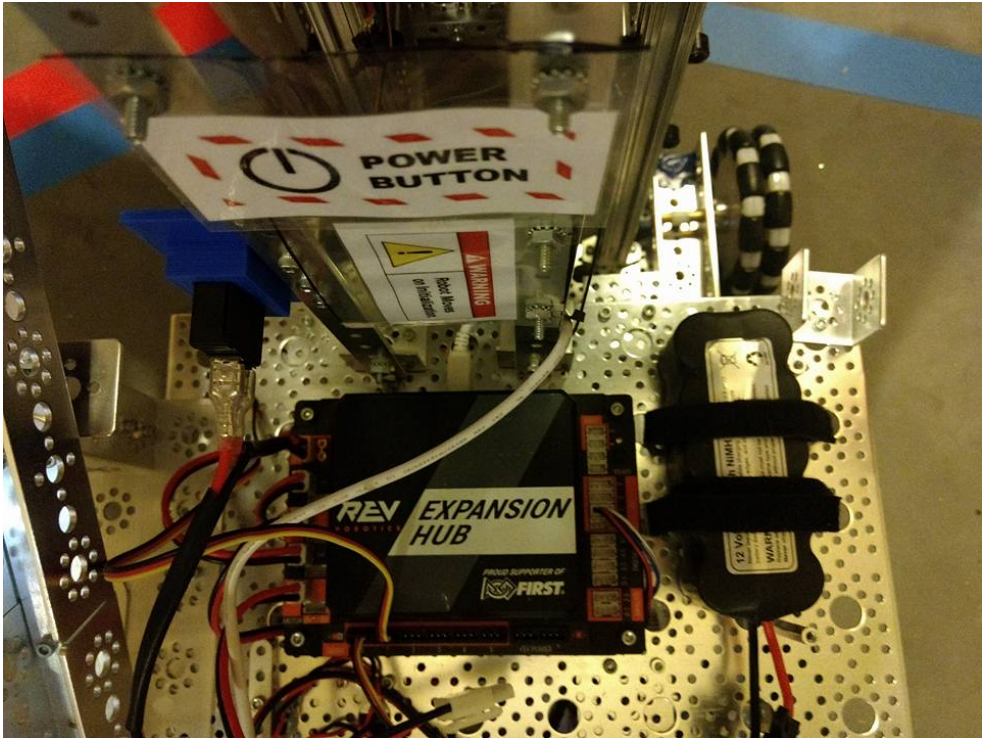
11/27/17

During the week we have made the following adjustments:

      We got the parts in we had ordered to straighten out our grippers. So we added them in. The straightness of the hands helps us do a better job picking up glyphs.

      We added rubber bands to stabilize the USB connection to the Rev hub

      Finalized programming so that we have something coded for each quadrant

12/1/2017

Last meeting before competition:

We attached numbers and ran through our robot inspection checklist, organized and packed up supplies, going over engineering notebook, and did test runs the robot a few times.
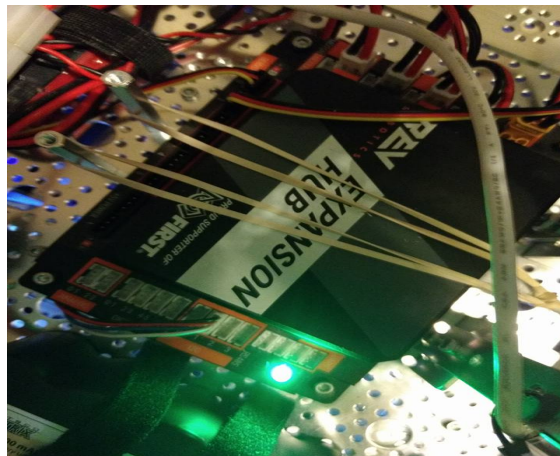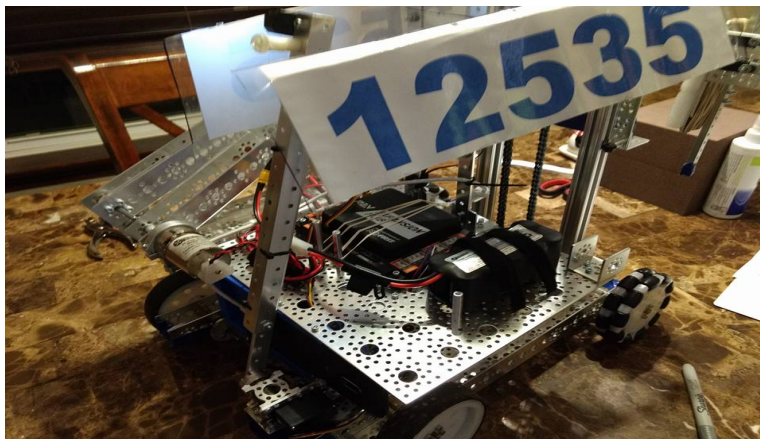
12/3/17

- **On the third of December we met for an hour from 4:00 to 5:00 on the day after our first qualifier, and also using it as an opportunity to show what our team can do to younger members of our sister teams.**
- **This meeting was used to talk about several things, the main one being everything we did at the qualifier and what we wanted to improve on.**
- **We talked about what we need to do before the next qualifier, picture included below.**

- **We decided that we need to make our relic arm function and/or be able to stack four glyphs, and be able to get as many points as possible on autonomous. This is so we can help our chances of getting on an alliance.**
- **Code need to be organized so it will be easy to organize**
- **We learned that the judge interview is actually a presentation to make an impression of your team onto the judges. Therefore, we need to actually work on making one of those! Groups have been redecided! While people weren't yet ready to make a decision, we definitely have some idea on what we want to do.**

12/10/17 M.H

First full meeting after qualifiers and we discussed changes to the robot to be a better alliance member.

- Moving color arm from the back to the side to eliminate some variables on the autonomous. Lowering platform and changing wheels to 6 in wheels to get more height under our robot to get on the balance board easier.
- Linear slide for the glyphs to get the glyphs 4 blocks high.
- Linear slide for the relic to place it down.
- Move the wheels to be symmetrical so we can get on the balance board easier.
- Change wheels to better grip wheels for more traction.
- Change platform to a 9 by 8 platform from 9 by 12.

We removed the top platform and color sensor to reorganize to complete our goals for today. We will probably get the new wheels at the next meeting.

12/13/17 S.M

Today we had come up with a parts list to improve our bot

- Pattern plate
- Max axle spacers
- 5mm surgical tubing

We also began to work with CAD.

Getting some help from the Atomic Gears!

Showing the younger teams our bot

12/15/17 D.B.

We started assembling out robot again.
- Wheels
- Color sensor arm
- Modified grippers

12/17/17 D.B.

Friday's work was thrown out due to that the motors could not be mounted in an efficient way
We assembled the robot in a new way
- We directly mounted the motors to the wheels
- Disassembled the color arm

We marked the exact locations of holes we need so that when we get our custom cut plate in, we would know exactly where to drill the holes.

12/27/17 M.H

Today we started work on…
- Attaching the glyph linear extender because the chain driven elevator couldn't get higher than 18in
- Building the claw for the idol to grab it so it can go to the third section of the relic mat

12/29/17 I.M
- The goals of the meeting were
  - to clean up wires
  - try to attach the relic arm
  - write up the presentation
  - design some grippers for the glyph elevator in CAD
- We accomplished
  - Semi cleaning up wires
  - The claw was attached to the relic arm
  - The presentation has an intro and two parts
  - The grippers are almost done!
- Next meetings goals
  - Re-clean wires, make them look pretty!
  - Attach relic arm to bot
  - Have everyone write their part of the presentation!
  - Finish grippers
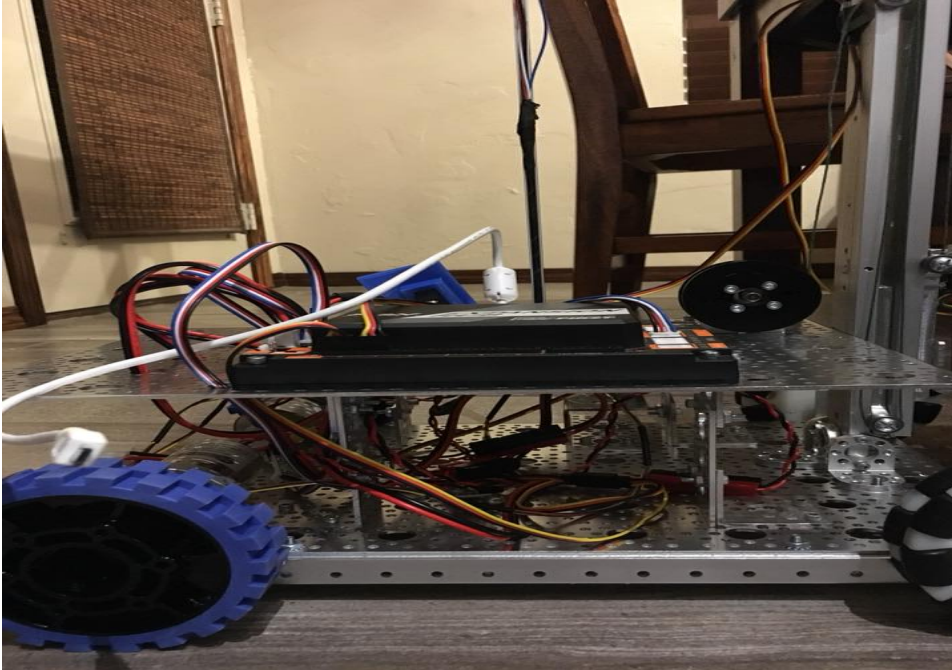
The wires that need fixing!
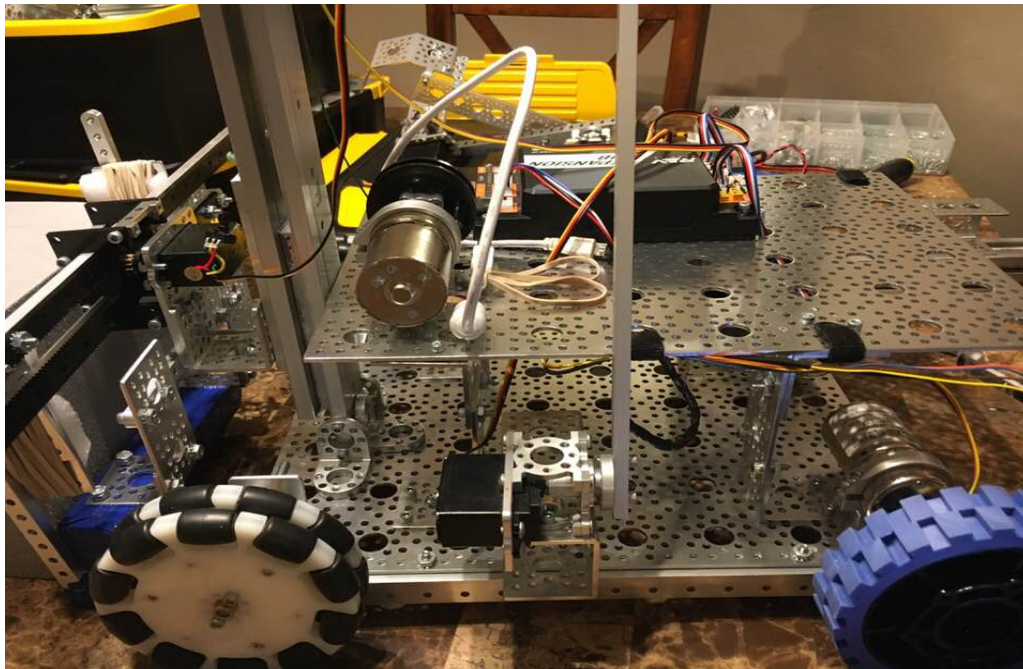
12/31/17 I.M

- The goals of the meeting
    - Re-clean wires, make them look pretty!
    - Attach relic arm to bot
    - Have everyone write their part of the presentation!
    - Finish grippers
- We accomplished
    - Grippers have been designed!
    - The presentation is written and each part has been assigned
- Next meeting goals
    - Attach relic arm
    - Attach grippers if they have printed
    - Clean up the wires!

Page B19

1/3/18 I.M

- The goals of the meeting
  - Attach relic arm
  - Attach grippers if they have printed
  - Clean up the wires!
  - Autonomous
  - FB page
  - Wiring diagram
  - Complete notebook updates
  - Print and fold pamphlets
- We accomplished
  - Public FaceBook page was created
  - The wires are cleaned up and look super neat!
  - Relic arm is attached
  - Grippers attached
  - Wiring Diagram made
- Next meeting goals
  - A second personal notebook
  - Autonomous

1/5/18 **I.M**
- The goals of this meeting
  - A second personal notebook
  - Autonomous
  - New wiring diagram
  - Adjust grippers
  - Update notebook
  - Update checklists
- We accomplished
  - Went through all checklists and updated them
  - Notebook updated
- Next meeting goals
  - Add CAD to notebook
  - Finish the wiring diagram
  - Attach new grippers when printed

Page B20A

1/7/18 **I.M**
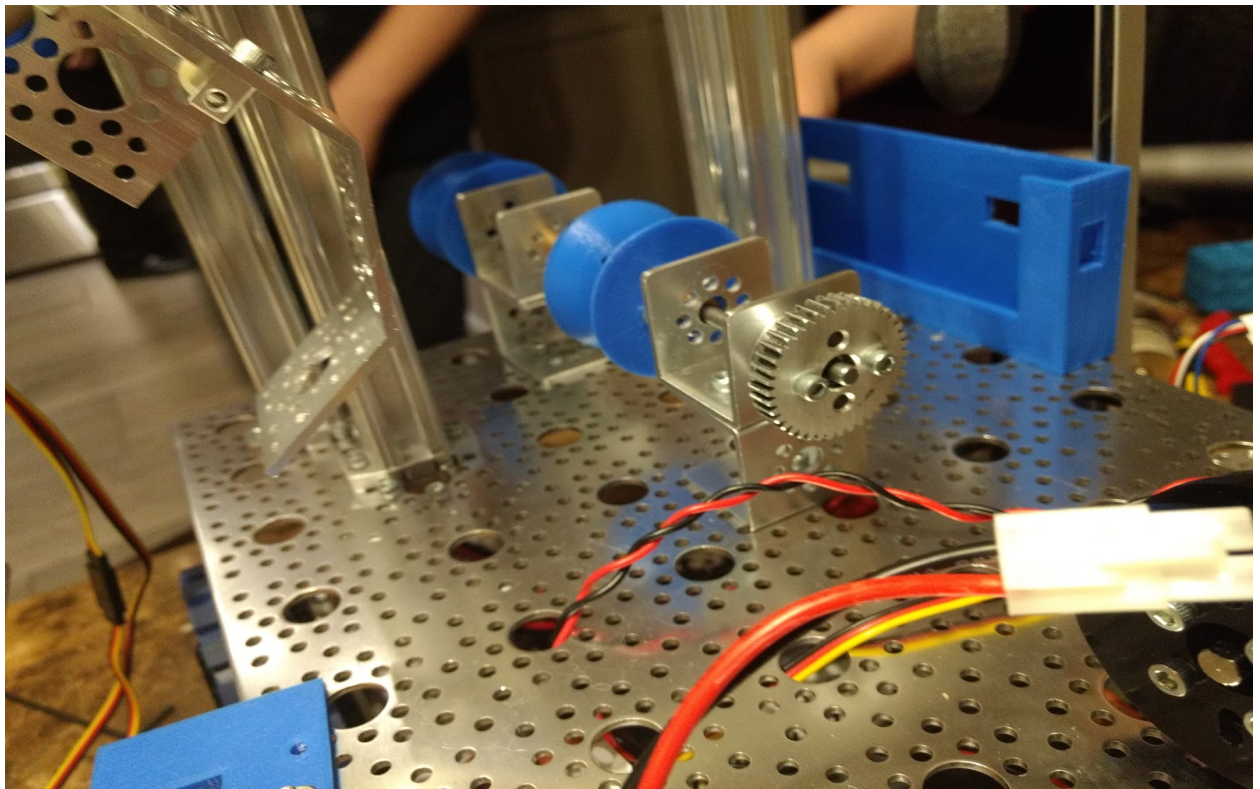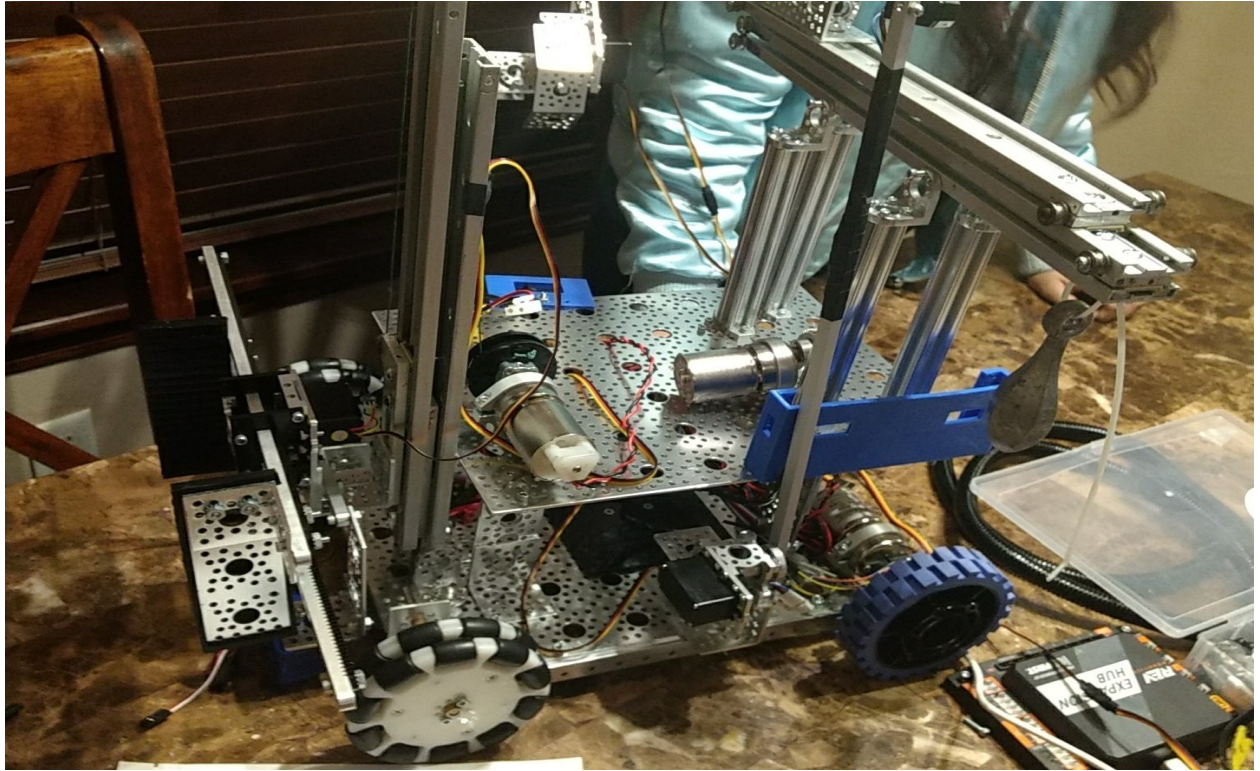
- The goals of this meeting
    - Add CAD to notebook
    - Finish the wiring diagram
    - Cable management
    - Autonomous
    - Grippers
    - Labels and Team numbers
    - Replace Cable
    - 2 notebooks
    - Complete nb updates
    - Print and fold pamphlets
- We accomplished
    - Finishing our wiring diagram
    - Added Cad to notebook
    - Cables are managed
    - The personal notebook is done
- Next meeting goals
    - Attach the switch and all labels
    - Autonomous
    - Grippers
    - Make pamphlets

