Engineering Notes (01/06/18)

Session: 15
Location: Servite High School (FIRST Kickoff), Anish's Garage
Attendance: Aaron, Albert, Anish, Arjun, Aryan, David, Euan, Jaimin, Jingwen, Rudy, Sophie, Steven, Yiming, Jason, Krish, Parva, Rithik
Coaches: Raj, Srini
Note Taker(s): David, Steven, Jamie

Objectives	**Achievements**	**Issues and Concerns**
Go to the Kickoff to receive necessary materials and examine game pieces for 2018 FIRST games	Good attendance, we were able to witness the schematics and mechanisms of this year's game	None
Discuss strategies, rules, and specifications for 2018 robot and game	Held a socratic style seminar where we analyzed every part of the game kickoff video and game manual	Disputes over whether we were allowed to raise our robot 12 inches by extending from the Scale platform

Objectives & Work Done

- We were able to examine the practice field at kickoff
- Received our kickoff kit
- Successfully accessed and read the game manual
- Discussed how to navigate this year's rules

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Confusion in understanding game rules; clarification by reading the game manual all the way through

Research *What did we have to learn about in order to move forward?*

- We had to learn about the game rules

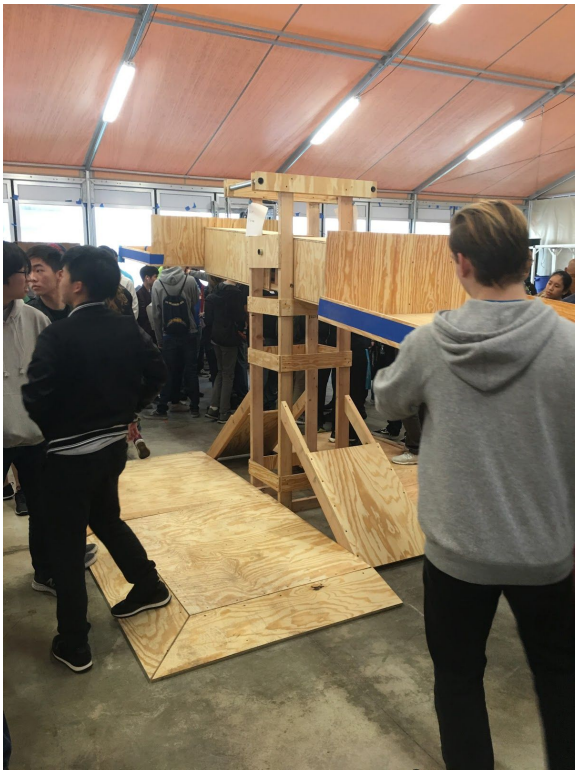
Decisions Made *What progress did we make? What was achieved?*

- We decided to prioritize the scale and switch missions over hanging

What we learned *What mistakes did we make and what can we learn from them?*

- We learned a lot about how this year's game would work

Pictures



Engineering Notes (01/07/18)

Session: 16
Location: Anish's House
Attendance: Aaron, Albert, Anish, Arjun, Aryan, David, Euan, Jaimin, Jingwen, Rudy, Sophie, Steven, Yiming, Jason, Krish, Parva, Rithik
Coaches: Raj, Srini
Note Taker(s): Aaron, Parva, Aryan

Objectives	**Achievements**	**Issues and Concerns**
Read the manual	We had all team members go over the manual so there we would be no issues later on	Many might forget the specifics of each rule. Hard to remember.
Watched strategy videos	Decided on point values	Still concerned about switch/scale/climb importance, ranking pts vs winning

Objectives & Work Done

- Discussed the game manual and had a discussion on topics we were confused about with the game manual and strategy videos
- Started discussing our game plan, strategies, and our design for the robot's components
- Discussed on possible supplies that we would need to buy or what we already had

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Since it was the beginning of the season, we did not face any problems regarding the robot, nor did we have any issues with our fundraising/outreach efforts.

Research *What did we have to learn about in order to move forward?*

- We thoroughly read the game manual and discuss all aspects of this year's challenge. In addition to reviewing the rules, we discussed on the best strategy to maximize our points and wins.

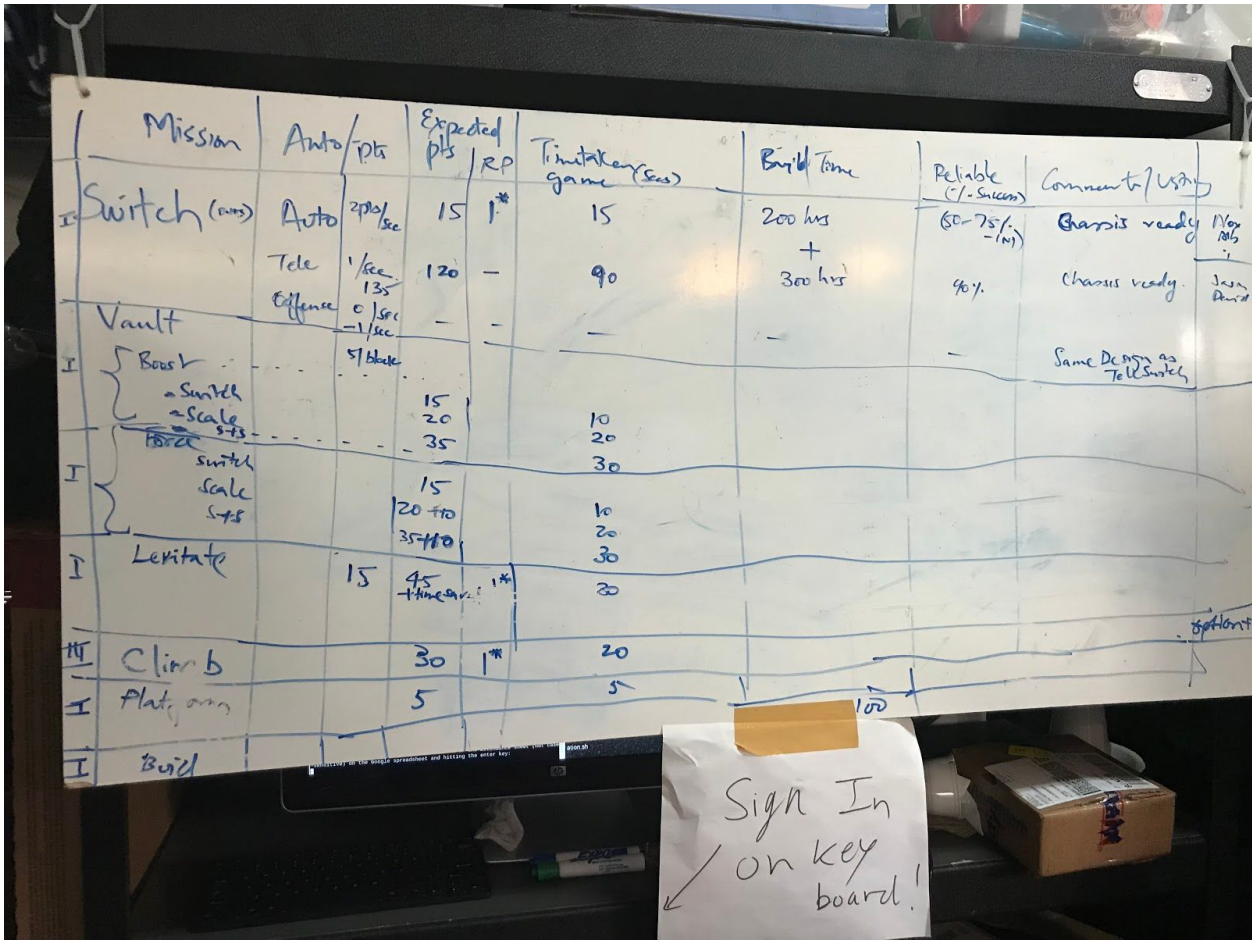
Decisions Made *What progress did we make? What was achieved?*

- The team decided on the strategy that we would use. After long hours of discussion and debate, we were ready to tackle the FRC challenge.

What we learned *What mistakes did we make and what can we learn from them?*

- Through this long process, team members learned how to better convey their ideas and thoughts in a large group setting. They, along with the coaches, went through many plans, and learned how to finalize on the best one. Strategy skills were also developed,

as the team needed to decide on one plan before proceeding in order to best utilize our limited time.



Above: the decision matrix we used to decide our mission plan.

Engineering Notes (01/12/18)

Session: 17
Location: Anish's Garage
Attendance: Aaron, Albert, Alex, Anish, Jaimin, Jamie, Jason, Jingwen, Jun, Krish, Parva, Rithik, Sophie, Yiming
Coaches: Raj
Note Taker(s): Albert Lin, Arjun Neervannan, Jaimin Patel

Objectives	**Achievements**	**Issues and Concerns**
Design prototype for the lever arm system Design grabbing mechanism for cubes	Settled on a simple lever arm design with hex shaft for rotation, and piston to supply counterweight	Did not want to waste metal, so we used wood to create prototypes
Start construction of field elements	started on the exchange, decided on the design and cut most of the wood for the field elements	ramp might be a problem because we don't have a thin enough piece of wood so the robot may have trouble placing the power cube inside the exchange
Build CAD model for the base chassis + arm system	got together with build to work out what parts and things we need	Dimensions for anything still to be determined
Continue Outreach efforts	Reached out to more schools as well as the Discovery Science Cube in Santa Ana	Only a few responses

Objectives & Work Done

- Prototype for level arm
    - Drilled holes and attached hubs, bearings, and mounting blocks
- Grabber
    - Blocks cut out for pieces, pneumatics attached
- Field components
    - Productive day, decided on designs and started the exchange, focused on cutting wood and drilling in holes
- Outreach
    - Contact more places to present (children's centers, schools)

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Prototype for lever arm
    - We need to consider the dimensions for this and whether they'll fit within the robot dimensions and maximum limits
    - Needed to provide support that can consistently counteract weight of arm - piston

Engineering Notes (01/13/18)

Session: 18
Location: Anish's Garage
Attendance: Arjun, Albert, David, Rithik, Jason, Anish, Yiming, Alex, Aryan, Aaron, Jamie, Jingwen, Parva, Krish, Jaimin, Steven
Coaches: Srini, Raj
Note Taker(s): Anish Neervannan, Krish Mehta, Yiming Jia

Objectives	**Achievements**	**Issues and Concerns**
Complete prototype for the lever arm system	Our basic prototype is now complete, with proof of concept that a piston-string attachment would work very well	At this point, several - whether we can get the piston to pull the lever-arm higher, how tall the support and arm should be to not exceed the length of the chassis, and which configuration of chassis to use (also in conjunction with the CAD objective below)
Continue constructing field elements	made progress on the exchange and started making the switch, exchange is almost done, mostly sanding and cutting wood, used blocks to cover the wood screws that were sticking out on the inside of the switch	we remade the ramp because we found thinner wood and it was more effective although this did take up a lot of time
Build CAD model for the base chassis + arm system	Redid another CAD diagram to suit another person's idea.	Bad communication with build. One person in build asks for one thing and another person disagrees. Confusion and hard for 2 CAD people to manage build's ideas.

Objectives & Work Done

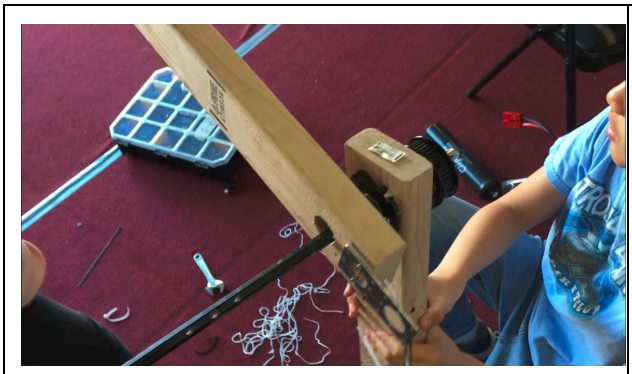
- Prototype for level arm
    - Complete; hinge is attached with a string connected to the opposite end of the fulcrum, compensating for the weight of the arm on the other side
    - So now we can use a motor to fine-tune the motion of the arm without having to strain
    - Problem lies in whether the piston can pull the arm all the way up- right now it only goes up till 30 degrees
    - Can perhaps be solved by moving the point where the piston's string is attached to the lever-arm -- will just need more power however
- Field Elements
    - The wood screws we had were a bit big but we made do with them by using wooden blocks on the other side for the screws that were sticking out

- we solved the problem of the ramp being too thick by sanding down a thinner piece of wood and adding triangle supports to the ends

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Prototype for lever arm
  - We need to consider the dimensions for this and whether they'll fit within the robot dimensions and maximum limits
  - Also need to make sure that the piston can reach maximum height

Pictures



Lever arm extended all of the way up. String is attached to metal bar, and piston is supporting the weight of the fulcrum

Construction of the field elements ongoing

CAD modeling and hand-drawn diagrams to figure out chassis restraints

Engineering Notes (01/14/18)

Session: 19
Location: Anish's Garage
Attendance: Jason, Rudraksha, Rithik, Jamie, Jingwen, Parva, Alex, Yiming, Krish, Aryan,
Coaches: Srini, Raj
Note Taker(s): Rithik Lingineni, Rudraksha Gupta, Jason Lin

Objectives	**Achievements**	**Issues and Concerns**
Start designing multiple CAD designs for the chassis	Almost completed one of the desired missions	Slow computer, 1.5 person working on CAD, finals week
Test out the grabber mechanism	Tested out the mechanism and improved it by making it more efficient at doing its job, as well as simplifying the design	Pneumatics was a concern as we had to replace certain parts
continue field elements	finished exchange and begin/continue switch	The wood we used for the switch is kind of flimsy so the result might be a little unstable

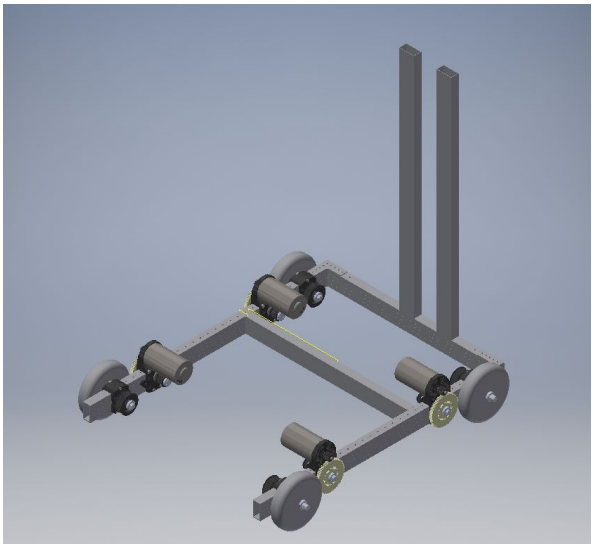
Objectives & Work Done

- Started designing the arm mechanism we saw on Ri3d. Basing most of our ideas from them.
- Planning to buy some parts from kit of parts
- Planning to do an elevator design
- Grabber prototype completed and kinda tested
- Attached pneumatic pistons onto the grabber
- Program and attach the pneumatics system
- Placed the grabber onto a boardtin and attached it to our preseason robot.

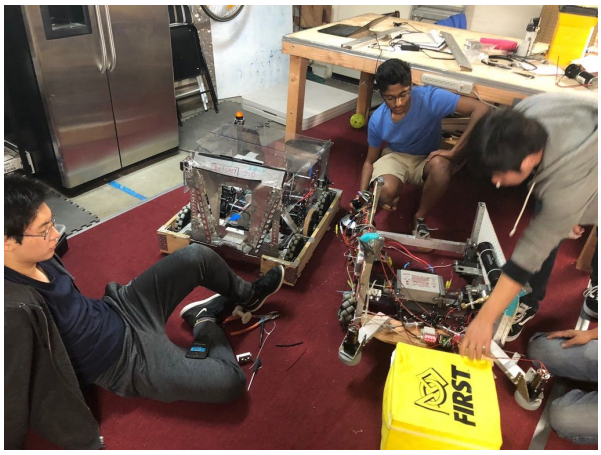
Problems *What problems did we face and how did we solve or attempt to solve these?*

- Computer slow - no way around that…
- Not many people doing CAD - got Jason to do CAD on grabber, but he's busy with build
- Pneumatics system had leaks
- Solenoids weren't acting in sync
- Gearbox for the grabber was somewhat loose from the inside

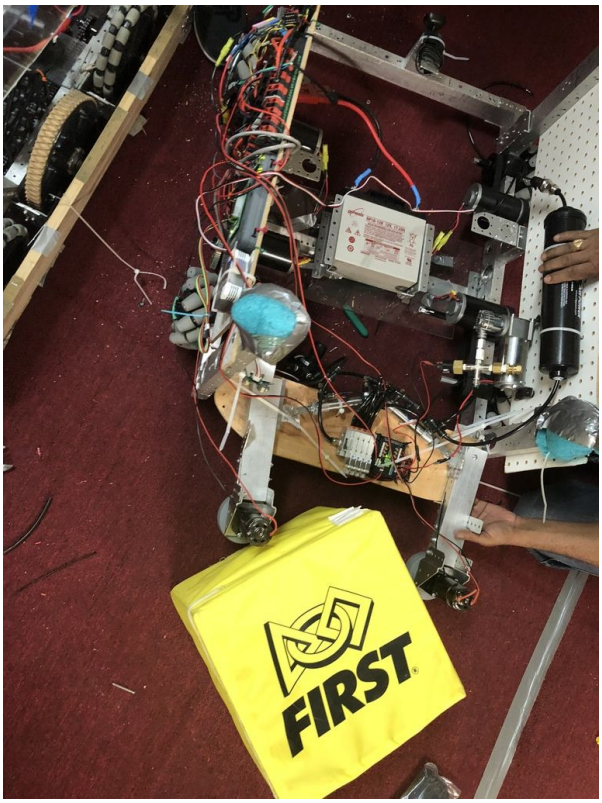
Pictures



Designing arm with the chassis. Elevator idea next.



Testing grabber



View on grab.