1/8/18 **M.H**

This meeting we want to accomplish…
- Attach the switch securely on the robot
- Attach the labels including numbers, power, and initialization to be in compliance with the rules.
- Make the grippers work on the glyphs so we can score points
- Continue Autonomous for the robot

Page B21-a
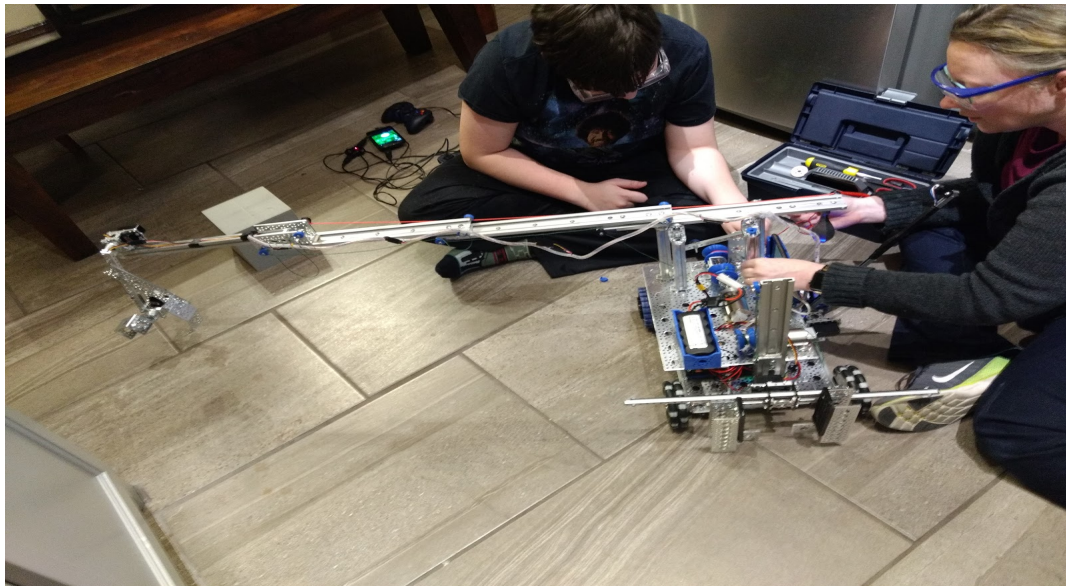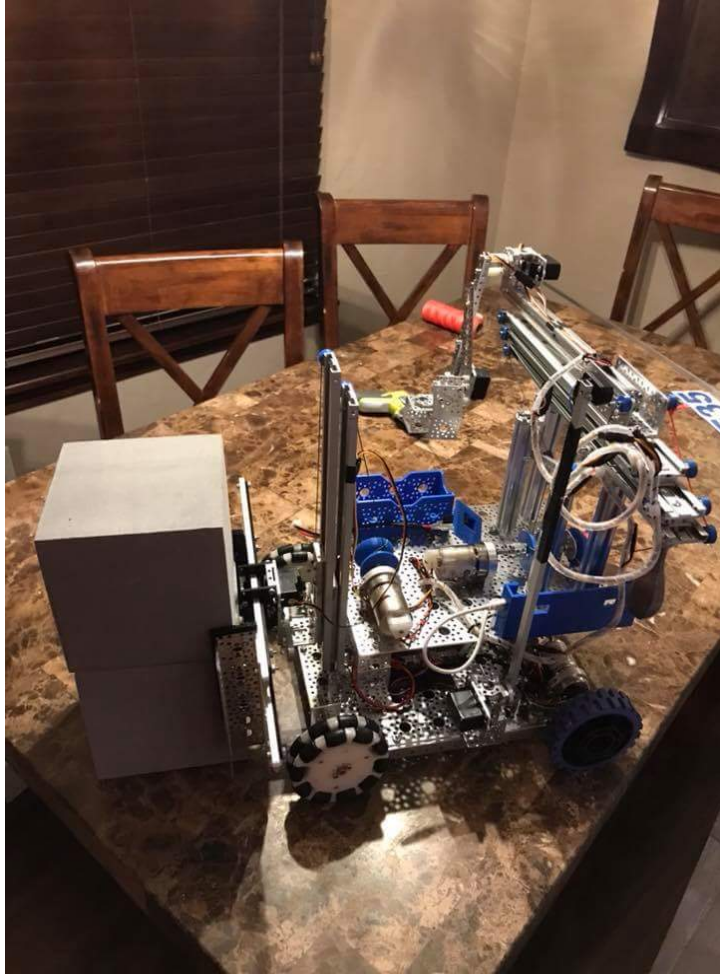
- The goals for this meeting
  - Cable management
  - Replace loose screws in relic arm
  - Mount power label
  - Mount initialization label
  - Mount team number
  - Extend length of glyph bumpers
  - Autonomous program
  - Thorough tighten/ loctite screws
  - Presentation prep
  - Notebook labels
  - Print pamphlets
  - Update programming section of notebook
  - Control award sheet
  - Robot inspection
  - Help the Senoritas to the best of our ability
- What we accomplished
  - Helped out the Senoritas
  - Mount power label
  - Mount initialization label
  - Mount team number
  - Notebook labels
- Next meetings goals
  - Pack up all supplies!

1/12/18 I.M The last meeting
- The goals
  - Cable management
  - Autonomous
  - Tighten/loctite screws
  - Presentation prep
  - Print pamphlet
  - Update programming
  - Control Award
- What we accomplished
  - Tighten/loctite screws
  - Control award
  - Packing stuff

1/21/18 I.M
- The goals

- - - Strategize
      - How do we improve so that we can try to qualify for super regionals?
    - Re-design gripping mechanism
      - This is so that we can easily grab glyphs quickly and efficiently
    - CAD new spools for glyph pulley
      - We hope that this will make the speed of our pulley increase
- What we accomplished
  - CAD new spools for glyph pulley
  - Strategize
  - Re-design gripping mechanism
  - Attach new gripping mechanism
  - CAD team numbers to possibly use
  - The REV Expansion Hub died on us
    - We went to reddit and found other had this issue and were able to find a solution
  - Discussed the removal of our relic arm
    - Decided to hang onto it, though our focus is currently glyphs
- Next meetings plans
  - Talk about fundraising/donation possibilities
  - Discuss a budget
  - Wiring diagram needs to be adjusted
  - Update config
  - Try and get it driving
  - Finish the grippers
  - Discuss a wheel intake

1/24/18 M.H
- During this meeting we are trying to finish the grippers.
  - We found a L shaped piece and we are going to attach it to grip the glyphs faster because our gear rack was to slow
  - We got storm seal to grip the glyphs because the L bracket from before wouldn't grip the glyphs

Page B23-a
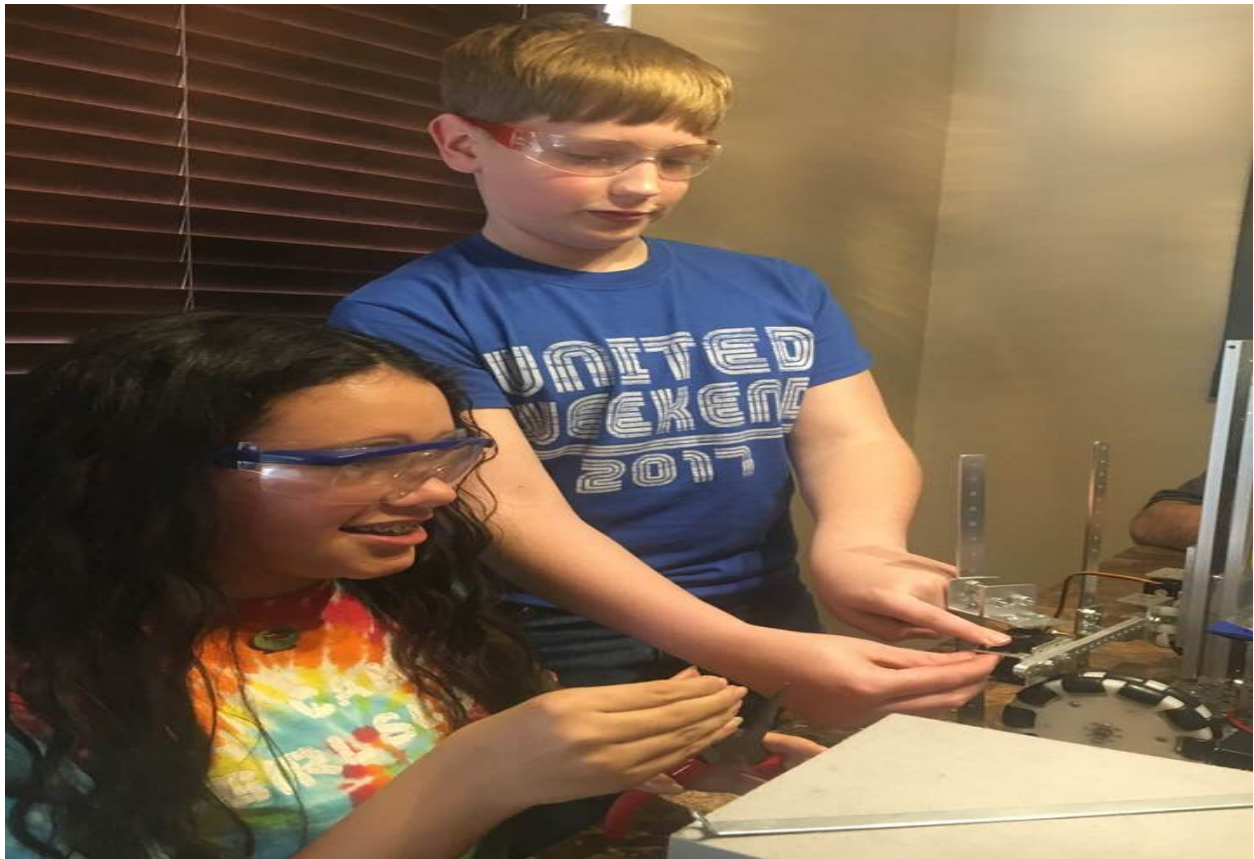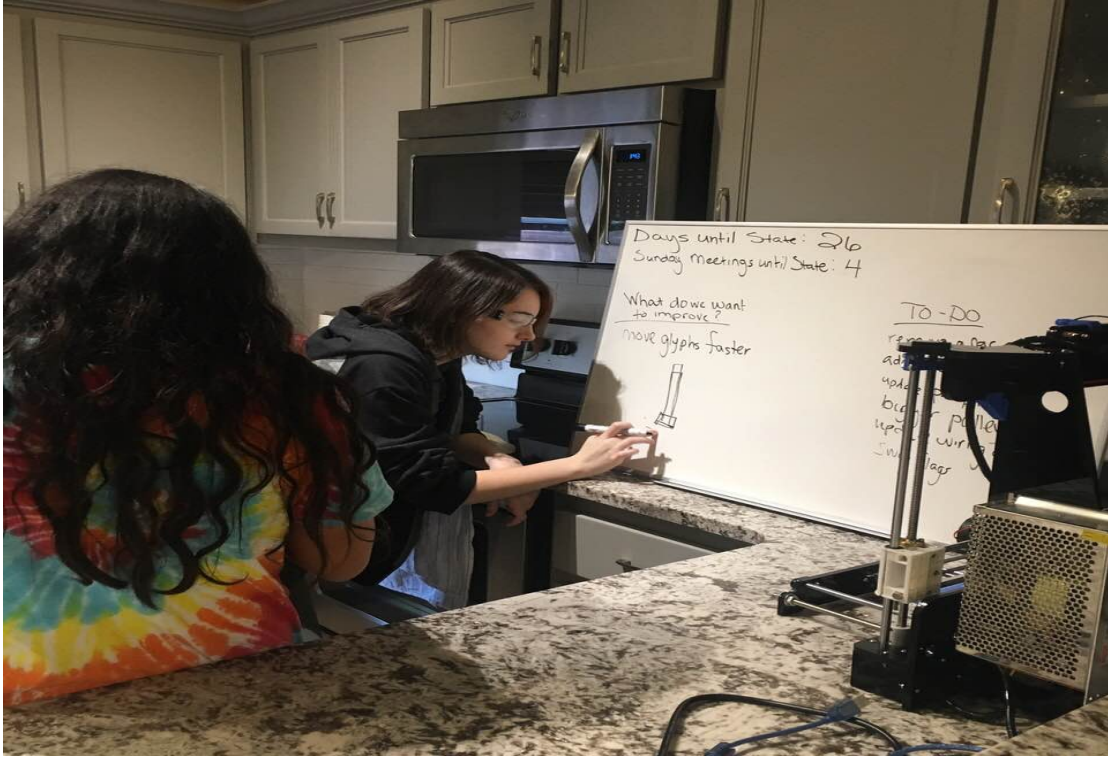
- Robot
  - Issues
    - The motor for the glyph arm was not high enough to mount the new spool.
    - Screws were wobbly
  - Action take
    - Added a channel to raise the height of the glyph arm motor
    - Electrical tape and weather stripping have been added to the glyph arms for gripping
    - Cable managed the glyph arm
  - Required action
    - Screws need to be tightened
- Drive
  - Gripper arms work as expected?
    - Yes!
  - Gripper arms lift as expected?
    - No
  - Robot drives as expected?
    - No
  - Required action
    - Program for lift and drive

1/28/18 I.M
- Robot Design
  - Issues
    - Gripper loses bottom glyph when glyphs are stacked
    - String gets caught in the gap of the new spool
    - Channel supporting the spool is unstable
    - Servo cables are still catching on motor during lift
    - USB hub intermittently fails to work
  - Actions Taken
    - Vertical plate added to front of robot to help push glyphs into zone
    - A plate has been added to top of lift to help align glyphs
    - Servo cables has been cable managed so it does not wrap around the lift motor
    - Vertical glyph arms have been bent inward to hold the bottom glyph effectively but issue persists
    - Tetrix bars have been added to the glyph arms to increase surface area

    - Drew has designed a block to stabilize the spool channel and a new spool for the lift arm
    - USB hub and adapters have been ordered

- ○ Required Action
  - ■ Stabilizing block and new spool need to be 3D printed
  - ■ USB hub needs to be replaced
  - ■ Weather stripping needs to be wrapped around glyphs arms to improve hold of glyphs
  - ■ Add vertical bars to stabilize the two new plates of the new glyph arm rig
  - ■ Recover parts from old glyph arm rig
  - ■ Consider relic arm
- ● Programming
  - ○ Issues
    - ■ Autonomous mode is not finished
  - ○ Required actions
    - ■ Finish autonomous mode
- ● Notebook
  - ○ Issues
    - ■ CAD section needs updated
  - ○ Required action
    - ■ Update notebook
- ● Presentation
  - ○ Issues
    - ■ Presentation needs to be updated
  - ○ Required action
    - ■ Update presentation
- ● Outreach
  - ○ Issues
    - ■ Banner needs graphic artwork
    - ■ Pamphlets need to be finished and printed
  - ○ Action take
    - ■ Olivia made a rough draft for banner
  - ○ Required actions
    - ■ Liv needs to make digital version of the banner design
    - ■ Finish pamphlets and print and fold pamphlets
- ● Tele-Op Strategies
  - ○ Action taken
    - ■ Drive team did runs to time how long it takes to grab and stack glyphs
  - ○ Strategy
    - ■ Focus on building columns instead of rows and drive coach will direct the driver on which glyphs to grab and stack
  - ○ Issues
    - ■ Gripper keeps dropping bottom glyphs and string for lift keeps getting stuck in the spool gap

Page 24-a

Page B24-b

- Issues
  - Glyphs arms are physically unstable
  - Glyph arms so not grip glyphs dependably
  - Relic arm is not functional
  - Nine updates available for the phones
  - Glyph arms need to be programmed to close at an even rate
  - Glyph arms do not reach high enough to accurately stack a fourth block
- Action Taken
  - 3D printed and mounted stabilization for glyph arm's servos.
  - Added 3D printed grippers to the glyph arms
  - Removed the Relic arm temporarily
  - New motors have been delivered
  - Glyph arms were reprogrammed to close at an even rate
- Required Actions
  - Test glyph grippers
  - Program autonomous mode
  - Replace motors (After checking "issues" with current encoders)
  - Update phones
  - Glyph system needs to be raised higher

2/2/18
- Robot Design
  - Issues
    - Relic arm is not finished
    - Relic hand is not built
    - Motors need to be replaced
    - Glyph arm servos need to be cable managed
    - Glyph arm goes too low and collides with the left front wheel
    - Glyph arm positions are off
  - Actions Taken
    - Old relic arm supports removed (No longer needed)
    - Glyph servo wires managed
    - Mark has adjusted the number for glyph arm positions
    - Screw added to block the glyph arm from running into the left front wheel
  - Required Actions
    - Motors need encoder wires before they can be replaced
    - Finish relic arm
    - Build relic hand
- Programming
  - Issues
    - Autonomous program is not finished

  - Required Actions
    - Finish autonomous

- Presentation
  - Issues
    - Presentation needs updates (Build and CAD)
  - Actions Taken
    - Updated presentation
- Notebook
  - Issues
    - CAD section needs updating
    - Wire diagram needs updating
  - Action Taken
    - Sara updated the wiring diagram
  - Required Action
    - Update CAD section
- Outreach
  - Issues
    - Graphics not finished for banner
    - Pamphlets not finished
  - Required Action
    - Finish pamphlets
    - Print and fold pamphlets
    - Finish graphics
    - Call other teams and offer to scrimmage

Page B25-a
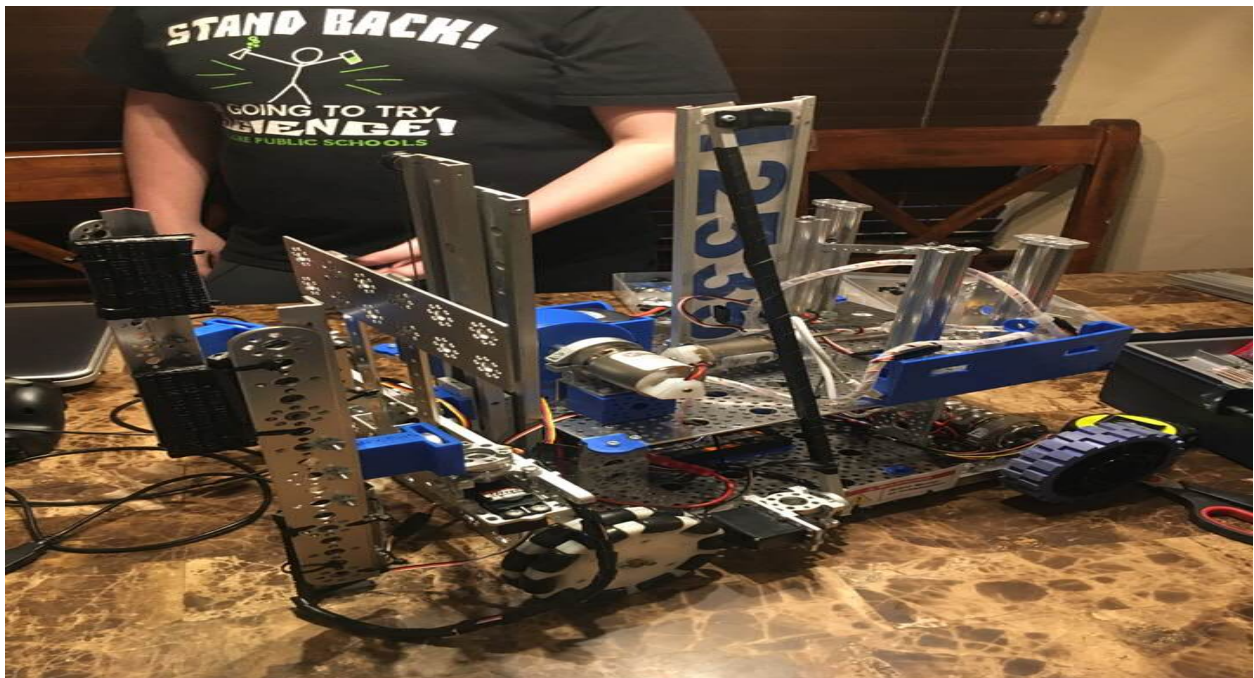
2/4/18 I.M
- Robot Design

- ○ Issues
  - ■ Relic Arm is not operational
  - ■ Relic arm has no hand
  - ■ X-rails are unstable under its own weight
  - ■ Out of zipties
  - ■ 3D printed standoff at end of the x-rail system is too short
- ○ Actions Taken
  - ■ Zipties placed on order list
  - ■ Hand built
- ○ Required Actions
  - ■ Channel at the base of the relic arm needs to be replaced with a 3" by 1.5" plate
  - ■ The method of stabilizing the x-rails needs to be explored
  - ■ 3D printed standoff on the end of the x-rail system needs to be replaced with a longer version
- ● Programming
  - ○ Issues
    - ■ Autonomous needs to be finished
- ● Notebook
  - ○ Issues
    - ■ CAD section needs to be updated
  - ○ Actions Taken
    - ■ CAD section updated
- ● Outreach
  - ○ Issues
    - ■ Pamphlets not finished
    - ■ Neds to reach out to other teams for a scrimmage
    - ■ Moore STEM club needs to be added to the graphic
  - ○ Required Action
    - ■ Finish pamphlets
    - ■ Print and fold pamphlets
    - ■ Call other teams and offer scrimmage
- ● Checklists
  - ○ Issues
    - ■ Checklists is outdated
  - ○ Required Actions
    - ■ Bakers rack needs to be added to packing checklist

Page B26-a
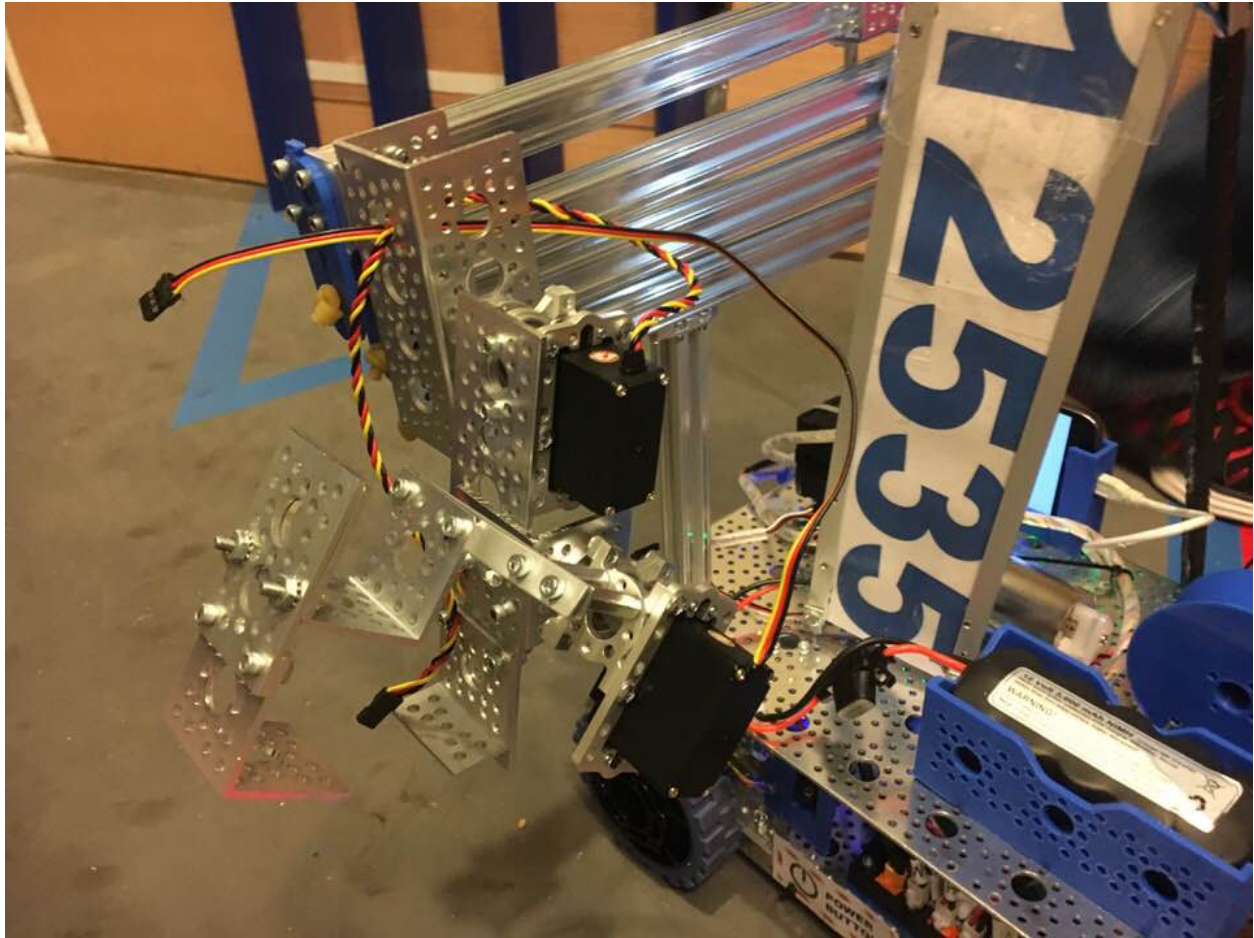
- Robot Design
  - Issues
    - Relic arm is mounted but a servo on the claw is not working
    - Robot can complete ⅓ of a crypto-box in 2 minutes
    - Out of zipties
    - Protective cover for the x-rail strings keep breaking
  - Actions Taken
    - Replaced a servo on the relic hand
    - Robot motor speed has been doubled
    - New protective covers for the x-rail strings have been 3D printed
- Programming
  - Issues
    - "See blue" on blue back is not working
    - Robot is too fast. Speed needs to be reduced or turns need to have different values than the drive
- Outreach
  - Issues
    - Pamphlets are not finished
    - Need to reach out to other teams for a scrimmage
    - MCSC needs to be added to graphic
  - Required Actions
    - Finish Pamphlets
    - Print and fold pamphlets
    - Call other teams and offer to scrimmage
  - Actions Taken
    - Lightsabers came over and drove on the field

2/11/18 J.B
- We began the meeting by going to a drive practice at Mount St. Mary's
- Robot design
  - We had multiple issues today
  - Our Rev Expansion Hub had problems with two of the motor ports
    - We were able to overcome this problem by borrowing a older non-used Expansion Hub from one of the Mt. St. mary's teams
      - Side Note: We still decided to purchase another Rev Expansion Hub
  - Also we discovered that our HiGrip wheels were illegal
    - To overcome this problem we were also donated a set of **Legal** wheels from one of the Mt. St. Mary's teams.
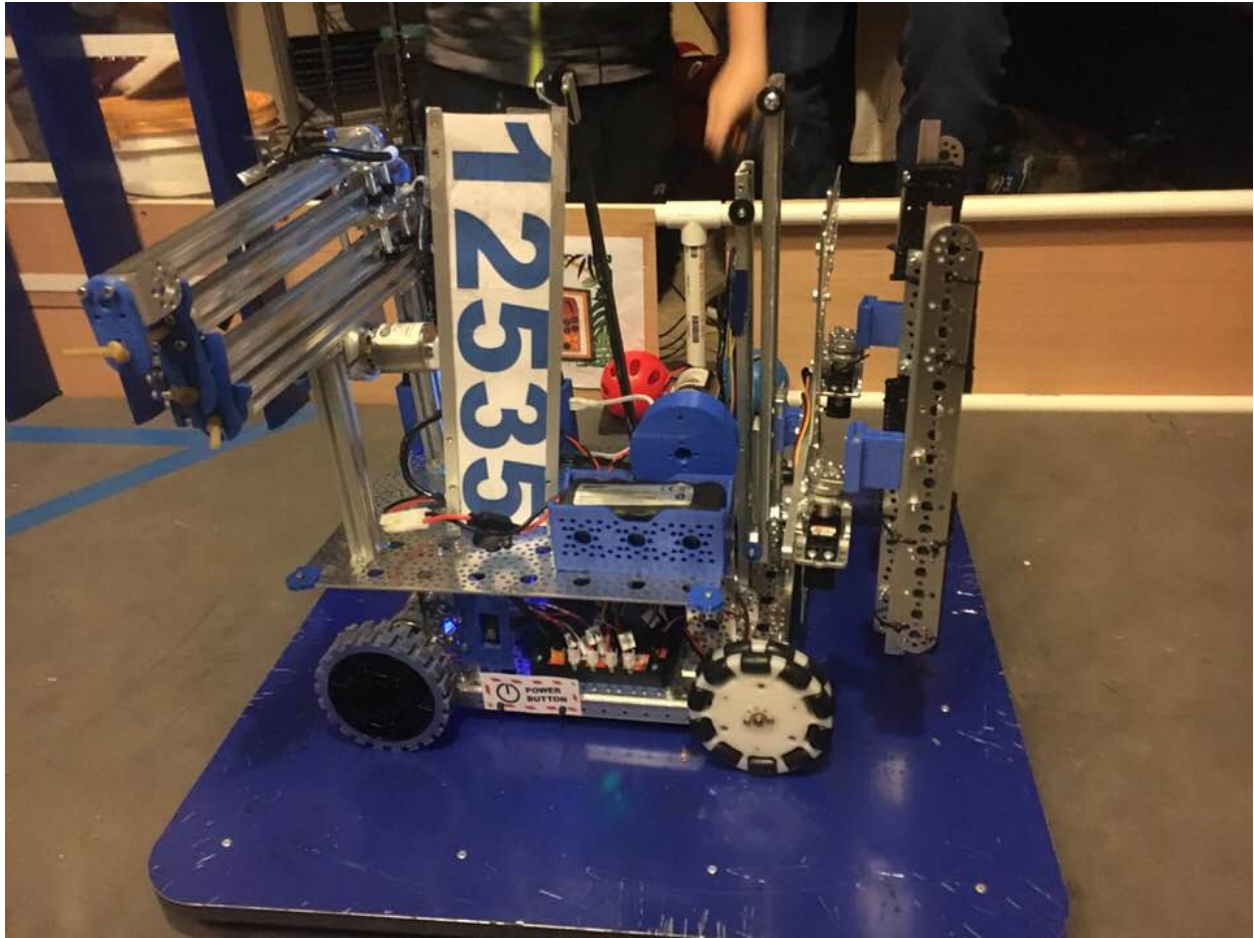
Page B27-a

- Issues
  - Autonomous not finished
  - Notebook needs updating on several sections
  - Presentation needs updating and everyone needs to learn their parts
- Actions Taken
  - Practiced driving
  - Worked on autonomous
  - Notebook is updated
  - Presentation is updated
- Required Action
  - Pack up all items on list
  - Add all updates
  - Learn parts of presentation
  - Finish final autonomous
  - Do control award

2/15/18 I.M
- Issues
  - Autonomous not finished
  - Notebook needs printing
  - Robot needs last minute updates
  - Pack up
- Actions Taken
  - Loctite all the screws
  - Updating page numbers and printed CAD, OUTREACH, and NOTES
  - Extra numbers for robot printed
  - Robot checklists done
  - Finish autonomous
  - Updating and learned presentation
- Required Action
  - Go to State!!!

Page B28-a
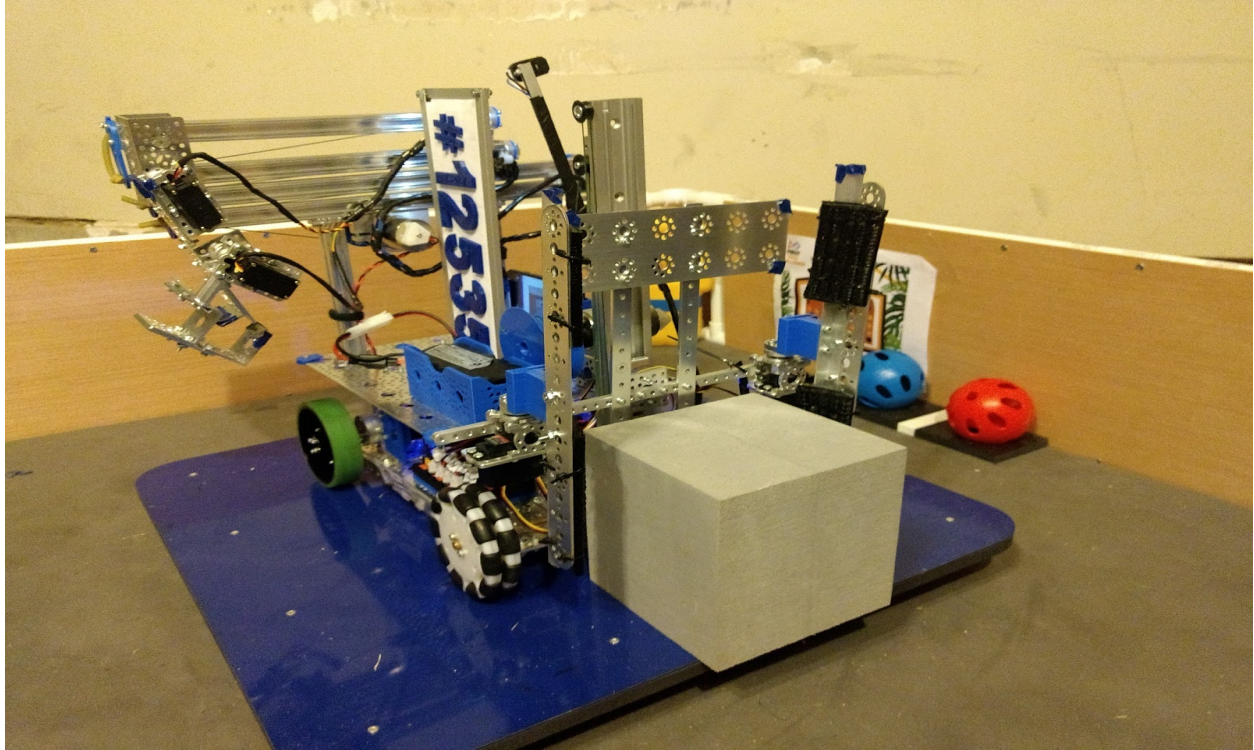
Programming

Section C

Notes About Our Programming

Our programming has evolved a lot since the beginning of the season. It has evolved even more since the last qualifier.