Engineering Notes (01/18/18)

Session: 20
Location: Anish's Garage
Attendance: Aaron, Albert, Anish, Arjun, Euan, Ganesh, Jaimin, Jamie, Jingwen, Jun, Krish, Parva, Rithik, Rudy, Sophie
Coaches: Raj, Srini
Note Taker(s): Aaron

Objectives	**Achievements**	**Issues and Concerns**
Dimension and prototype the Arm design	Finalized design for the arm and did some CAD for it	We need to know the exact dimension as we may go over frame perimeter with current dimensions, worried about 16 inch rule while reaching the ground
Take inventory on all newly acquired material, inspect what materials are lacking	Inventory on all metal bars taken with hex shaft and wheels (mecanum)	Very time consuming, some new stuff was misplaced so it the whole sitation became complicated
Continue building field elements	Most of switch built, moving on to the scale and deciding on our design for how to balance the scale; decided on using supports in a windmill like structure	The switch is slightly flimsy because of the thin wood, so we need to add something to the corners to stabilize it

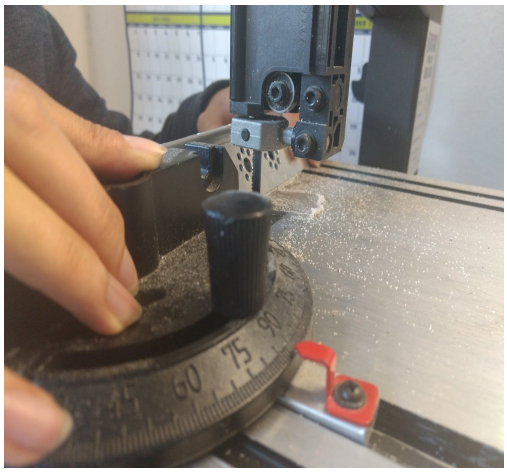
Objectives & Work Done

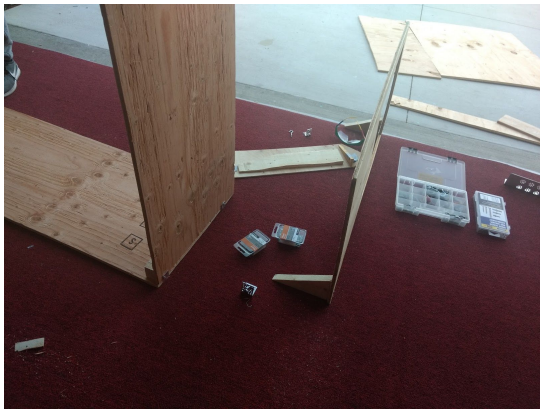
- Final dimensions being confirmed
- Prototypes of CAD finished
- Official CAD and chassis production being set up
- All materials being reorganized

Problems *What problems did we face and how did we solve or attempt to solve these?*

- The switch is flimsy since we only built 3 sides, so we have to add something to the corners to keep it stable
- Computers are still slow and we had a limited number so as a result had limited productivity

Pictures





Engineering Notes (01/19/18)

Session: 21
Location: Anish's Garage
Attendance: Everyone
Coaches: Srini, Raj
Note Taker(s): David Kurniawan, Steven Li, Arjun Neervannan

Objectives	**Achievements**	**Issues and Concerns**
Finish CAD Model of Chassis, construct chassis frame, begin assembling it with drive system	We were able to construct all the parts needed to make the chassis and began to assemble it as we received the drive system parts	Unsure of specifications as CAD model was built off a rough sketch
Finish building the grabber	Pretty much completed the grabber with only minor adjustments and testing left	Still have a few issues left concerning testing and making sure everything is smooth
Assemble pneumatics panel	Roughly completed the system with the only thing left being to attach it to the panel and attach that to the robot	Not finished yet, still need to attach a few more things
Continue field elements	Working on the scale now, which is the most time-consuming piece; we finished the platform for the scale and the plate by using bolts and a cross-like frame on the bottom	The plate might not be able to be supported by the scale, so we need to think of more ways to support the weight

Objectives & Work Done

- Assemble the chassis frame
    - We were able to cut out the bars, attach the brackets and do a rough-assembly of the frame
    - We drilled out the holes where the wheel axles and hubs will go
- Start on the drive system
    - We received the vex parts for the gearbox and wheels and finished assembling the gearbox

Problems *What problems did we face and how did we solve or attempt to solve these?*

- There was some difficulty figuring out the assembly of the gearbox, especially with the key and the gear
- We were able to solve this problem eventually
- The bolt would not go down all the way because we used to wrench to force it in since the wood was too long and the bolt was too short to put a nut at the end

Research *What did we have to learn about in order to move forward?*

- We used the manual online to figure out how to assemble the gearbox correctly./configure --prefix=$GEOS_DIR ./configure --prefix=$GEOS_DIR

Pictures

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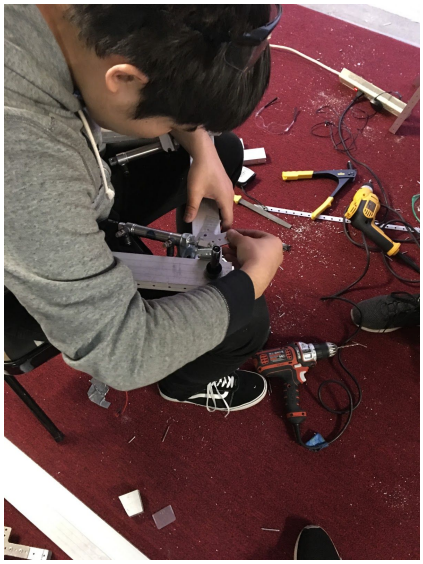
<td>  </td>
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Engineering Notes (01/20/18)

Session: 22
Location: Arjun's Garage
Attendance: Everyone
Coaches: Raj
Note Taker(s): Aaron, Steven, Jamie

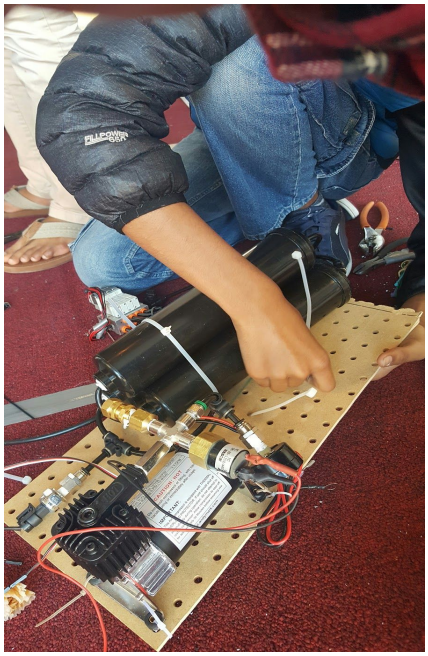
Objectives	**Achievements**	**Issues and Concerns**
Finish CAD model of drive system	New model made with new drive system with pulleys	We ran into many constraint and lag issues
Continue to build stage	Switch and balance almost done; we are working on the plate for the scale balance right now,	Dimensioning and screwing wood in difficult because it is so thin and the wood keeps on splitting
Begin construction of the Arm subsystem	Finished prototype, actual arm almost done, attachment to the chassis	Arguments over construction and dimensions in CAD takes place, issues with placing the bearings
Continue build grabbing/intake system	Made good progress on the intake system	

Objectives & Work Done

- Continued working on a scale and switch for the field elements in order to get more accurate testing for robot
    - The team bought stronger steel screws in order to ensure the wood parts wouldn't slip or break off
- CAD team continued work on designing sections for our robot in order to get a simulation ready before we started building the real design
    - Our new drive train system which used a system of belts(pulleys) seemed to work; however, we found that the system extended beyond the boundaries, so it would need to be altered
    - CAD model of arm completed
- Since the CAD model of the arm was done, we began prototyping with build team members; however, there were issues in regards to bearing placements
    - Furthermore, there were issues in regards to dimensions as the bars made were off in comparison to the lengths designated on the CAD diagrams
    - We also risk extending beyond the boundaries which is an issue we need to look in to
- Jason and other build members continued work on the grabbing intake system using the green compliant wheels to get extra grip on the box'

- Our electronics team also began prototyping ways to fit the compressor and other electrical components on the robot

Pictures



Engineering Notes (01/21/18)

Session: 23
Location: Arjun's Garage
Attendance: Everyone
Coaches: Raj
Note Taker(s): Yiming, Jingwen, Alex

Objectives	**Achievements**	**Issues and Concerns**
Mount the motors onto the robot	Decided on a new design for the motor mounts; assembled gearboxes for the robot	
Field components (scale)	Finished base+supports; almost finished with the whole scale and ready to assemble together	Time management and problem wit balance of weight for the scale, it might tip over if we don't have sturdy supports
Begin 2nd chassis	Cut pieces for the chassis, started making holes for bearing blocks and shafts; reviewed mistakes made in the 1st robot in order to not make the same mistakes in the 2nd	The mill broke so we had to use the holesaw which was very inefficient, then we used a hammer to pop the holes out