At the beginning of the season, we started out with Blocks. After using it, we decided we wanted to learn how to use OnBotJava, because we felt Blocks had limitations. We learned Java using FTC YouTube channels, such as PiEaters and Swerve Robotics. These helped us get a good grasp on how to get started.

At our first qualifier, we were able to knock off the jewel most of the time, park in the parking consistently, put a glyph in a random column. However, our code was long and messy. That was a problem for us because when we needed to make quick changes during the competition, we had a hard time finding the right section of code.

We decided after that to focus on cleaning the code up. With help from Will Edds, a mentor for the Capitol Hill FRC team, we learned to use methods and classes to organize the code to make it easier to use and modify. We currently have two classes: one for the relic arm and the other for teleop and autonomous commands.

We also decided that we needed to focus more on using the VuForia we had already figured out to get the glyph in the correct column.

Since our second qualifier, we have worked to understand how to use and code for encoders. This addition has helped our autonomous programs to be more consistent.

We are proud of the progress we have made in programming. You can see a sample of our new code at Page C3, a sample of the previous version is at Page C4, and the old long code is starting at Page C5.

Tele-Op Code

The logic of the code is..

.

```
                              TeleOp

If Left Stick    If Right Stick   If Right Trigger   If Left Trigger   If Right Bumper   If Left Bumper
On The Y-Axis    On The X-Axis    Is Pressed         Is Pressed        Is Pressed        Is Pressed

Move Forward Or  Turn Either Way  Elevator Moves Up  Elevator Moves    Close The         Open The
Backwards                                            Down              Grippers          Grippers
```
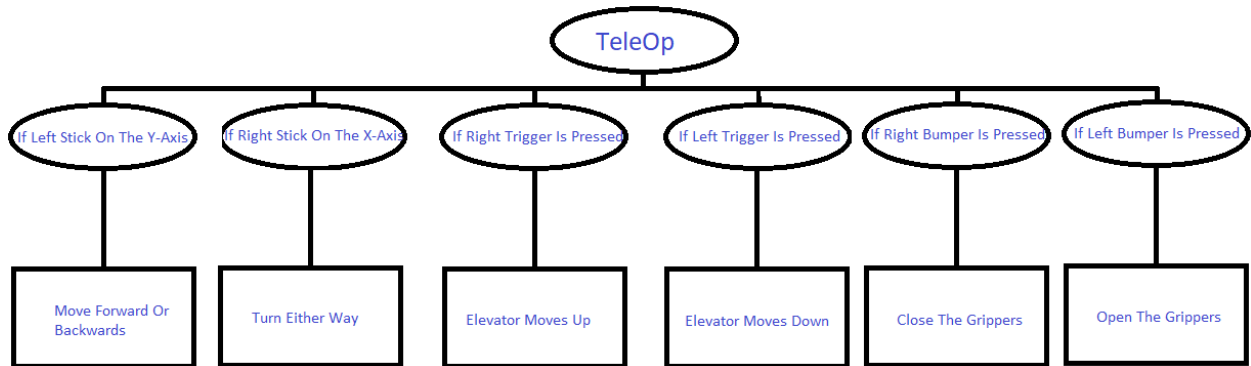
In the future we expect this code to include four more buttons for the Relic Arm. The X, Y, A, and B buttons will possibly be for the two parts of the arm. The D-Pad will be for the servos that will grip the Relic.

A copy of our Tele-op Code is found on the following pages.

```java
package org.firstinspires.ftc.team code;

import com.qualcomm.robotcore.eventloop.opmode.TeleOp;
import com.qualcomm.robotcore.hardware.CRServo;
import com.qualcomm.robotcore.util.ElapsedTime;
import com.qualcomm.robotcore.hardware.Servo;
import com.qualcomm.robotcore.hardware.DcMotor;
import com.qualcomm.robotcore.eventloop.opmode.OpMode;

//These are notes.
//10/17/17 Use division to slow down motors. /
//10/17/17 Check the OnBotJava DcMotor breaks
//
//
//
//
//
//
//
//


@TeleOp (name="Drive", group="Drive")
//^This tells the Driver Station what name shows up and where it is.

public class Driving extends OpMode {
//^This tells the sidebar to call the program Driving on the computer

DcMotor leftWheel = null;
// defines the verriable "leftWheel" telling it to be in the motor class
DcMotor rightWheel = null;
// defines the verriable "rightWheel" telling it to be in the motor class
DcMotor pully = null;
//defines the verriable "pulley" telling it to be in the motor class

Servo colorArm;
// assigns the variable "colorArm" servo properties
CRServo glyphArm;
// assigns the variable "glyphArm continuous rotation  servo properties"


double speed;
// a variable named speed can be a positive or a negative
double turn;
// a variable named turn can be a positive or a negative
```

```java
double pullySpeedDown;
// a variable named pulleySpeedDown can be a positive or a negative
double pullySpeedUp;
// a variable named speed can be a positive or a negative


@Override

public void init () {
//what happens when you press INIT on the DS (driver station)

    leftWheel=hardwareMap.dcMotor.get ("leftWheel");
    // assigns leftWheel the motor named leftWheel in the config
    rightWheel=hardwareMap.dcMotor.get ("rightWheel");
    // assigns rightWheel the motor named rightWheel in the config
    pully=hardwareMap.dcMotor.+get ("pulley");
    // assigns pulley the motor named pulley in the config

    colorArm=hardwareMap.servo.get ("colorArm");
    // assigns colorArm the servo named colorArm in the config
    glyphArm=hardwareMap.crservo.get("glyphArm");
    // assigns glyphArm the servo named glyphArm in the config

    leftWheel.setPower (0);
    //sets the motor leftWheel's power to 0
    rightWheel.setPower (0);
    //sets the motor rightWheel's power to 0
    pully.setPower (0);
    //sets the motor pulley's power to 0

    colorArm.setPosition (0.4);
    //sets the color arm position to .4
    glyphArm.setPower(0.5);
    //sets the glyph grippers power to .5

}

@Override

public void start () {
//activates when you hit play but it is not a loop

}

@Override
```

```
public void loop () {
//happens once it runs through the start

    speed=gamepad1.left_stick_y;
    // sets the variable speed to a numeral from the left stick on the y axis
    turn=gamepad1.right_stick_x;
    // sets the variable turn to a numeral from the right stick on the x axis

    pullySpeedDown=gamepad1.left_trigger;
    // sets the variable pullySpeedDown to a numeral from the left trigger
    pullySpeedUp=gamepad1.right_trigger;
    // sets the variable pullySpeedUp to a numeral from the left trigger



    //10/17/17 Always have <,>,<=,>=,=, or !=. != means not equal to.
    //11/19/17 || means or

    while (gamepad1.left_stick_y!=0) {
        //while you  are using the left stick on the y axis
        leftWheel.setPower (speed);
        //sets the power of the left wheel to the speed variable
        rightWheel.setPower (-speed);
        //sets the power of the right wheel to negative of the speed variable
    }

    while (gamepad1.right_stick_x!=0) {
        //while you  are using the right stick on the x axis
        leftWheel.setPower(turn);
        //set the power of the the left wheel to the variable turn
        rightWheel.setPower(turn);
        //set the power of the the right wheel to the variable turn
    }

    leftWheel.setPower (0);
    //sets the motor leftWheel's power to 0
    rightWheel.setPower (0);
    //sets the motor rightWheel's power to 0

    if (gamepad1.left_trigger!=0) {
        //if the left trigger is pressed
        //10/17/17 Math.abs means absolute value

        pully.setPower (Math.abs (pullySpeedDown)/2);
```

```java
            //sets the power of the pully to the absolute value of variable pullySpeedDown and then divides it by two
        } else {

            pully.setPower (0);
            //sets the power of the pully to 0
        }

        //10/17/17 Use (Math.abs (variable) ) *-1 or /-1 \); to do a negative absolute value

        if (gamepad1.right_trigger!=0) {
            //if the right trigger is pressed
            pully.setPower(  (Math.abs (pullySpeedUp) )/-2);
            //sets the power of the pully to the absolute value of variable pullySpeedDown and then divides it by
negative two
        } else {

            pully.setPower (0);
            //sets the power of the pully to 0
        }

        //11/5/17 You need to set the power of the CR servo to 0.5 (center position) to make it stop.
        //10/17/17 Can't do a negative on a servo.
        //10/17/17 0 is all the way to one side .5 is middle and 1 is the other.

        if (gamepad1.left_bumper) {
            //if the left bumper is pressed
            glyphArm.setPower(1);
            //sets the power of the CRServo to 1
        } else if (gamepad1.right_bumper) {
            //if the right bumper is pressed
            glyphArm.setPower(0);
            //sets the power of the CRServo to 0
        } else {

            glyphArm.setPower(.5);
            //sets the power of the CRServo to .5 (a stop)
        }

    }

    @Override

    public void stop() {
    //when you press stop it runs through the thing underneath    leftWheel.setPower (0);
        //sets the power of the leftWheel to 0
```
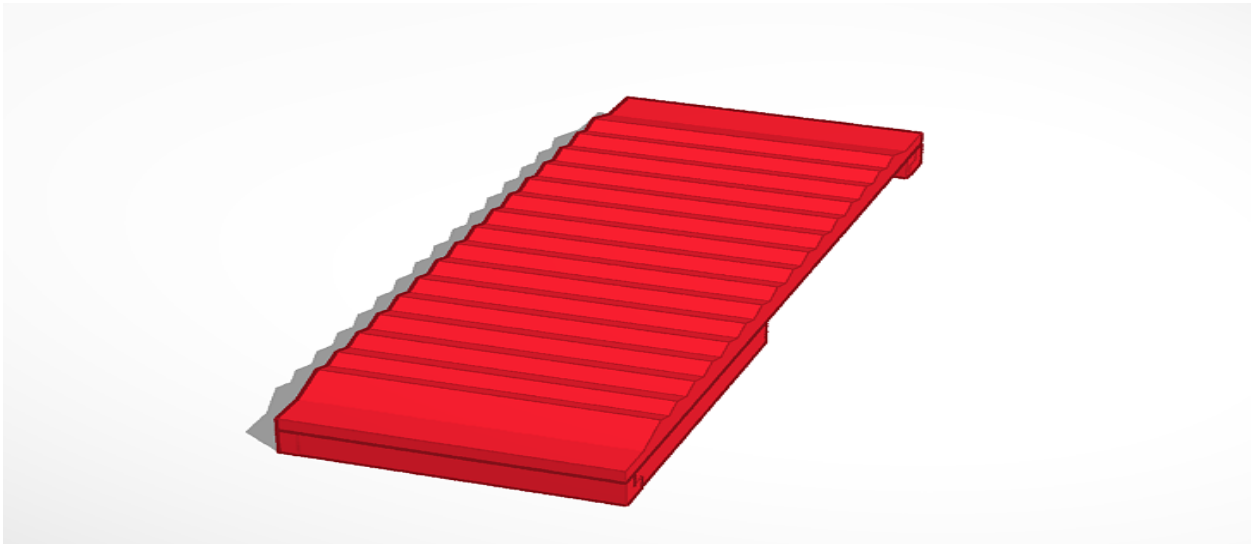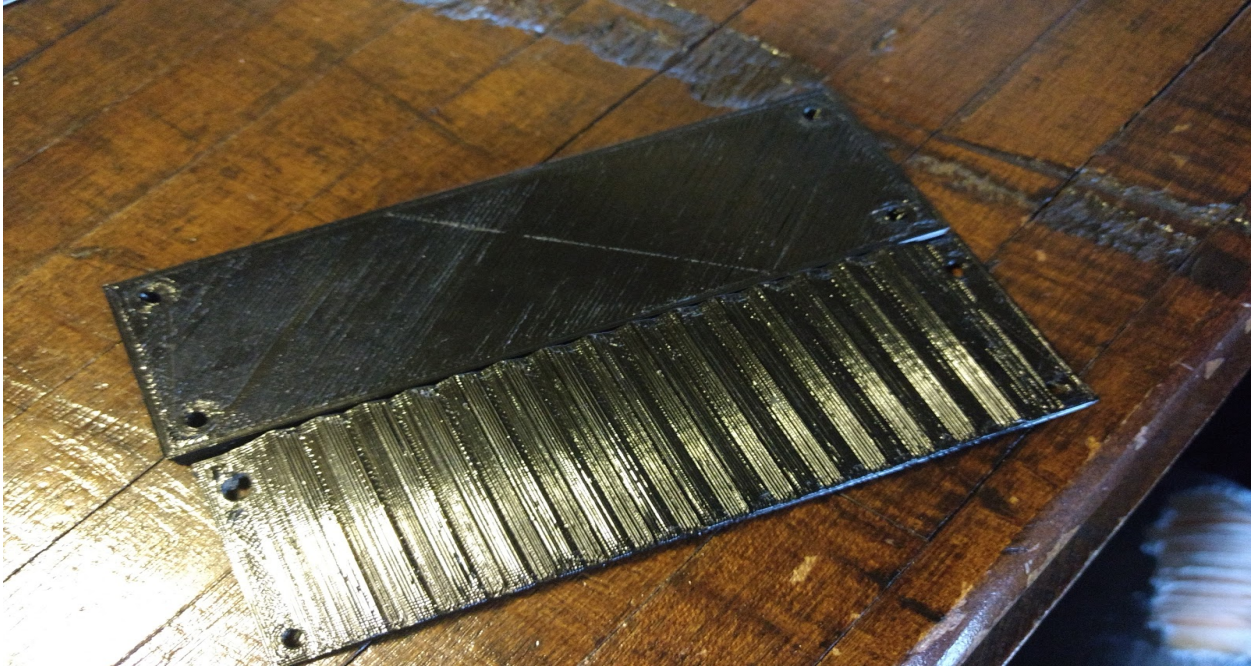
```
        rightWheel.setPower (0);
        //sets the power of the rightWheel to 0
        pully.setPower(0);
        //sets the power of the pully to 0
        glyphArm.setPower(0);
        //sets the power of the glyphArm to 0
    }

    }
```
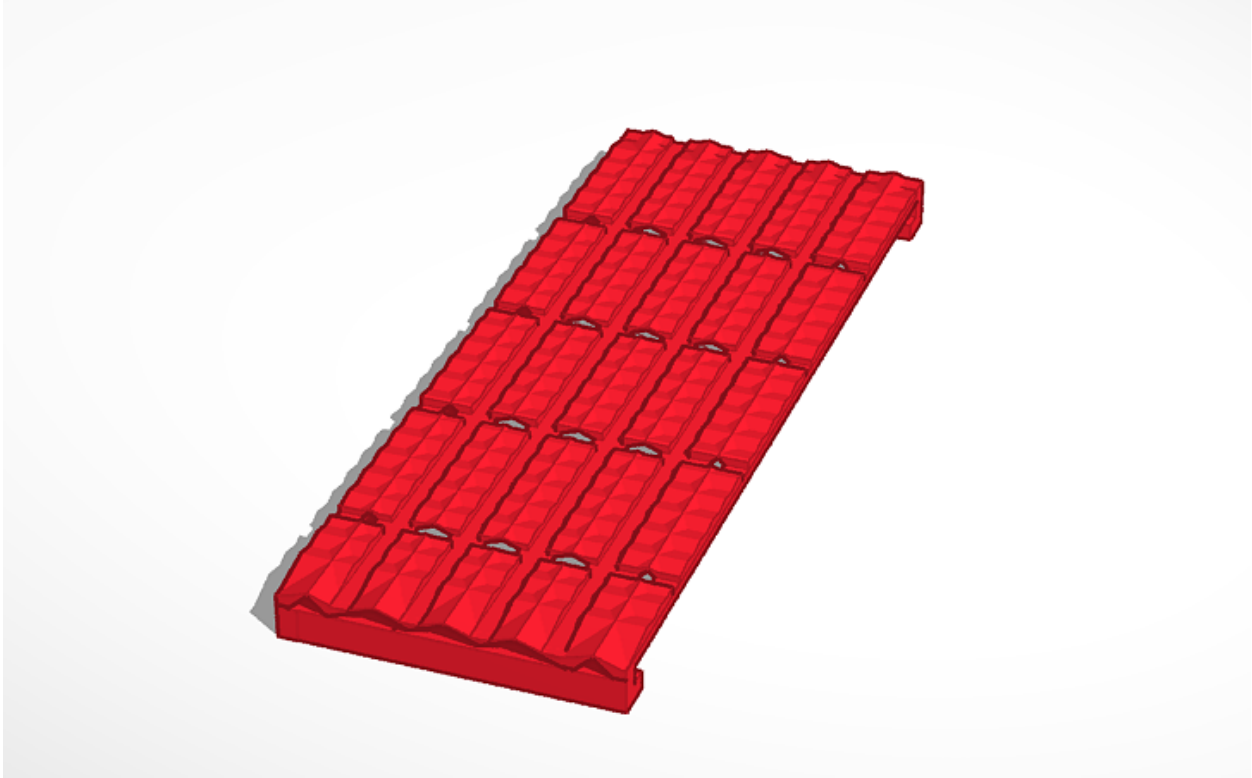
Computer Aided Design

This is a collection of all the pieces we have designed or 3D printed for the robot

Section D

The two pieces shown here are designs of gripper pieces to hold the glyphs on our elevator. The top design printed without the grooves, so we went back and redesigned the grooves and came up with the bottom design.
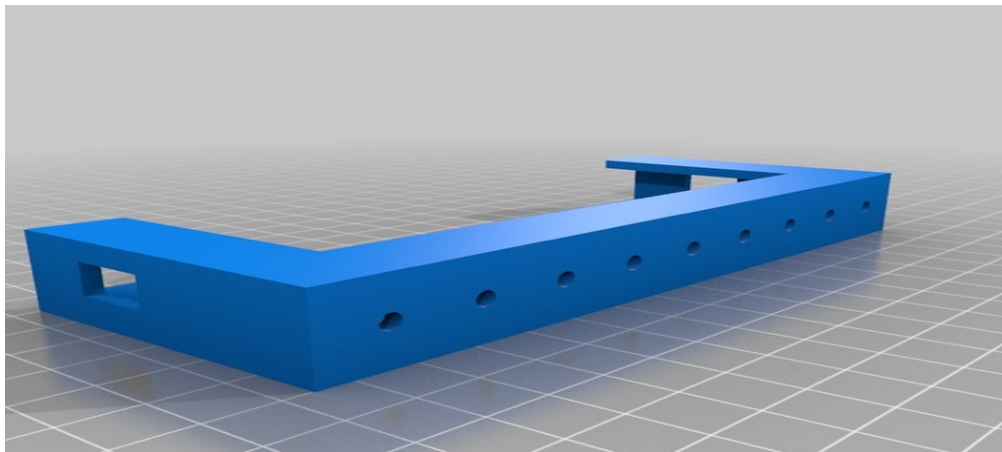
The bottom design did not work out as intended, so we came up with this new design. We were satisfied with the performance of this design.