Objectives & Work Done

- Since we had the first chassi made, we began work on the second chassi in order to begin our important replication task for practicing later on once we have to bag our first robot
    - We cut the bars and began drilling holes in order to attach them later on
    - Slight issue with a the mill being broken delayed our progress so we used the holesaw instead of the mill
- We began attaching the motors to motor mounts in order to make the building much more sturdy
    - We also did this so we wouldn't have to worry as much about the motors breaking or becoming damaged due to the increased stress
- The field-element-build team continued work on the large scale
    - We built supports for the long wooden shaft using four other planks
    - Attached on new large steel screws in order to provide extra strength

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Field components: our first design of the scale (windmill-like supports) was not sturdy enough; we then changed the design to regular slant supports against the beam and attached bolts to lock them in place
- Mill broke which temporarily stopped us from drilling through the bars

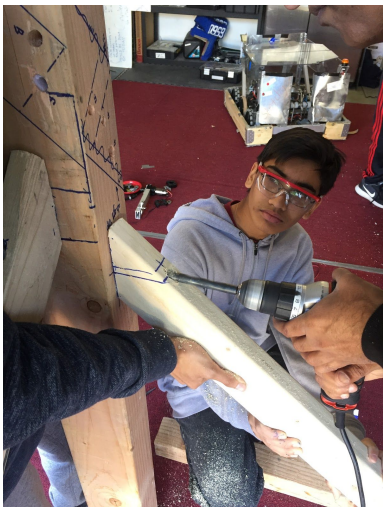
Decisions Made *What progress did we make? What was achieved?*

- We would have to postpone progress on making large holes as the mill was not working properly

What we learned *What mistakes did we make and what can we learn from them?*

- Always handle tools and machinery with care to prevent future issues later on and always keep a backup tool that can accomplish the same task

Pictures



Engineering Notes (01/22/18)

Session: 24
Location: Capeberry
Attendance:
Coaches: Raj, Srini
Note Taker(s): Krish, Albert, Jamie

Objectives	Achievements	Issues and Concerns
Finish attaching balance bar to supporting arm	Successfully added 2 1-inch balance bars to the arm using T-brackets and rivets, one at the top of the arm and one at the edge of where the grabber will tuck into	Short on rivets; also caution because the top bar may collide with electronics so we might need to tilt the bar so that it aligns with the rest of the arm
Work on field components	In progress with the scale, need to fix the supports because the windmill design didn't work out and the bolts were colliding with each other on the other side	We need time to fix the supports, and we also need stronger and longer bolts that will go through the whole scale
finish assembling entire grabber, 2nd chassis, and drive	Finished whole grabber for the 2nd robot and chassis, and finifhsed assembling drive, such as mounting motors and sprockets, now we need to start the frame for the 2nd chasss	

Objectives & Work Done

- Finished attaching balance bar to support
- Worked on field components, mainly the scale and redoing the supports, finishing the plate, etc
- Finished assembling grabber and drive for the 1st robot

Problems *What problems did we face and how did we solve or attempt to solve these?*

- For the scale, we had a massive lack of resources
- worked our way around this by salvaging wood from stuff around the garage and even the jacks.

Research *What did we have to learn about in order to move forward?*

- We learned about problem solving and time and resource allocation in order to make progress on the construction of the robot and field elements.

Decisions Made *What progress did we make? What was achieved?*

- We had to make the decision to make an opening at the top of the scale instead of the center in order to give it more “variability”.

What we learned *What mistakes did we make and what can we learn from them?*

- We made the the scale’s fulcrum in the wrong spot, so we fixed it by putting in the top.

Engineering Notes (01/26/18)

Session: 25
Location: Arjun's Garage
Attendance: Aaron, Albert, Arjun, David, Euan, Ganesh, Jaimin, Jamie, Jamie, Jingwen, Jun, Krish, Rithik, Rudy, Sophie, Steven, Yiming
Coaches: Raj, Raja, Srini
Note Taker(s): Albert, Krish, Sophie

Objectives	**Achievements**	**Issues and Concerns**
Finish the grabber portion of the arm system	Finished assembling grabber by tackling the minor issues and attached it to the robot; next is the electronics in order to actually test the pneumatics of the grabber	
Assemble chain and sprocket for motion of the arm	Took out the connect chain link; drilled holes into the arm so that we could put the chain and sprocket system onto the arm and make it accessible to rotating	Need to take out the 22nd link in order to shorten entire chain, still having trouble with chain breaker
Finish up field components	Finished scale, switch, and exchange; fixed the supports and assembled all the part of the scale together	Lack of space for all the field components, need to either move them to the other house or clean up our workplace

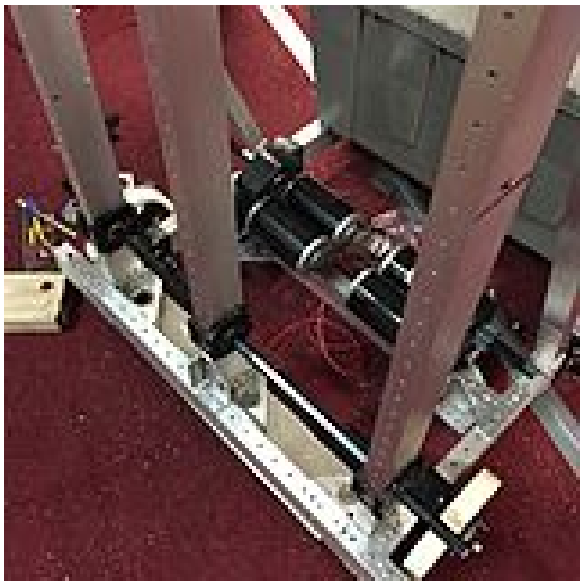
Objectives & Work Done

- Finished building majority of grabbing system, need to put electronics in in order to test pneumatic compressor and spinning wheels
    - We tested the open and close mechanism using our hands
- We continued drilling holes in the arm and then fit in the chain and sprocket system needed to rotate the arm up and down for game cube moving
    - While the shafts were being put in, another member used 18 teeth sprockets and measured out the chain length needed in order to allow for movement
    - We cut the chain; however, we found that the chain still was too long and we would need to remove a link in order to shorten it
    - Also, since the chain breaker stopped working, we tried a different method using a hammer and thin metal puncher in order to remove chains

Problems *What problems did we face and how did we solve or attempt to solve these?*

- The space needed between the bridging metal was wrong
    - Took one out temporarily, switched the arms upside down.
- Problem taking the connect link out of the chain

Pictures



Engineering Notes (01/27/18)

Session: 26
Location: Arjun's Garage
Attendance: Aaron, Albert, Arjun, Aryan, David, Euan, Ganesh, Jaimin, Jamie, Jingwen, Jun, Krish, Parva, Rithik, Rudy, Sophie, Steven, Yiming
Coaches: Raj, Raja, Srini
Note Taker(s): Rithik, Jason, Aryan

Objectives	**Achievements**	**Issues and Concerns**
Attach on the grabbing mechanism to the main chassi	We managed to attach it on and add in some extra components for making sure the cube wouldn't slip out	The grabber mechanism is a bit too heavy
Make sure the pulley mechanism is able to carry the weight of the bar	We still need to work on this	The arm is way too heavy, and we might not be able to progress without switching to lighter metal
Get the robot mechanisms fully assembled	Created chains, assembled multiple gearboxes: chassis gearbox for second robot and versaplanetary gearbox w/ encoder	Wrong screws were used, gearbox was very loosely attached to the motor

Objectives & Work Done

- Fundraising:
    - We visited the car dealers and interacted with them. We will follow up with them
    - We worked on the Chairman's Award
    - We sent out follow up emails, mainly to the school districts
- Build:
    - Grabber System:
        - We added on the grabber system to the main chassi, but we still need to test it out with pneumatics
        - We initially continued work on the second grabber system for our second robot but then focused more on the first grabber we were making
        - We also added on a little back L-Bracket to prevent the box from falling
    - Drivetrain:
        - Assembled drivetrain gearbox for second robot
        - Created chains
    - Electronics:
        - Created 2 gearbox w/ encoders

- Pulley(arm) Mechanism:
    - We began by trying to find a solution to the weight problem by using a spool which would rotate due to pulling on the string; however, the bar that the string was attached too was too loose and bent
    - A team began work on reinforcing the bar with large steel screws in order to prevent rotation which the T-Brackets allowed
    - A team also added on the motors which would be used to control the rotation of the grabbing mechanism on the arm

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Build: The main issue with our pulley mechanism and our grabber system is that the weight of the mental is too heavy and the motors in place might not be strong enough to carry said weight
    - We might need to add pneumatic pistons in order to assist in holding the weight
    - We could also switch our current metal bars to ones that weigh less
- Our riveting guns kept breaking which caused a bottleneck as we only had 2 available
    - We began focusing on sharing more and keeping parts open for other groups to use and easy to access
- Lack of master link to connect more chains
- Some fundraising efforts were not reciprocated, and the outreach team did not hear back from everyone they contacted.