Phone Holder Designs
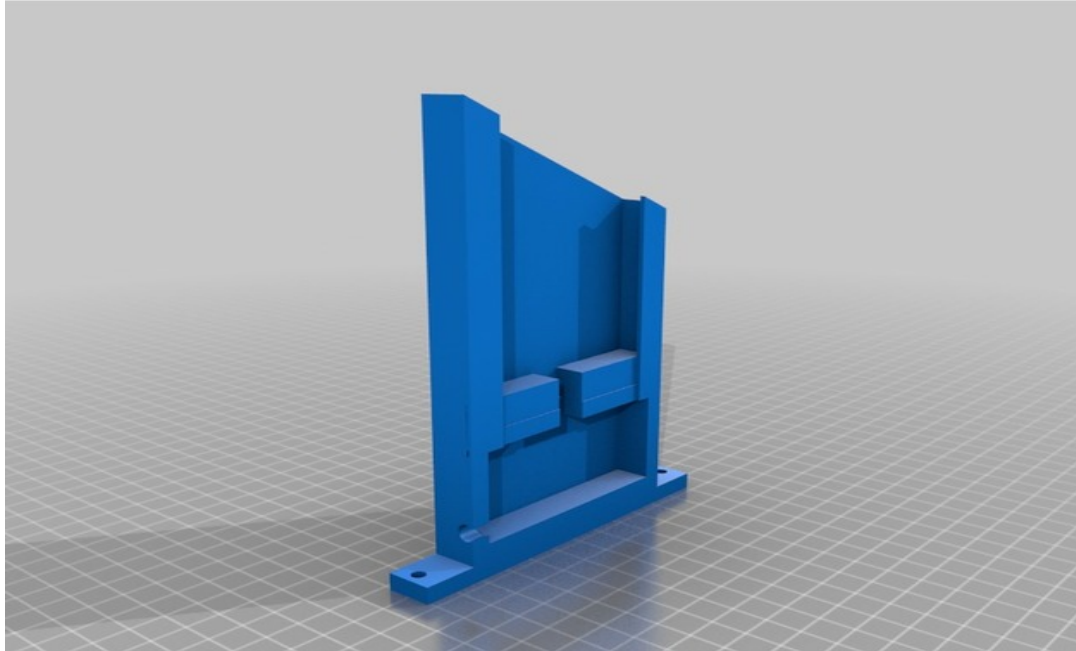
This was the first design of the phone holder we found on Thingiverse, printed and used for the original design of the robot. Made by syborgsrobots


This second design we also found on Thingiverse and it works much better with the newer design of the robot. It holds the phone on its side and has holes on the side of the piece to plug the phone into the Rev Hub. Made by jwheelsl
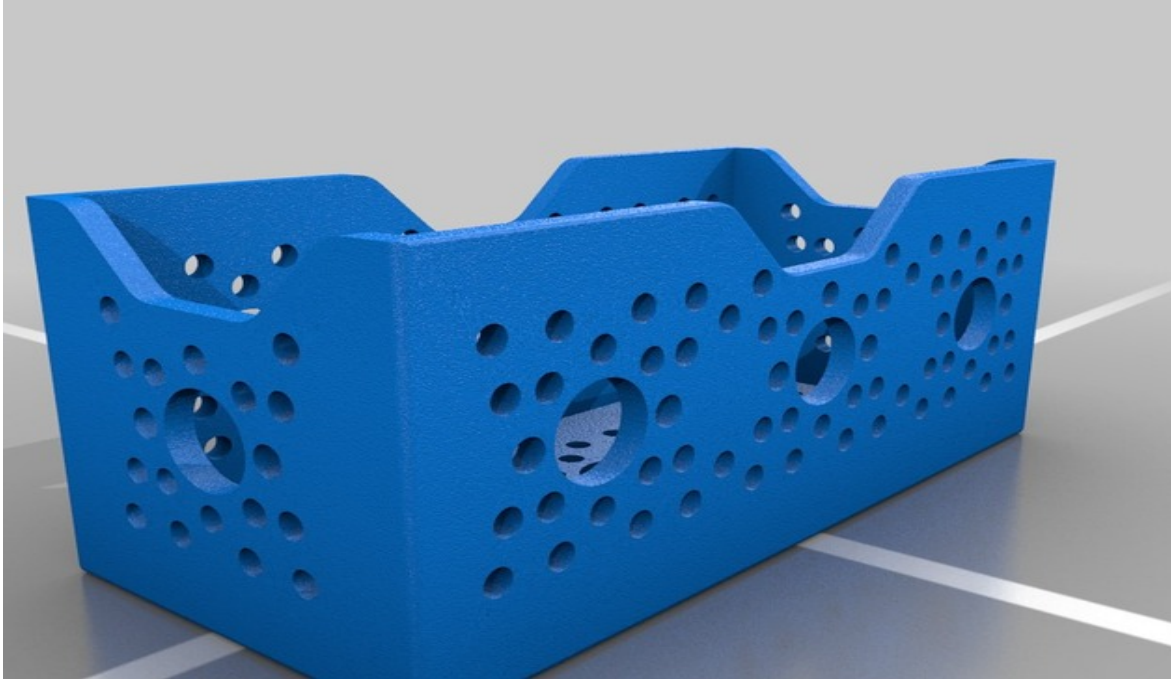
Rev Expansion Hub
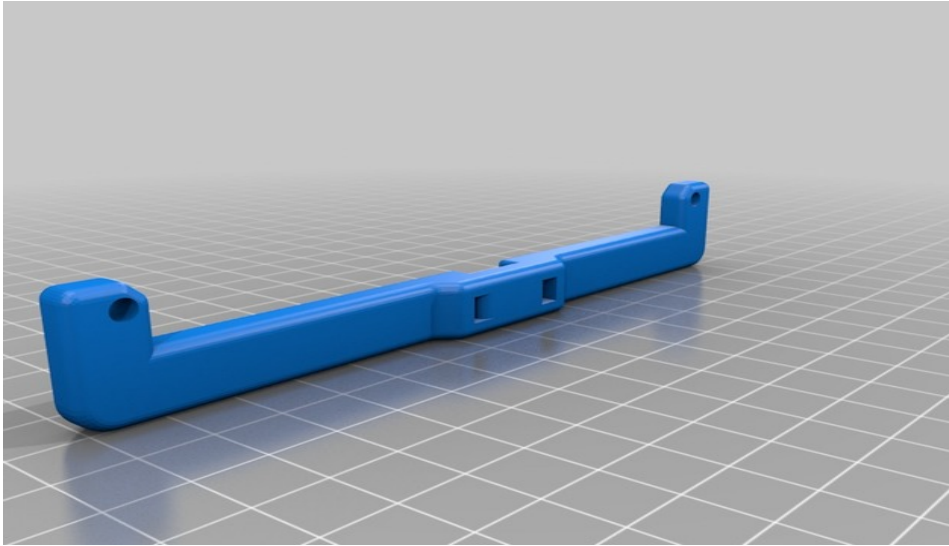
This first iteration of a stabilizer for the USB to connect the phone to the Rev Hub made by VCHSRobotics. It did not work for what we wanted it to so we made a new one.
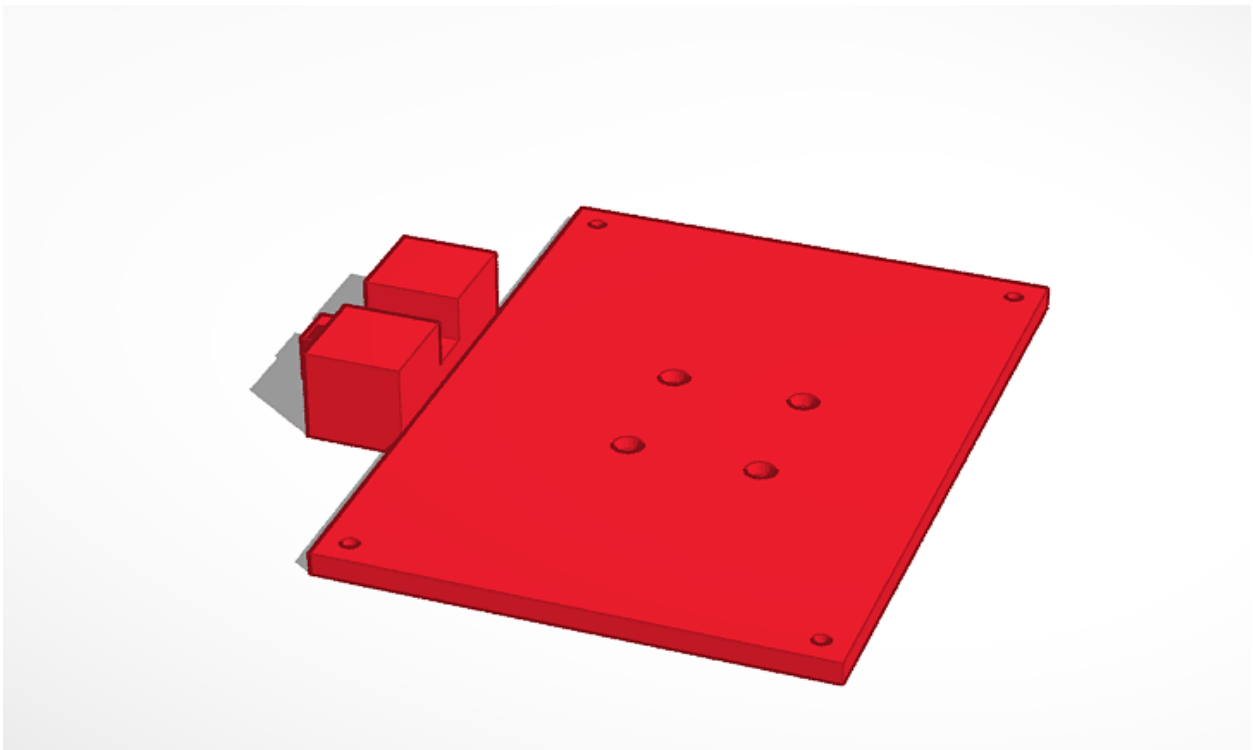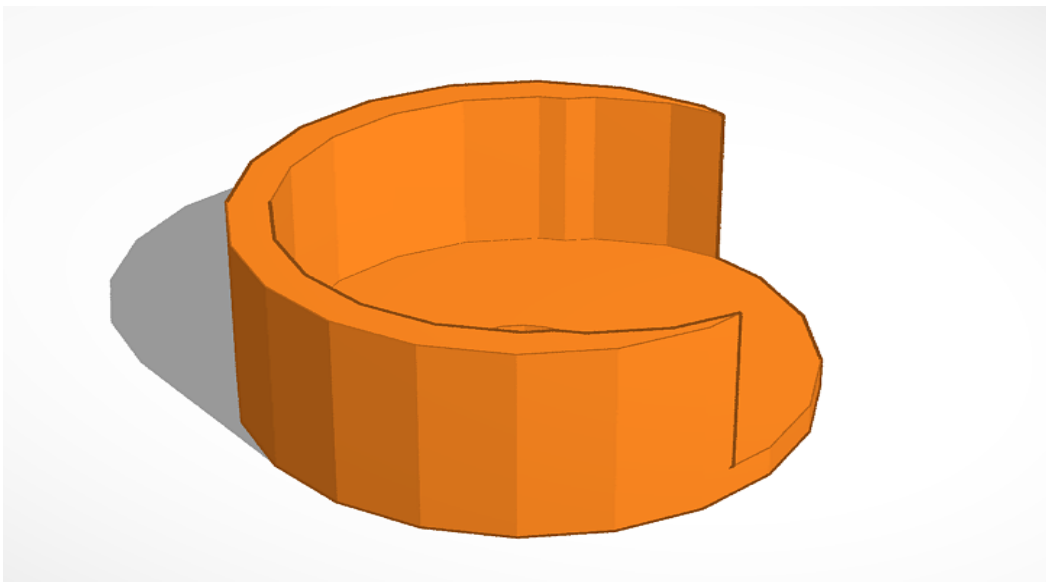

This one we designed to support the USB while also attaching the hub to the ACTO plating
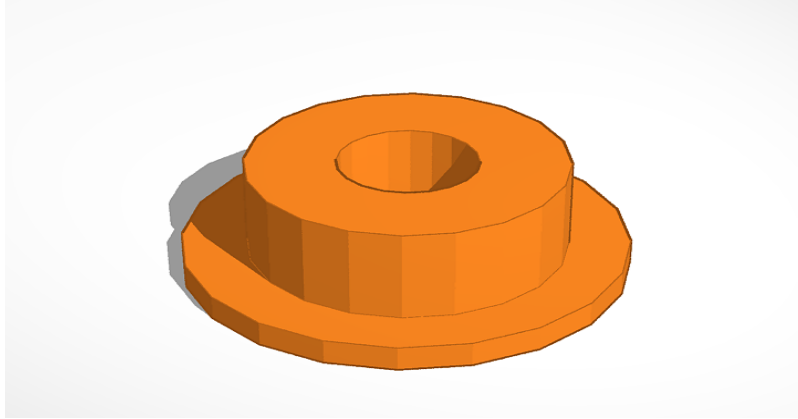
Other

This is a battery holder we found on Thingiverse to keep the battery contained with the patterns of the ACTO plating for easy placement. Made by RoboAaronII

This is a bearing cap we created and printed to keep on the bearings that keep our string in place. for the string that is operating out linear slide. It keeps the string in place.

This is a bushing we created and printed. It is a converter piece to fit peice into Actobotics pieces while using axels from the TETRIX kit.
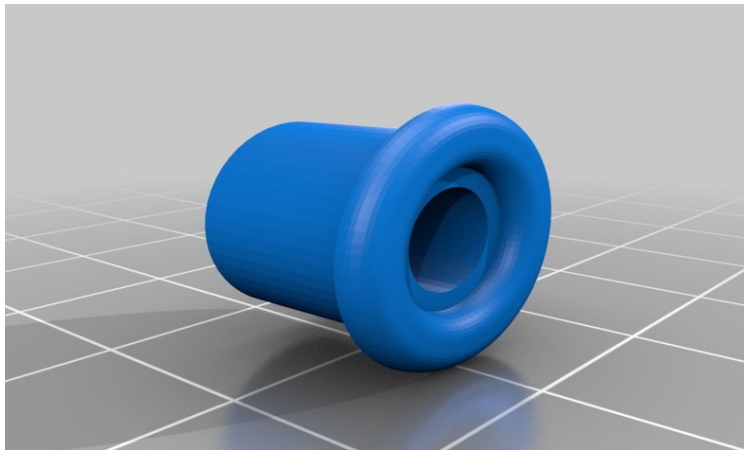
This is a flag holder we found made by 123456123456. It holds the flag to identify our robot on the field at competition.
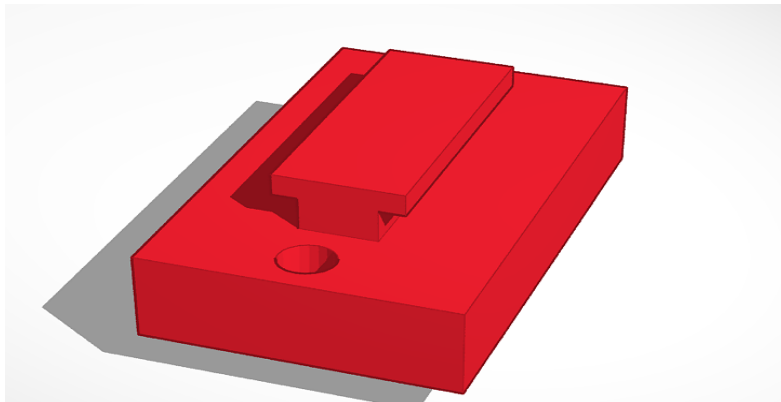
This is a linear slide bearing we created and printed but ended up not using due to it not being what we needed for our linear slide.