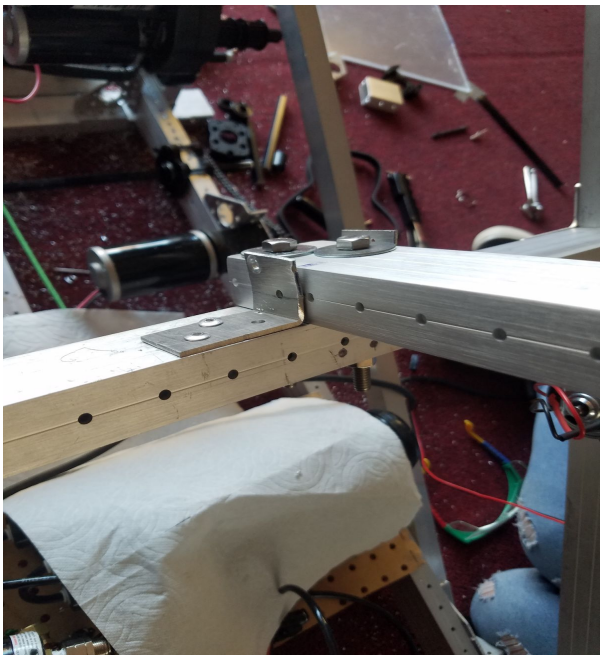
Decisions Made *What progress did we make? What was achieved?*

- We decided that progressing on the second robot was not our main priority as we should finish our first design then move on as time was running out
    - We made good progress on the build and getting the drivetrain and grabber mechanism working

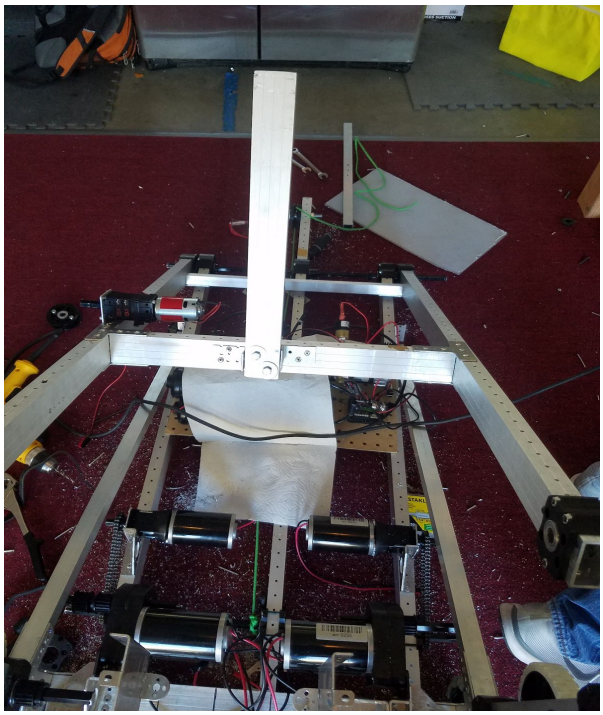
What we learned *What mistakes did we make and what can we learn from them?*

- Vex has their own encode for their planetary gearbox

Pictures



New secure string mechanism on arm with steel screws



New secure string mechanism on arm with steel screws

Engineering Notes (01/28/18)

Session: 27
Location: Arjun's Garage
Attendance: Jason, Arjun, Albert, Anish, Jamie, Jingwen, Rithik, Sophie, Aryan, Yiming, Jun, Jaimin, Alex, Euan, Aaron, Ganesh, Parva, Rudy, Steven
Coaches: Raj, Raja, Srini
Note Taker(s): Arjun, Albert, Jason

Objectives	**Achievements**	**Issues and Concerns**
Start assembling the second robot's chassis	In progress right now; reviewed the CAD for the 1st robot, looked over mistakes and started cutting bars and required supplies for the robot	Missing gussets and other parts; ordering and are on their way now
Bring the first robot to life by attacking all the chains, electronics, and gearbox	Mostly finished with the chain, electronics, and gearbox, we still have a few issues with the gearbox and the drivetrain	Gearbox had a problem, drivetrain not working
Organized the workplace	Sorted new pieces we got and organized inventory, also cleared up the table and put things back in their labeled boxes	

Objectives & Work Done

- Build:
    - Started assembling the chassis for our second robot
    - The gearbox responsible for lifting the grabber was defected and required it to be reassembled
- Electronic
    - Extended one of the motor's wire
    - Fixed electronics and made them orientate the right way

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Lack of parts
- Lack of snails and our incorrect installation of pulleys/belts caused our robot's inability to drive

Research *What did we have to learn about in order to move forward?*

- Figure out a way to prevent the rope from slipping out the pulley
    - We made a temporary solution to lock the rope in place using scrap metal wire to create a 'wall'

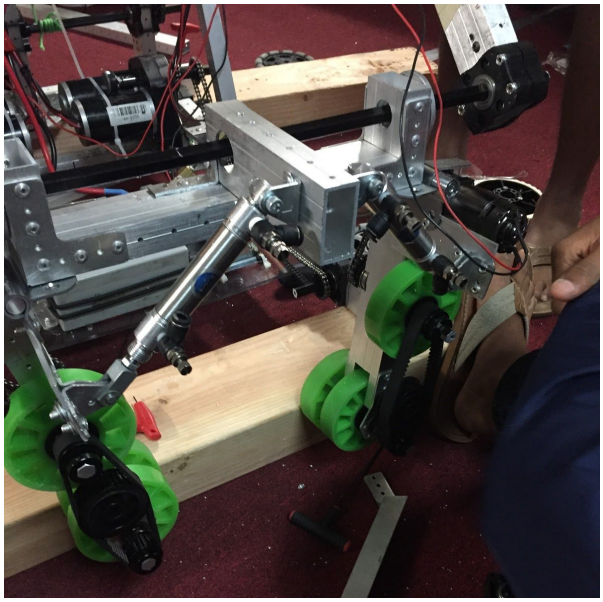
Decisions Made *What progress did we make? What was achieved?*

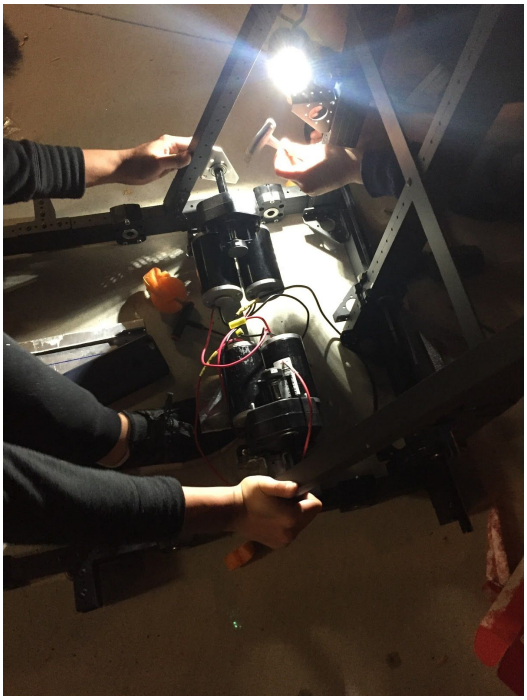
- Chains would be a better option for the drivetrain

What we learned *What mistakes did we make and what can we learn from them?*

- Pulley was installed incorrectly
    - Kept slipping
    - Not tight enough

Pictures





Engineering Notes (02/02/18)

Session: 28
Location: Arjun's Garage
Attendance: Aaron, Albert, Anish, Arjun, Euan, Ganesh, Jaimin, Jamie, Jason, Jingwen, Jun, Krish, Parva, Rithik, Rudy, Sophie, Steven
Coaches: Raj, Raja, Srini
Note Taker(s): Jun, Ganesh, Jingwen

Objectives	**Achievements**	**Issues and Concerns**
Build the arm	Started building the arm, almost finished with the chassis, cut bars for the arm, added hinges and wheels, pistons	Mill is still broken, so we need to use the holesaw which takes more time and is inefficient
Figure out what to do with bumpers	came up with several idea on how to attach noodles to wood and how to attach wood to robot; Decided on the design; haven't actually started	We need to buy supplies, such as noodles and duct tape and wood screws
Finish chassis	In progress; managed to drill holes even though the mill had problems, need to finish riveting	The drivetrain is still a little sketchy, so we need to work on stabilizing it

Objectives & Work Done

- We first began by distributing work and one of the main priority tasks was to hopefully finish the main chassi by the end of the day
    - With the mill broken we had to adapt and in the end our techniques worked out pretty well, and we were able to make the holes we needed
    - Still a bit more work to do in regards to riveting and making the drive train more structurally sound
    - We also began work on the second arm, and we cut the bars needed to fit the same dimensions as the ones listed in the CAD file
- Since we had our drivetrain almost done, some members began work on the bumpers
    - We decided we would use the same cloth that we had used last year
    - Members then cut wood planks to fit the requirements

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Power tools are very loud and may damage team member's ears through long use
    - We might want to invest in more headphones and use them more
- The mill is still unable to turn properly
    - We have to continue adapting to different techniques such as using a hole saw

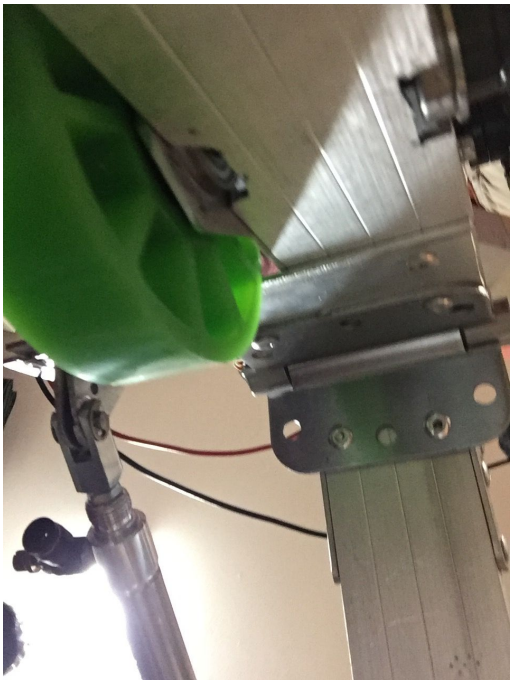
Research *What did we have to learn about in order to move forward?*

- We did research on whether we could use a mill bit on a normal hand drill, and we found that it could work and would help us widen our holes for shafts

What we learned *What mistakes did we make and what can we learn from them?*

- We had bumper build team members recap on how to build bumpers based on last year's design
- We also had the bumper build team members look over the game manual to make sure our bumpers fit the rules and regulation so we face no penalties in the long run

Pictures



Engineering Notes (02/03/18)-(02/04/18)

Session: 29/30
Location: Arjun's garage
Attendance: check attendance sheet
Coaches: Raj, Srini
Note Taker(s): Steven, Jaimin, Rudy

Objectives	**Achievements**	**Issues and Concerns**
Getting an idea of what to do with the bumpers	Figured out an idea on how to attach bumpers, started making the frame of the bumpers and plates that will connect to the robot, we are going to use clips to attach the bumper to the plates of the robot	Might be shaky, unknown status because the clips are a little too wide for the bumpers and may be loose; we have an idea to add screw to reinforce sturdiness
Finish the arm	Finished the arm by completing cutting the bars, assembling them with hinges, adding wheels, chains, pistons, etc	A little shaky, have to put more reinforcements
Bought more headphones and restocked on other supplies	Protect people's ears, finished inventory for majority of the new supplies ;	We still have to organize them
Work on electronics	Organized some of the electronics onto the plexiglass that was cut; cut holes in plexiglass and zip tied some electronics	
Worked on second robot's drivetrain: chains, wheels, etc	Unable to complete drive system and start testing	
Started on the bumpers: cut wood, attached them, etc	Finished creating the wooden frames for the bumper	

Objectives & Work Done

- Bumpers
    - We got an idea on what bumpers should attach like.
    - Some debate if it will be easy to change.
- Arm:
    - A bit shaky but mostly finished
    - need to fix the hinges so that it is more stable
- Bought needed supplies such as headphones
- Electronics:
    - used plexiglass and cut holes into it so that we could ziptie electronics onto it

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Changes on the real robot might not be good since we already spray painted the robot.
- Arm is still a bit shakier than the actual robot, may need more supports
- Bumpers might be a bit too easy to take on and off so that a simple bump could render in a penalty

Decisions Made *What progress did we make? What was achieved?*

- How to attach bumpers

What we learned *What mistakes did we make and what can we learn from them?*

- Spray paint parts first and then apply to robot when we are really sure.

Engineering Notes (02/09/18)

Session: 31
Location: Arjun's Garage
Attendance: Aaron, Albert, Arjun, Anish, Ganesh, Jason, David, Jingwen, Jamie, Sophie, Parva, Krish, Rudy, Rithik, Euan,
Coaches: Srini, Raj
Note Taker(s): Jason, Aaron, Euan, Parva, Jamie

Objectives	**Achievements**	**Issues and Concerns**
Finish second robot's drivetrain (chains, wheels, etc)	Attached encoders onto motor, which were then attached onto the robot, attached some chains, attached a few snails	Missing one encoder part
Drivetrain on first robot needs to be redone	Began work on extra gearbox support, drilled snails, tightened chains	Gearbox is being pulled up needs support
Finish with adding pool noodles to bumpers	Finished taping pool noodles to bumpers, fixed incorrect angles on the wood for the bumpers, before they were slightly off from 90 degrees, also cut off the part of the L bracket that was going off the edge into the noodles	Tape used for attatching the pool noodles need to be redone (the current tape used is too weak) Team cloth/banner still need to be attached to the bumper
Re-doing of the overall stability of the arm	Replaced weak hinges of the arms with stronger ones, and made the arm overall more stable	Wires connecting to the motor of the arm easily gets broken because of it hitting part of the frame of the robot.

Objectives & Work Done

- Drivetrain
    - Finished majority of assembling the chains, wheels, and other parts of the drivetrain
    - We are missing one part of the encoder, so we may have to re-order parts
    - The first robot needs a drivetrain, so we worked on making another drive train
- Bumper
    - Added pool noodles and tape to the bumpers, so now we have completed the bumper itself, we just need to make the frame of the robot attachable to the bumpers
- Arm
    - Made the arm more stable by replacing hinges, giving it more security

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Missing one piece for the encoder was missing so we had to push back this problem back
- This was the first time assembling the gearbox lite, which was a little problematic since we didn't know what was to be done
- The hinges on the arm was super flimsy and weak, so we replaced it with a bigger and stronger hinge
- Re-secured pistons and wires to make them more stable
- Not that major, but some of the spray paint flaked off, and it may have to be redone.

Research *What did we have to learn about in order to move forward?*

- Sometimes the hydraulic riveter will break rivet heads, making it hard to take them off.

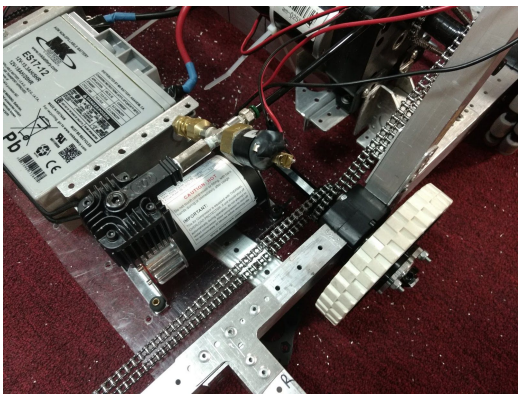
Decisions Made *What progress did we make? What was achieved?*

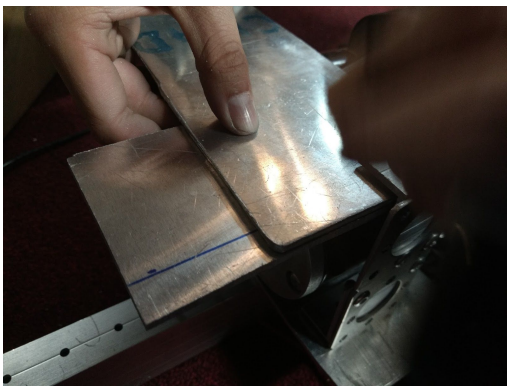
- *Attached encoders onto motor, which were then attached onto the robot, attached some chains, attached a few snails*
- *Began work on extra gearbox support, drilled snails, tightened chains*
- *Finished taping pool noodles to bumpers, allowing for the bumpers to be made attachable the next day*
- *Replaced weak hinges of the arms with stronger ones, and made the arm overall more stable*

What we learned *What mistakes did we make and what can we learn from them?*

The Drivetrain gearbox is being pulled down, loosening the tension of the drivetrain chains, so a solution was devised to use brackets and bearings to support it.

Pictures





Engineering Notes (02/10/18)

Session: 32
Location: Arjun's Garage
Attendance: Aaron, Albert, Arjun, Anish, Ganesh, Jason, David, Jingwen, Jamie, Sophie, Parva, Krish, Rudy, Rithik, Euan,
Coaches: Srini, Raj
Note Taker(s): Euan, Krish

Objectives	**Achievements**	**Issues and Concerns**
Finish working on bumpers	Finished by attaching pool noodles attaching the team cloth over the bumpers	Wheel grinds against part of the bumper Tape was easily ripped off
put mounting brackets on bumpers then	finished putting brackets on bumper	None
attach bumper frame around perimeter of robot	attached bumper to frame and fastened it with rehook-like brackets + screws.	The bumpers are not very stable, and will fall out if it is pushed in a specific direction.

Objectives & Work Done

Bumpers finished and durability of tape increased.