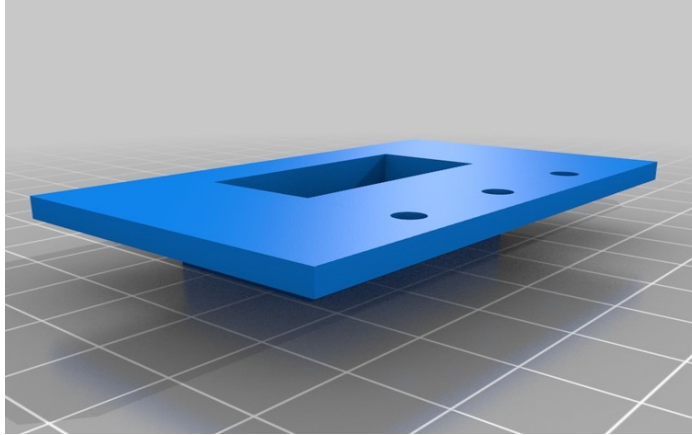This is a power switch holder found on thingiverse made by olstweartrobots. It is used to hold and attach the power switch in an easy access and visible place.
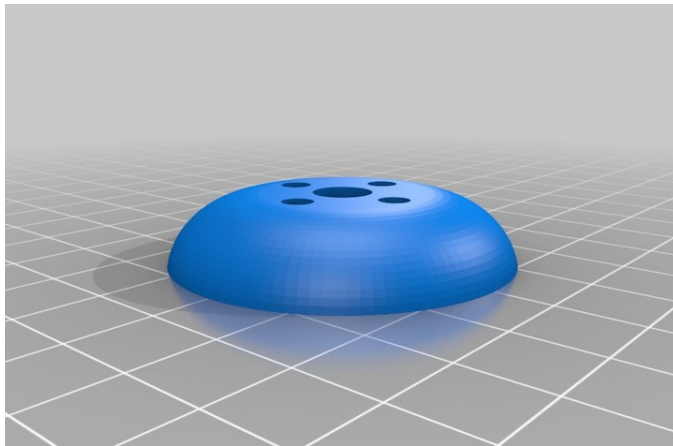
This a piece of a pulley. If you were to put two of these with a hub, you'd have a pulley system. This was found on thingiverse made by ssesrobotics
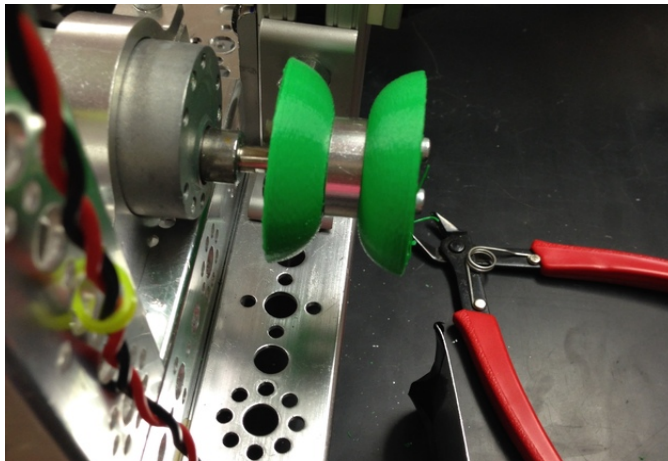
This is the complete pulley designed by the FTC team St. Stephen's Technospartans 7975 found on thingiverse.
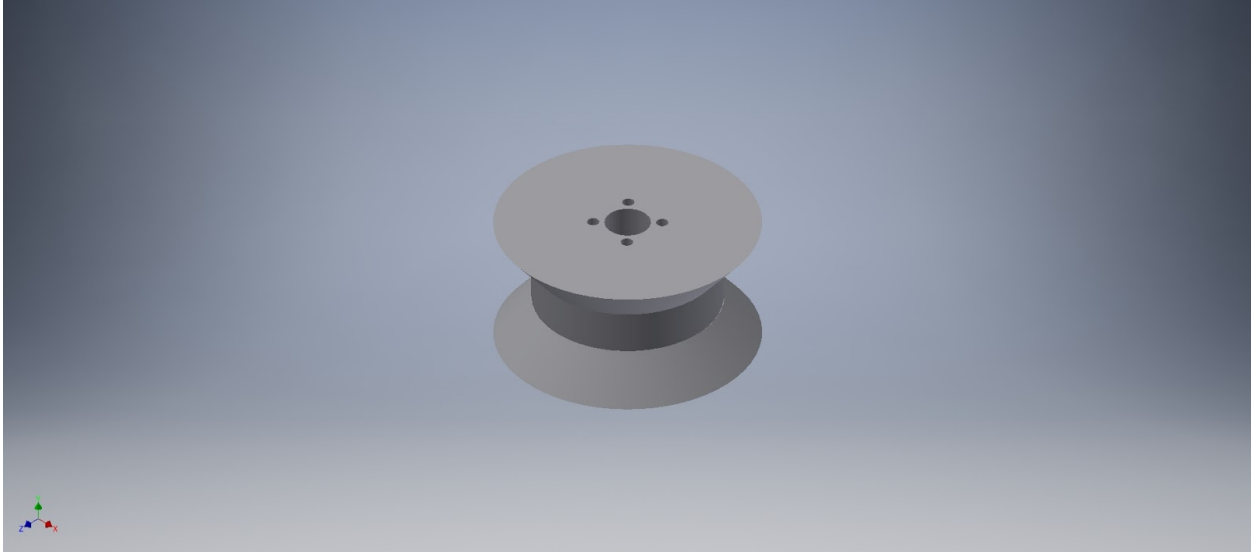
This is our glyph arm string spool 2.0. We built this to new version to speed up the glyph pulley system.
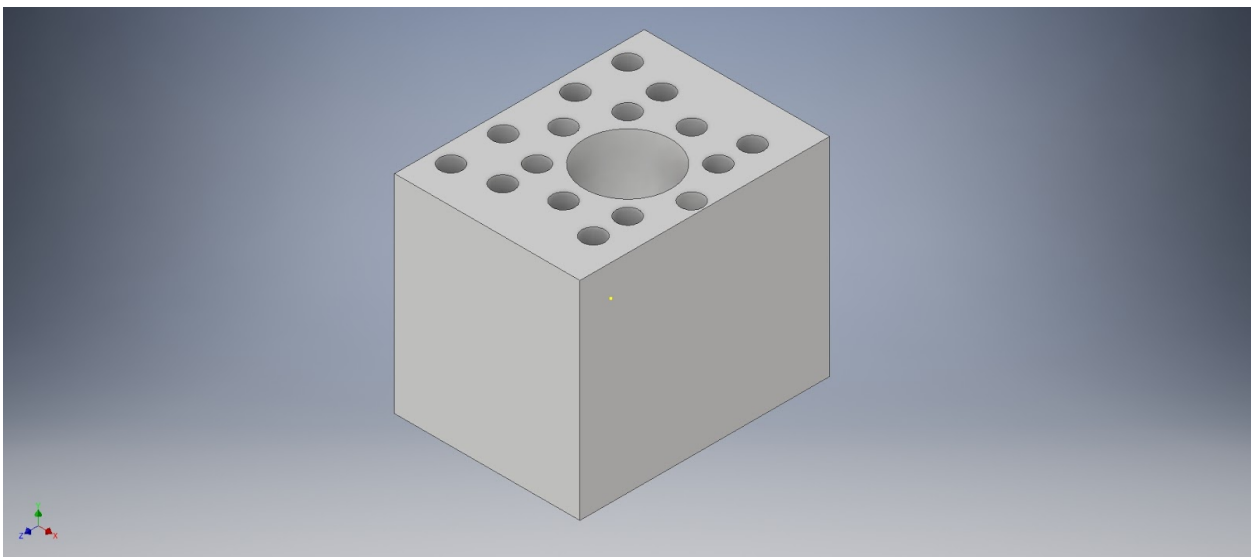
This stabilizes the channel under the pully motor.
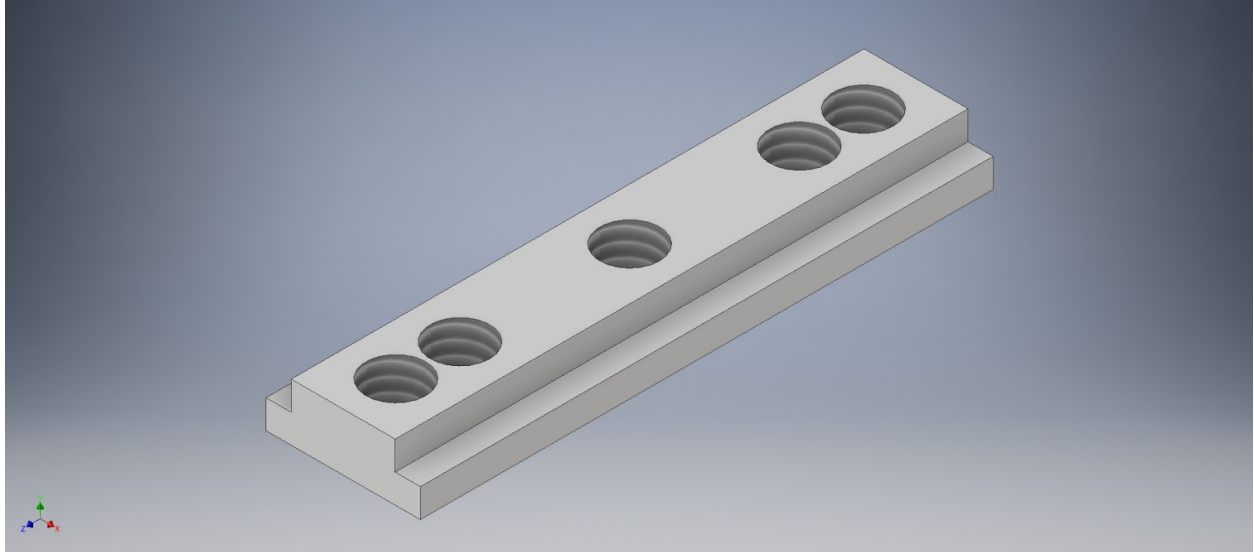
X-rail plate for our new linear slide. We designed this since servocity was out of stock of these.
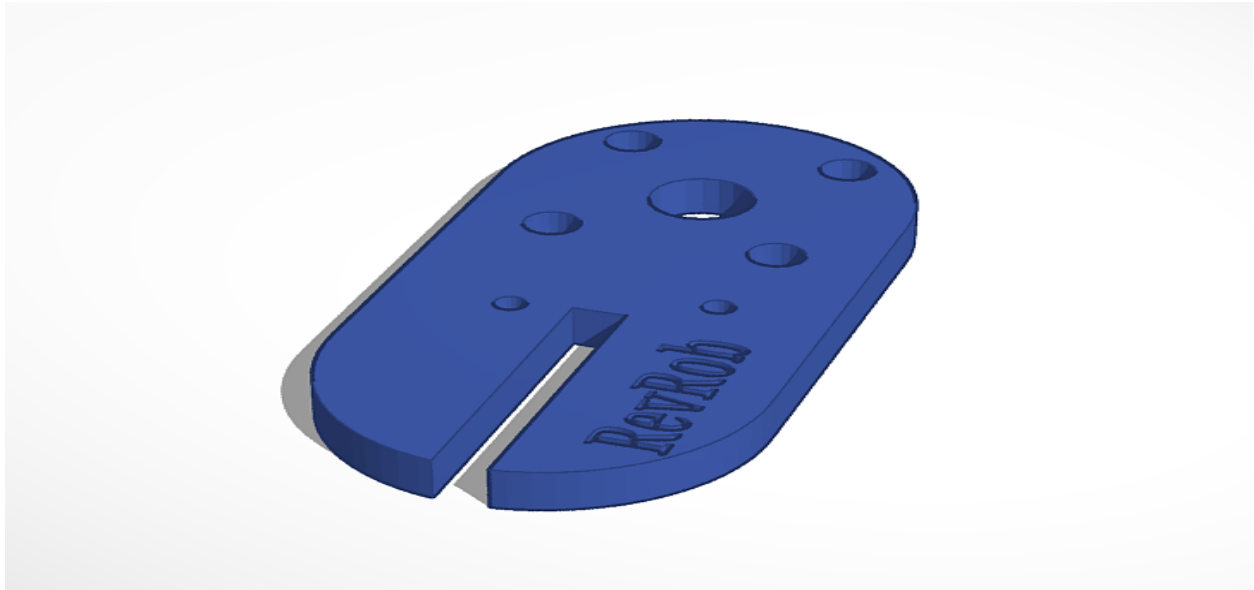
X-rail end to stop rails from sliding. We designed this because servocity was out of stock
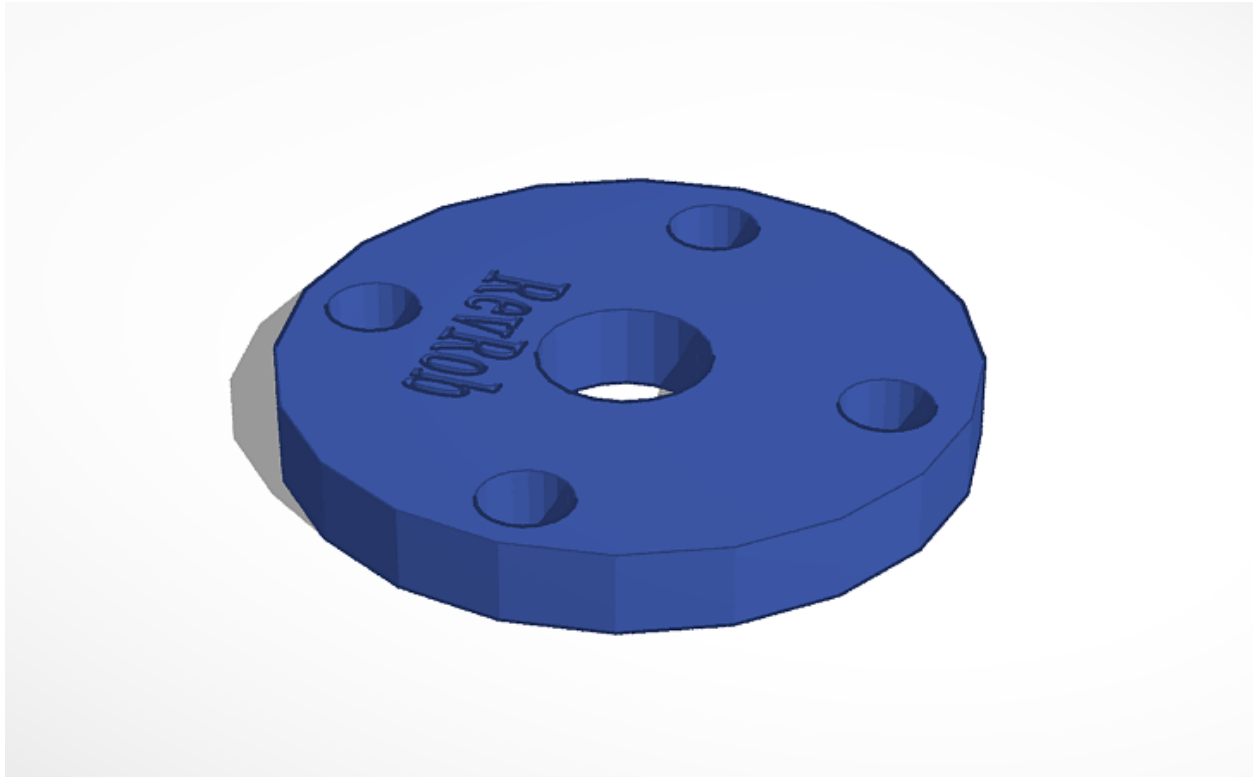