Problems *What problems did we face and how did we solve or attempt to solve these?*

- The nuts on the wheels were grinding against the metal part of the bumpers, so we sanded it down.
- The tape that we used was too weak, so we had to replace it with stronger duct tape

Research *What did we have to learn about in order to move forward?*

N/A

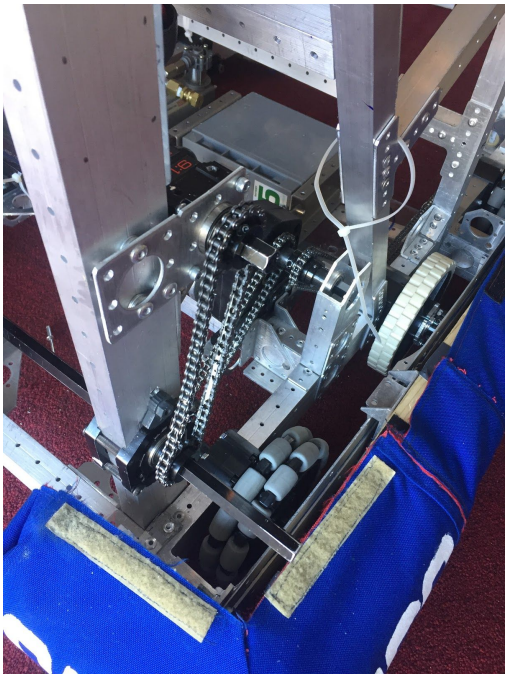
Decisions Made *What progress did we make? What was achieved?*

- *Bumpers were finished*
- *Bumper strength was increased*

What we learned *What mistakes did we make and what can we learn from them?*

We didn't take in account of the possibility that the nuts on the wheels could interfere with the bumper of the robot.
We didn't think about the durability of the tape that we used for the bumpers.

Pictures



Engineering Notes (02/11/18)

Session: 33
Location: 116 Capeberry
Attendance: Aaron, Albert, Alex, Anish, Arjun, Aryan, David, Euan, Ganesh, Jaimin, Jamie, Jason, Jingwen, Jun, Krish, Rithik, Parva, Rudy, Sophie, Steven
Coaches: Raj
Note Taker(s): Sophie, Jamie

Objectives	**Achievements**	**Issues and Concerns**
Added electronics to the robot, connect motors to roboRio and the battery	Made good progress today to electronics, motors, and the battery; not finished yet but working on it	Need to build battery holder
Make a platform to test for the scale platform	We finished the platform, although the duct tape we used should be replaced with something sturdier in the future	The slanted part is not attached to the rest of the platform completely
Improve the second grabber and the arms for the second robot	Made good progress today for the second grabber and arm; still in progress as well	None
Test robot with field elements	Good short 20 minute test with the field elements; we got some recordings of the robot successfully tossing power cubes into switch and scale, and the robot traveling off and on the robot	Some field elements might not be totally safe for the robot

Objectives & Work Done

- Add electronics to the robot
    - Adding motors and connecting wires
    - Making extra wires to attach to the robot and for connecting
- Make platform
    - Attach wood plates and thick wood to make height of the actual platform
- Jason working on the grabber
    - Fixing wheels' placement, etc
- Test robot with the power cubes to make sure it works
    - Test putting power cubes on the scale, switch, exchange zone, and getting on the platform

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Had trouble putting screws in all the way so it doesn't damage the wheels of the robot
    - Used flat screwdrivers to make space for the screws
- The robot stopped working when we attempted to get it up onto the platform

- The grabbing of the box and movement of the arm is still unstable

Research *What did we have to learn about in order to move forward?*

- Have better knowledge of the materials before use

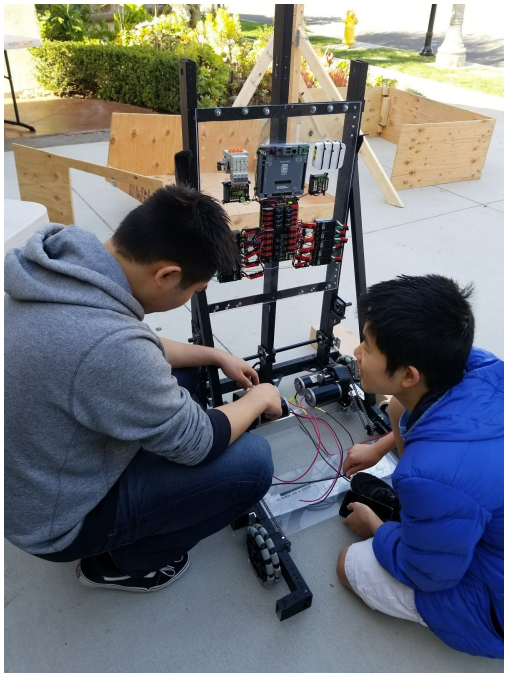
Decisions Made *What progress did we make? What was achieved?*

- Parts were added, new field element made

What we learned *What mistakes did we make and what can we learn from them?*

- We need to find ways to have the arm move up and down with stability
- Need to increase the success rate of getting the power cube

Pictures



Engineering Notes (02/16/18)

Session: 34
Location: 116 Capeberry
Attendance: Albert, Alex, Anish, Arjun, Euan, Ganesh, Jaimin, Jamie, Jason, Jingwen, Krish, Rithik, Rudy, Sophie
Coaches: Raj
Note Taker(s): Aryan, Alex, Albert

Objectives	**Achievements**	**Issues and Concerns**
To complete the various documents needed for fundraising, outreach, etc.	We worked further on previous efforts	We need to continue with what we are doing
Fix router connection issue	Used a more secure, 2 in 1, power and ethernet cable	Unsure whether that fixed the cause of the problem
Finish arm for competition robot, Start on bumpers, Attach electronics plate Add support mounts for extra stability for the arm rotation motors. Also add double chain for grabber motor so as to reduce stress on motor shaft.	Added horizontal bars on back support to fix the electronics plate onto Expanded arm width to be able to be added to the too-wide arm back supports	Arm supports on robot too wide, chassis was constructed wrongly, needed to expand arm

Objectives & Work Done

Problems *What problems did we face and how did we solve or attempt to solve these?*

- The back support bars were too wide,
- needed to adjust the arm and electronics plate to compensate
- the electronics plate was attached by fixing it to a wide horizontal bar spanning across the back support bars

Research *What did we have to learn about in order to move forward?*

- Started researching PID control for autonomous
- researched the usage of encoders
- absolute vs relative (pwm vs quadrature) positioning

Decisions Made *What progress did we make? What was achieved?*

- Instead of redoing the chassis and support back bars for the arm, we adjusted the width of the arm and attached the electronics plate to a horizontal bar

What we learned *What mistakes did we make and what can we learn from them?*

- Chassis cad model is slightly off from the real design, thus resulting in the aforementioned mistake

Picture

Engineering Notes (02/17/18)

Session: 35
Location: Arjun's house
Attendance: Aaron, Albert, Alex, Anish, Arjun, Aryan, Euan, Ganesh, Jaimin, Jamie, Jason, Jun, Krish, Rithik, Parva, Rudy, Sophie, Yiming
Coaches: Raj
Note Taker(s): Jaimin Patel, Jun Yun

Objectives	**Achievements**	**Issues and Concerns**
Work on transferring the design elements from the second robot back to the first	We have nearly identical robots that we can use for practice or competition now	Some dimensions are not entirely accurate between bots but for the most part they are within a safe margin of error
Disassemble 2016-17 FRC Robot for parts	We successfully salvaged electronics, wheels, metal, and other miscellaneous parts from "Sketchy 2.0"	Some metal parts are cut or bent out of place so they are relatively unusable
Organize the workplace	Organized the table and put away tools in the right place; sorted cabinets	Overcrowded and we had to put some tools in misc boxes because they didn't belong anywhere

Objectives & Work Done

- Second Robot
    - Worked on practice robot and copying the design from the official robot
    - We have basically identical robots now that are functional and can be practiced on now
- Salvage
    - Disassembled past robots to salvage some parts that we needed, such as electronics, wheels, and snails
- Organizing
    - Cleaned up the workplace by organizing the work table, threw away trash and old parts, labeled new boxes to place extra things into
    - Also organized the cabinets and put labels on the shelf
    - Organized the metal and wood blocks, organized scrap metal box, and cleaned out the past year's mess

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Many of the wheels and their respective chains were inadequate
- The wheel rotation was slow and very inconsistent
- Many of our members gained experience in splitting, adding and measuring chains for future use with our robot.

Research *What did we have to learn about in order to move forward?*

- Our drills were having trouble drilling out the rivets
- we learned how to adjust the torque and bit placement such that the drill doesn't slip or have difficulties in accomplishing the goals.

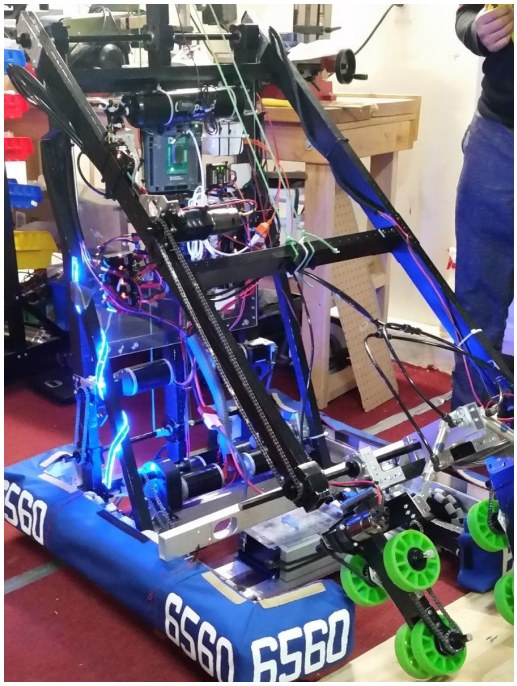
Decisions Made *What progress did we make? What was achieved?*

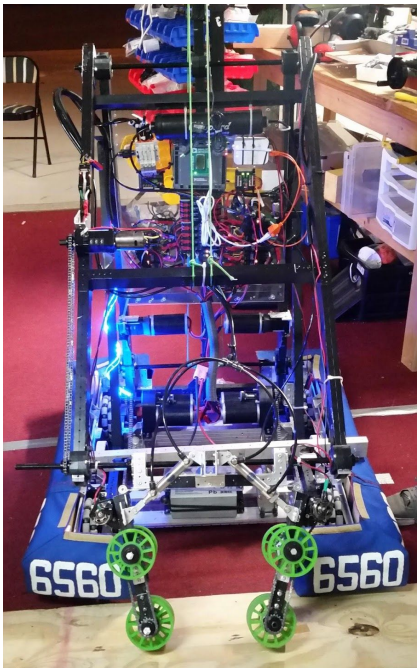
- We successfully salvaged almost the entirety of "Sketchy 2.0"
- obtained enough spare parts for almost an entire robot.