X-rail end version two to stop x rails from sliding. Servocity did not sell these.
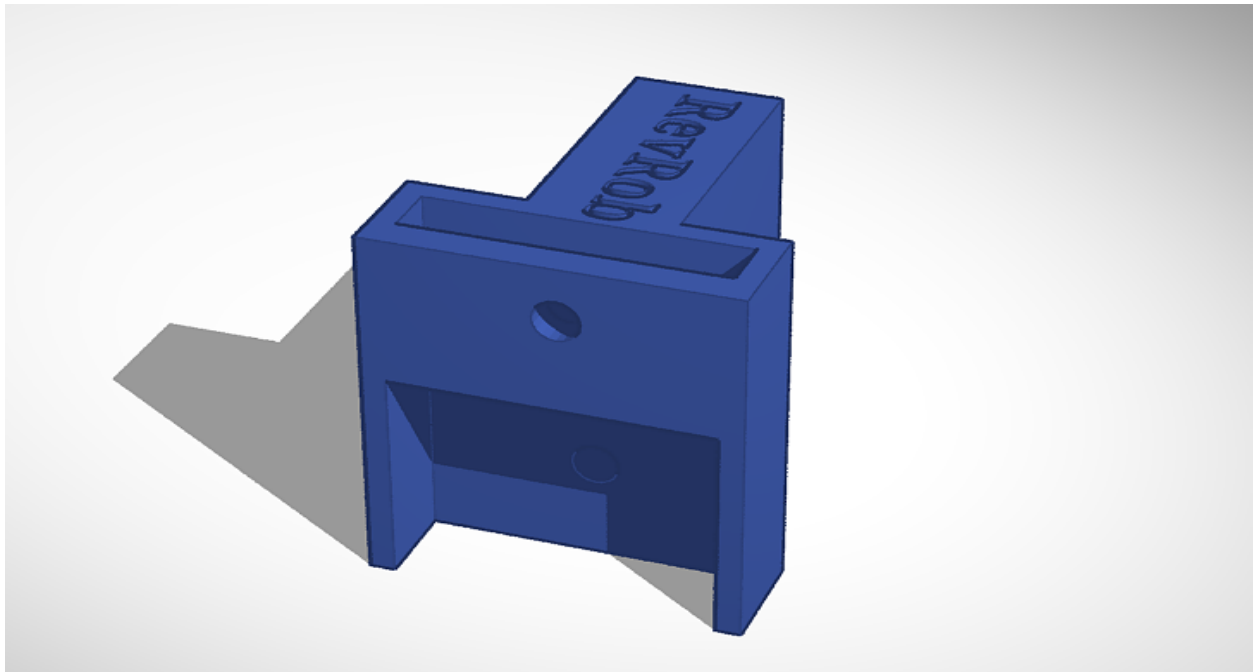
This is a support for our servos on our glyph arm. We were concerned about straining our servos too much
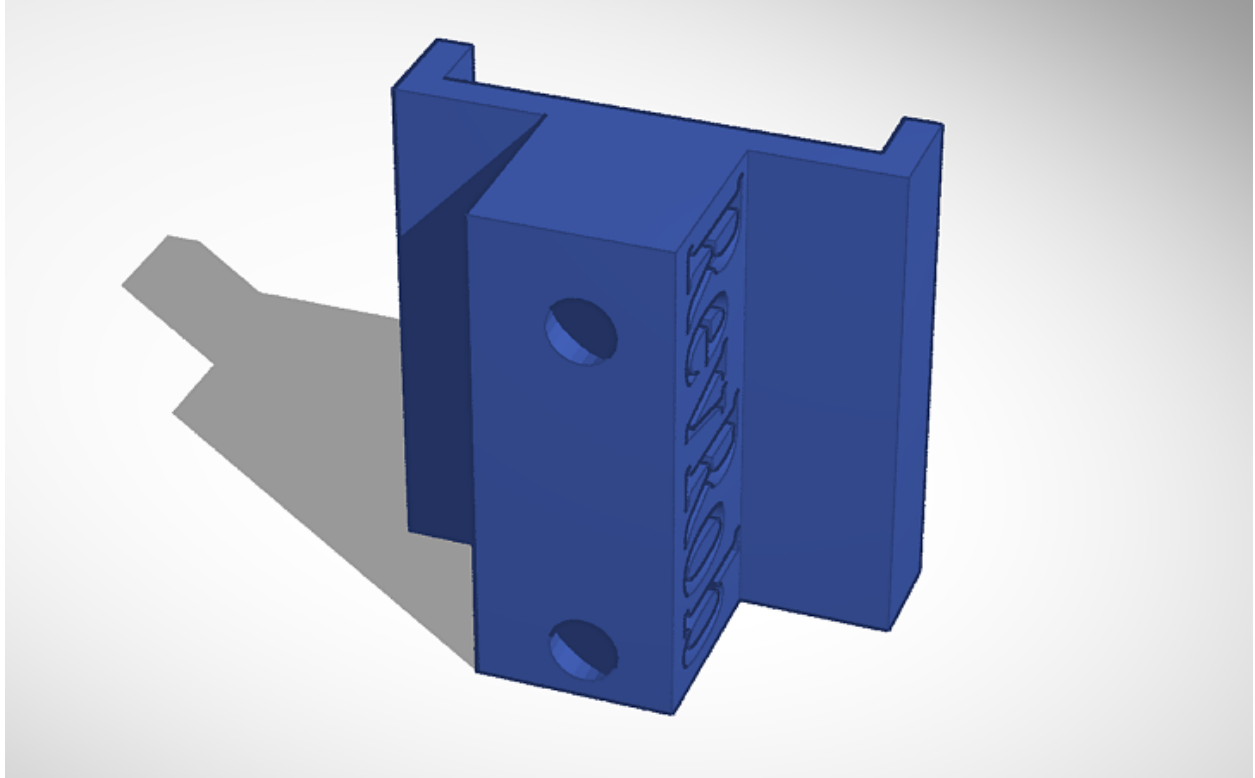
This supports our glyph hands and where they attach between our linear slide.
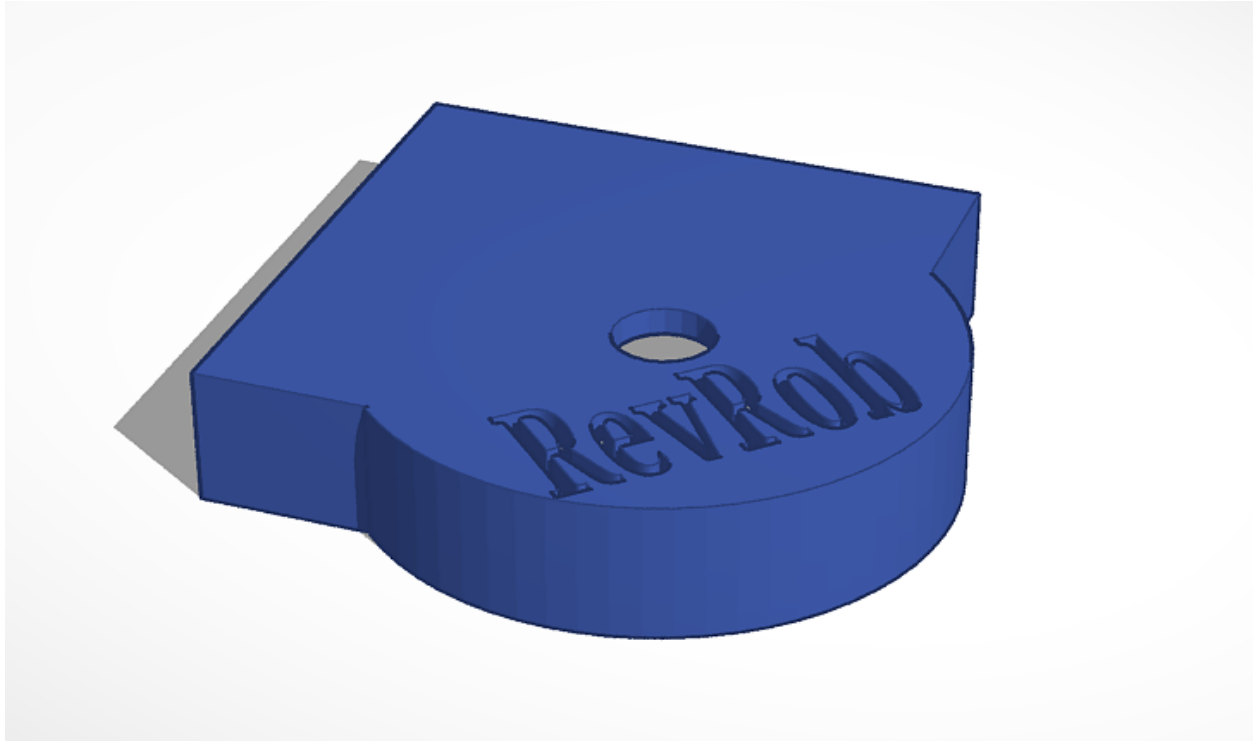
These are guards for our sharp edges on our robot. We (Mark) kept cutting ourselves on the corners.
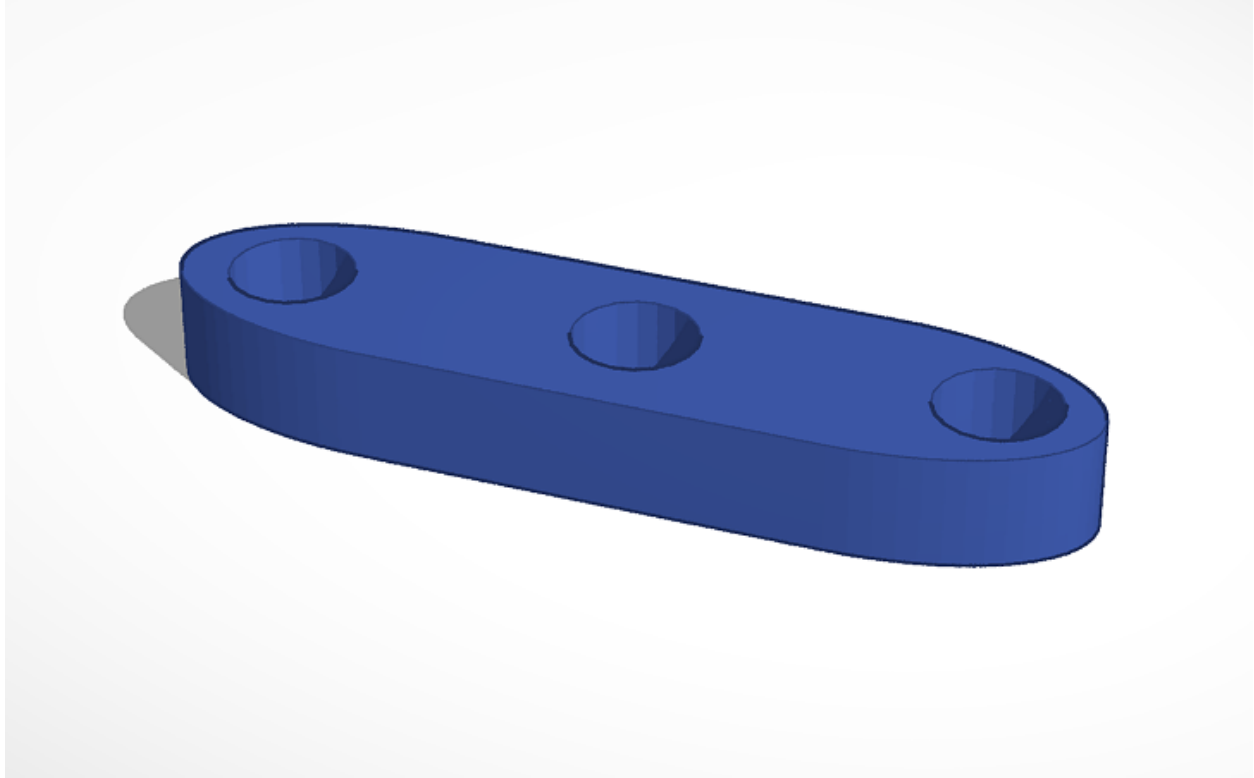
This is a bearing holder for our relic arm. Servocity didn't sell these individually.
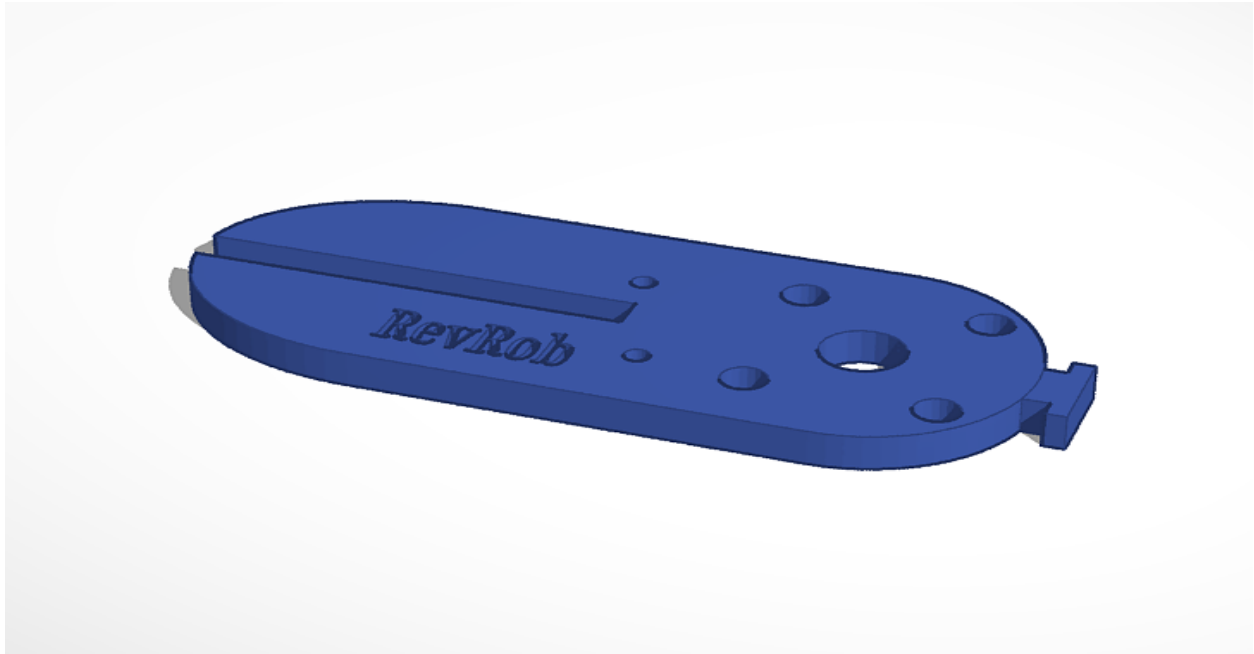
X-Rail End V40. A re-design of the X-rail because the others were not long enough for the final rail.
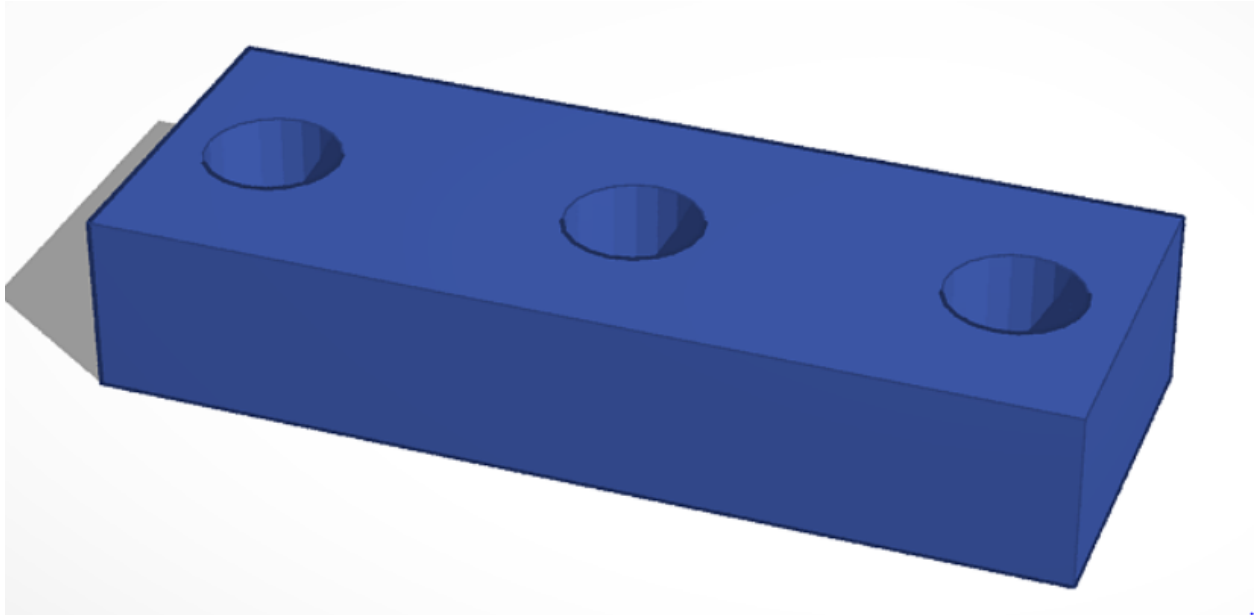
Bearing Holder, A re-design of the of our round bearing because the round one was flimsy and broke several times.
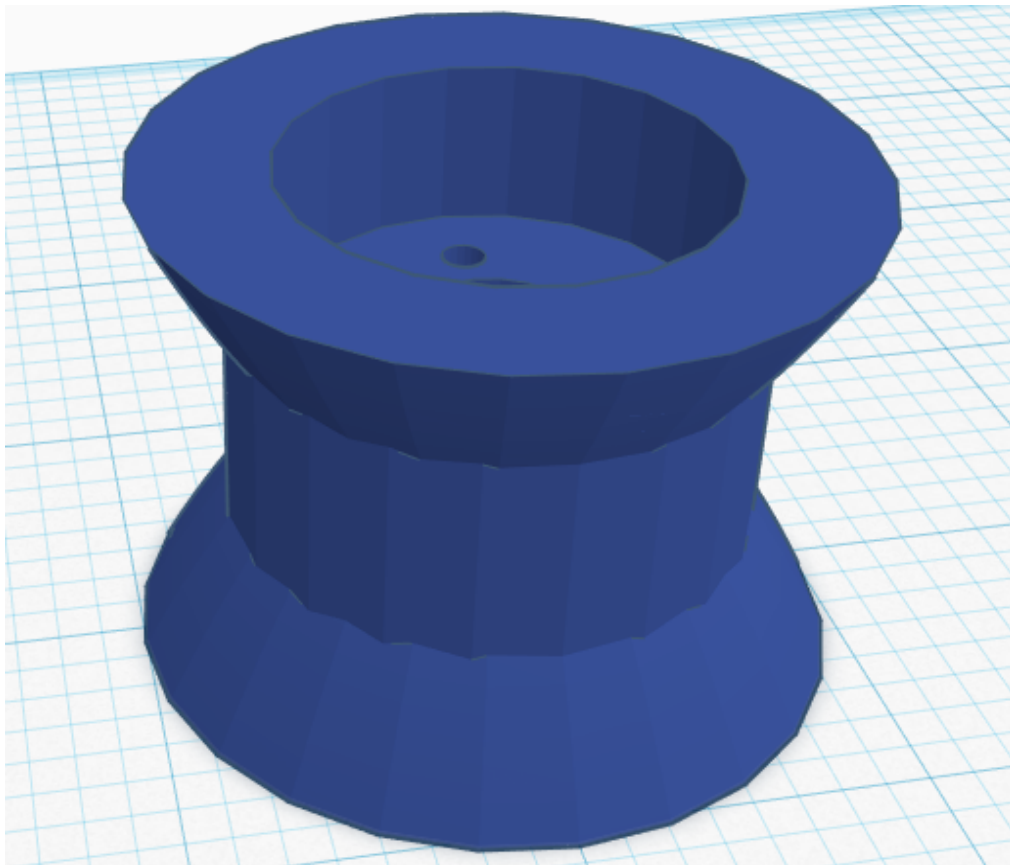
Relic Arm Spool, to hold the string and keep it from tangling
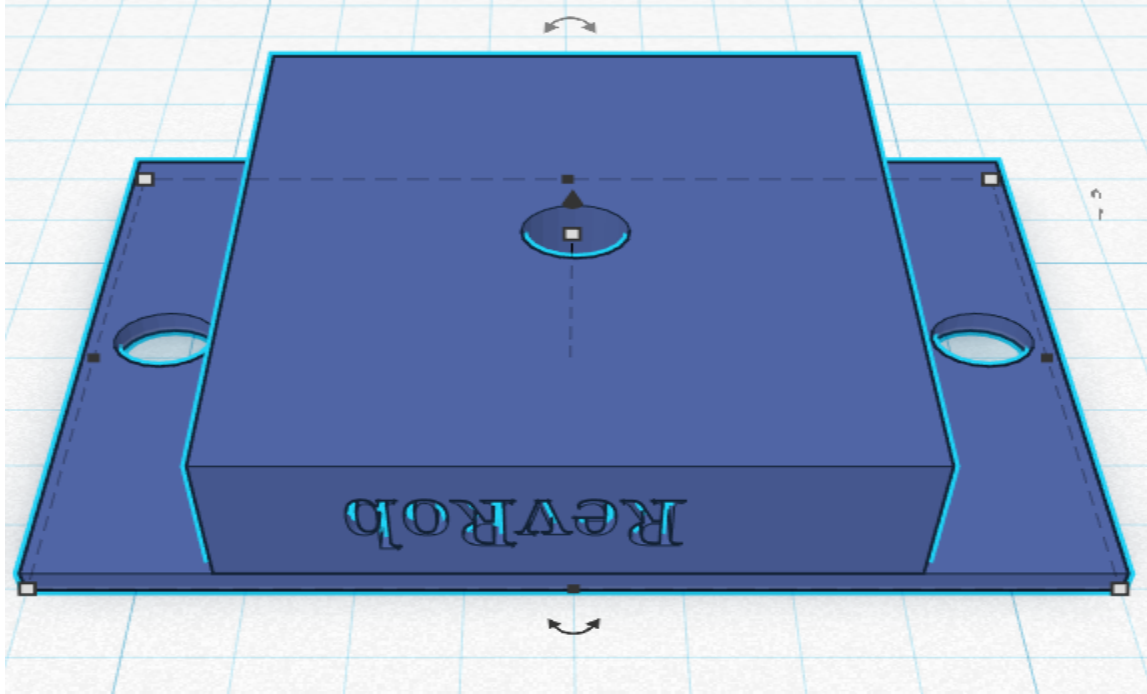
V-Wheel Support. Used to hold two brackets together on the relic arm without reducing the length of our relic arm.

BUSINESS/ STRATEGIC PLAN

Sustainably   Plan

  This is the first year the Moore Community STEM Club has sponsored an FTC team, and all of us on the team have been enjoying our first year. The STEM club does not only have the Revolutionary Robots, but an FLL team #15846, the Electrons, and two Jr. FLL teams, currently named The Waterdrops, #4377, and The Fast Cheetahs, #11468.

  Our FTC team members make an effort to get to know the younger team members so it may encourage the younger team members to advance to the next level of first when they are ready. For example, we have two team members who have served as mentors for the FLL Electrons. They have been able to attend almost Electrons meetings and have encouraged them to keep working to find solutions! (See   Page   F5)

  Also, we have planned at potluck for December 3, 2017, to get them introduced to what happens in FTC. We have invited all the teams of the STEM club so that those in Jr. FLL that can move up will also be able to talk with the FLL team.

  The STEM club does offer open team spots first to previous members of teams within the STEM club, however, they are always willing to accept others when there is an opening. For example, two members of our team came from a referral by Scott Taylor with the Oklahoma Science & Engineering Foundation. They contacted him looking for a team in the Moore area. We are so happy he did, because they have been a great addition to our team!

  We also help the STEM Club recruit new members by raising awareness of what we do. This was the purpose of having a presence at events such as Haunt Old Town and the Dell FLL Scrimmage. (See   Pages   F2   and   F4). We also have an event planned to show off our robot and talk about what we do at Tinkerfest 2018 at the Oklahoma Science Museum.

  We are fortunate enough that we have not had to fundraise yet. Moore Community STEM Club was founded in large part because of the volunteered time of Dell employees. Dell has a volunteer incentive program which allows them to direct donation money from Dell to the STEM club. Our parents also pay a fee up front for us to be a part of the team. This has been sufficient to cover our costs so far. However, we have been careful about our budget and work to stay within the amount allotted to us by the STEM Club.

  The Revolutionary Robots are already known for how loud and excited we get at events, and we love to leave that impression! In addition to our excitement, we also want to show those not in the FIRST community how kids are able to build and code these robots and how much we have learned about engineering and science. Most in the team now look forward to careers in technology   and   engineering   fields. (See   Pages   A2   to   A7)

Connections

In addition to making sure our team is sustainable by recruiting new team members, we have been working to make sure that our team is sustainable as to knowledge. We have been working to make connections with others who will share their knowledge with us.

One of them is our head coach Chris Hazen. He works at Dell as a manager of the enterprise storage support and has a bachelor's degree in mathematics and a minor in computer science. He has been extremely helpful in our FTC experience.

Our mentor, Marty, is an Apple computer repair technician since 2008 and work for a company called Delcom Group. He has been able to help us with technical difficulties and have a better understanding of the process troubleshooting when we have a problem.

At the Dell Scrimmage our team went to support our FLL team and got to talk to a few people who worked at Dell that had questions about FIRST, FTC, FLL, and our team. Our team got to answer questions from adults there to watch the competition and from those walking by during their work day. Our team members who also mentor the FLL team got to answer some questions for what happens at FLL competitions.

We are looking forward to making more connections at the qualifiers! We hope to meet other teams who can share their experiences with us. We know as rookies we have a lot   to learn.   We are sure there are others who have been through this experience before and may have some insight that will help us improve.

Business Plan

The Revolutionary Robots are a community club based team. This means that we are not limited to a school for our members. As long as you want to be part of a team, we are willing to have you. Though since we are not a school team, we have noticed it is sometimes harder to do outreach to spread the word of FIRST and involving other teams. So our team has tried to focus on community-based outreach. Going out and helping those in our community, regardless of whether we can spread the word of FIRST or not.

Goals

Personal Goals

Drew: My goal is to become "fluent" in Java and be able to use CAD

Ivory: I want to make this my best possible year in FTC because I plan on moving up to FRC next year.

Jackson: I want to be able to program using Java.

Mark: I want to program Java the very best, like no one ever has. And how to properly use the gyro sensor

Olivia: Try to win an award!

Sara: I want to make it to super regionals!

This Year

Make it to Super Regionals and beyond

Be the top rookie team in Oklahoma

Go out and tell others about FIRST

Have everyone on the team able to code

Accomplish all possible missions on the FTC field

Future Years

Make it to the Worlds competition

Expand our STEM club and make FIRST available to more kids

Hopefully have more sponsors so that the club will have a bigger budget

Financials

-Budget: $840-$940
 -Bought
  -FTC robotics Kit (Control & Communications, Modules & Servos, Tetrix set): $400.61
  - Rev Robotics Expansion Hub: $23.00
  -Materials for fence: $124.21
  -Foam Mat: $118.70
  -Field Mat: $554.19
  - First Registration: $275
 -Plans to Buy
  -Fabric for coats:$150
  -Fabric for flags: $20
  -T-Shirts: $108
  -Cocktail/Coffee Straws: $7 for 1000
  -Qualifier Registration: $75
  -State Registration: $200
  -Gaffer's tape: $55 for 3 rolls
  -Misc. Parts: $300-$400

The average budget for an FTC team is $2605. This includes everything we have already bought, a couple things that we want to get. Although, they include gas and food. We have food donated and everyone covers their own travel/gas expenses.
We have already spent $1495.71.
We want to have anywhere from $850-$950 to spend on team items and registration. We have to have at least $275 for registration. The rest of that budget is meant for possible extra parts for the robot, team uniform, and swag to hand out at competition. We offer the $850-$950 so that the STEM meeting can discuss and compromise on budget for Rev Robots.

OUTREACH

FLL Mt. St. Mary's Qualifier

On Saturday November 4, 2017 three members of our team Jackson, Olivia, and Mark and the coaches volunteered to help at the Mount Saint Mary's FLL qualifier. Also at the same FLL qualifier Sara was mentoring two junior FLL teams, the Fast Cheetahs, who earned the Gracious Professionalism award, and the Waterdrops, who won the Against All Odds award. The three that were volunteering were assigned to the practice table. At about 10:00 AM, teams started to show up and use the practice table. From that time on from 10:00 AM until about 11:30 AM the practice field was not used very much because it seemed like most teams were preparing their core values and their research projects. After lunch, the table was used much more. The starwhales used the practice table the most. Most of the time the starwhales were at the table and occasionally another team would take a five to ten minutes turn and then go back to their team table.To my surprise after the robot games began more teams came to the practice table than before. When the games started Jackson, Olivia, and Mark took ten minute shifts working the practice table so that we could all watch some of the games. It was a fun and an interesting day and we all had a lot of fun building the table and helping out the FLL teams.

Haunt Old Town

Haunt Old Town is the annual Halloween celebration in Moore, Oklahoma. This year it took place on October 28, 2017. In the Haunt Old Town outreach project we constructed a large cardboard robot constructed from tape, tinfoil, pipe cleaner, and colored construction paper. The team members involved were Sara, Irony, Mark, and Olivia. Our team talked to "SO MANY PEOPLE", said by team member Sara but our team and coaches estimate they spoke with more than 100 people about what we do and how early you can join this program or a similar one, F.T.C.,F.L.L., F.R.C.

We handed out about 38 pounds of candy!

Our Parody Song

Our team participated in the FIRST song parody challenge with a parody of "Where Them Girls At" called "Where Them Bots At". The lyrics were written by our teammate Ivory Moore with the help of Sara Moore, and the video was filmed and edited by Alda Johnston, a team parent. The parody can be found at https://www.youtube.com/watch?v=JXE1BHoy3eE

Dell FLL Scrimmage Day!

Our team got to be at the scrimmage that was held at Dell in OKC on October 20th. The Moore Community STEM Club's FLL team, the Electrons, #15846, was one of the teams competing at the scrimmage. Our team had gone to promote FTC and support our FLL team. We talked with many adults about FIRST and about our team. We also conversed with another FTC team, the Rockets, and exchanged advice and questions.

Mentoring

The Revolutionary Robots understand that a valuable way to keep our team going is to keep connections strong with Jr. FLL and FLL teams so they can advance as they grow up. This is a big reason why we have team members who also mentor. Two of our team members, Ivory and Mark, are mentors for the the Electrons, FLL#15846. We also have another team member, Sara, who works with two Jr. FLL teams - The Waterdrops #4377 and The Fast Cheetahs #11468.

Social Media!

The team has three open social media: a YouTube channel, Revolutionary Robots Team #12535, a Twitter, @FTC12535, and a FaceBook, Revolutionary Robots. All are recognizable by the icon on the front of our notebook.
The Moore Community STEM Club has a FaceBook, Moore Community STEM Club , and a Twitter, @moorestemclub.
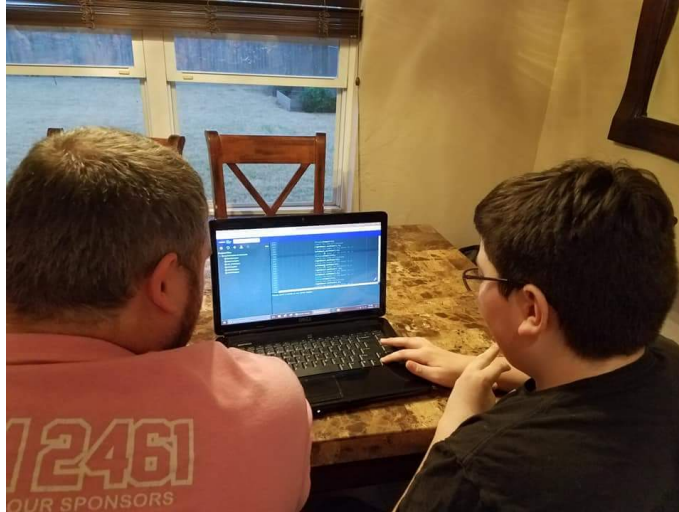
POTLUCK

On December third the day after our first qualifier, our team held a meeting to talk about the results from the qualifier. After the meeting our team hosted a potluck for the FLL and Jr. FLL teams that we mentor. We talked about FTC and the differences from FLL and Jr. FLL. We then showed them our robot and talked about the challenges we have to complete.

Financials

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Getting Help!

This season was tough for us! Luckily, after our first Qualifier we made some good connections and were able to get help from the Atomic Gears, #10641, and the Iron Giants, #7452. They were such a big help and our notebook and robot probably wouldn't be like they are now without their help.

The first time we met up, it was purely for advice on whatever they were willing to give. The team split up, one half going to work with the notebook and the other to get robot advice.

The second meeting we asked if they could help us with CAD. We were trying to design our own pieces and build our robots, but it just wasn't working out and we weren't sure about some of the functions.

We are extremely grateful for all their help!

Helping Other Teams

In the final week before the Newcastle Qualifier a team Ivory used to work with came up and said that their coach had abandoned them. This team is the Senoritas of Awesomeness, team #12526. Their robot could only move forward and backward, and they wanted to know if they could just come and get some help. And we accepted!

They came over on Wednesday and Friday before the competition they came to us with questions about their robot, some notebook ideas, and questions about how competition worked. We helped them to the best of our ability and can not wait to see how they perform at competition!

Scrimmages!

The Lightsabers

A week before state, we decided to invite some teams over to our field for some Scrimmages. The LIghtsabers responded and came over. We were able to help each other out and ask questions. Our robot had a few malfunctions, but they were able to help us out and give us some advice about an encoder problem we were having.

Mt. St. Mary's

The weekend before state our team participated with other teams at a scrimmage that Mt. St. Mary's held. We ran into a TON of issues, but the Mt. St. Mary's teams were able to help us out. We first encountered the problem of our REV Expansion Hub no longer functioning the way it was supposed to. The team loaned us one of theirs and a pair of wheels because the ones we were using were illegal. This we did not know, and we thank the teams for pointing this out to us!

Future Events

The Revolutionary Robots are planning to volunteer at the Oklahoma Regional FRC Competition at the Cox Convention Center on March 28, 2018 to March 31, 2018.

Revolutionary Robots have signed up to run a table at Tinkerfest 2018 at the Oklahoma Science Museum. We believe this will give our team an opportunity to connect with a lot of people.

On April 28th, the Revolutionary Robots have volunteered time for a local food bank.

Checklists and Forms

Start of Meeting

- Core Values
- Robot Checklist
- Cover Last Meeting
- Develop Plan of Action
- Check Batteries
- Turn On Everything

End of Meeting

- Take Pictures
- Update notes
- Shut down Everything
- Plug In Everything
- Pick Up Parts
- Check Floor
- Store All Parts
- Dismantle The Floor And Fence
- Core Values

FTC CORE VALUES

- ★ We act with integrity.
- ★ We are a team.
- ★ We do the work to get the job done with guidance from our coaches and mentors.
- ★ We respect each other in the best spirit of teamwork.
- ★ We honor the spirit of friendly competition.
- ★ What we learn is more important than what we win.
- ★ We behave with courtesy (pronounced curt-uh-see). and compassion for others at all times.
- ★ We share our experiences with others.
- ★ We display gracious professionalism in everything we do.
- ★ We have fun.
- ★ We encourage others to adopt these values.

COMPETITION CHECKLISTS

Pre-Match Checklist

- ❏ Make sure fresh battery is in place
- ❏ Power on phones
- ❏ Place phone in holder with Velcro
- ❏ Check all electronic connections include controls (ESPECIALLY USB)
- ❏ Check for loose screws
- ❏ Check for unsecured wiring
- ❏ Clean wheels
- ❏ Test all motorized parts
- ❏ Spray the relic arm with WD40
- ❏ Check pulley line

Field Setup Checklist

- ❏ Check all cable connections (ESPECIALLY USB)
- ❏ Make sure color arm is centered between jewels
- ❏ Check CR servo adjustment
- ❏ Make sure robot is straight on balance board
- ❏ Make sure balance board is straight
- ❏ Set glyph in front of robot
- ❏ Even out gear bars and lower elevator fully
- ❏ Make sure your program is correct
- ❏ Initialize
- ❏ Set up controllers
- ❏ Grippers in alignment
- ❏ Check the strings

Post-match checklist

- ❏ Power down
- ❏ Tighten everything up
- ❏ Check for missing parts
- ❏ Charge battery
- ❏ Charge phones
- ❏ Team meet to discuss issues and plan of action
- ❏ Make minor adjustments

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ALLIANCE CHECKLIST

TEAM #

TEAM NAME

AUTONOMOUS-	Jewel	Yes No
	Glyph in column	Yes No
	Correct column	Yes No
	Safe zone	Yes No
TELE OP-	Glyph row	0 1 2 3 4
	Glyph column	0 1 2 3
	# of glyphs	_____
	Pick up relic	Yes No
	Which zone	1 2 3
	Standing	Yes No
	Balancing stone	Yes No

What do they do really well? _____

What do they want in an alliance partner?

_____

Notes:

_____

_____