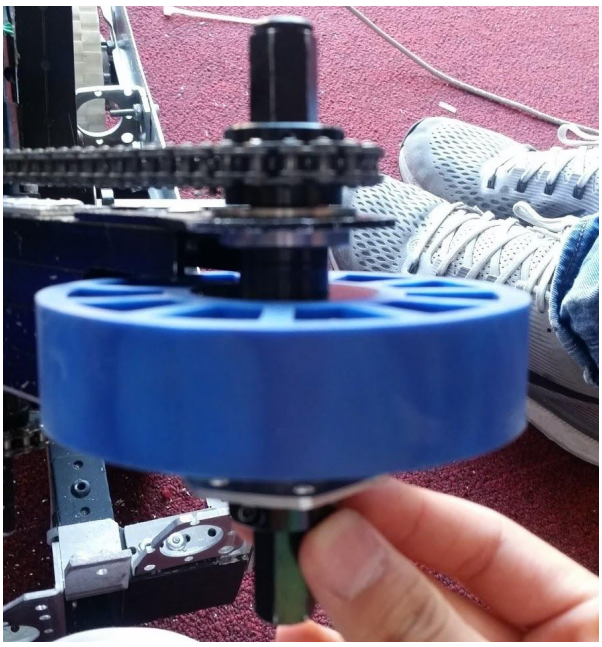
What we learned *What mistakes did we make and what can we learn from them?*

- Take out rivets immediately after drilling through them or else they will stack up on the drill bit and be difficult to take out
- Keep the workplace clean and clean after every meeting to prevent future mass cleanings

Pictures





Engineering Notes (02/18/18)

Session: 36
Location: Anish's and Arjun's Garage
Attendance: Jamie, Sophie, Arjun, Anish, Aryan, Jun, Ganesh, Parva, Yiming, Krish, Jason, Albert, Alex, Rudy, Rithik, Jaimin, Steven, Aaron
Coaches: Srini, Raj, Raja
Note Taker(s): Rudy and Rithik and Sophie

Objectives	**Achievements**	**Issues and Concerns**
Alter the grabber setup in order prevent it from getting caught on the bumper	We had one team make progress towards completing a new design while also altering the current one	We still need to finalize which design we will use
Prevent the arm from falling all the way down and colliding with the chassi	This was completed and worked	Maybe support would break
Make extra chains for the robot	We made the chains and even taught the new members	None
Update the website with the new pictures	We took a new team picture and need to update the profiles of our members	Will be too slow and hard to update site
Begin autonomous coding for the robot if possible	Using the encoders, we began coding some autonomous mechanism such as bringing the arm up without exceeding the boundary limits	Take a lot of time to update code with only two members working on it
Prevent box from falling on the battery in case the arm is not able to hold on the the box	Made supports on top of the battery to give cover	Had problem riveting the back side becauses the drill did not fit through

Objectives & Work Done

- The first work consisted on making replica chains for our grabbing and arm mechanism for the matches later on in the year
    - Sophie took up this task and completed the work
- Rithik and Jun added the two green compliant wheels that we took off yesterday as removing them made it harder for the robot to grab onto the box
- Jason began building and finished his new grabber arm design that allows for wheels to be placed closer to the bar, so we do not need to worry as much about the grabber mechanism getting caught on the bumpers
- Albert, Jaime, Ganesh, Steve, and Aaron worked on building a support for the arm mechanism
    - They were completed with the use of brackets in order to build a three bar support

- Yiming, Krish, and Euan began work on a secondary chain that would prevent the arm from shaking as much as it did before
    - It was completed and implemented on the second robot
- Parva and Sophie started the extra support covering the battery for safety
    - Completed using two thin slanted metal bars connecting other metal bars for support
- The business team worked on updating the website with the new team picture we took today

Problems *What problems did we face and how did we solve or attempt to solve these?*

- We still may face the issue of our robot exceeding the boundaries

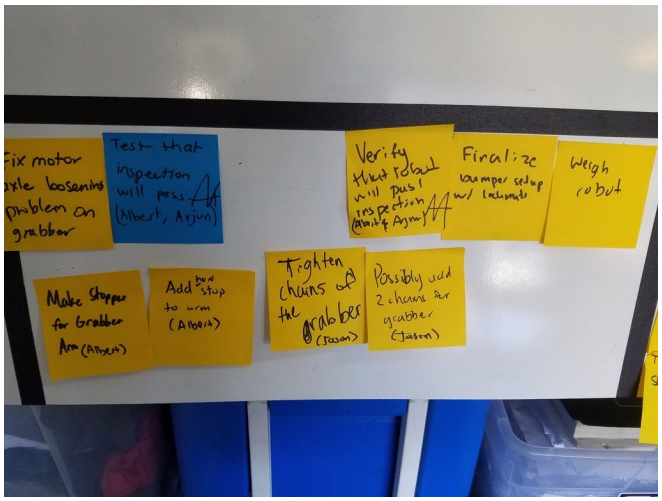
Decisions Made *What progress did we make? What was achieved?*

- We decided to make two designs for the grabber, one based on our current design and the other based on a new, lighter design with lower placed wheels to get more grip
    - Both designs were made

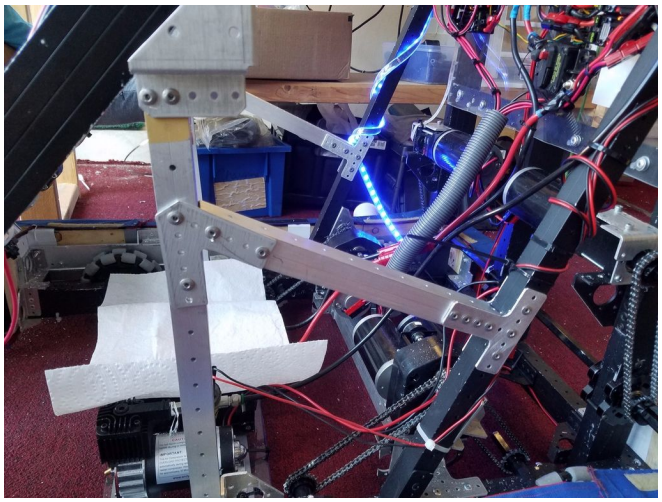
What we learned *What mistakes did we make and what can we learn from them?*

- We should make a better CAD that models parts accurately → part of this is the indecisiveness of the build team. Not enough communication between CAD and build.

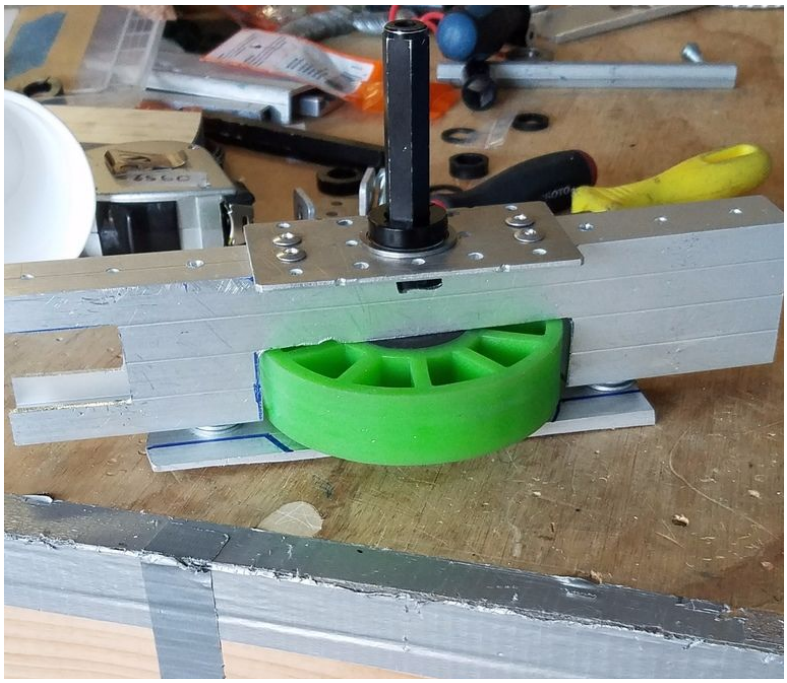
Pictures



Completed tasks



Support for arm



New grabber wheel placement

Auto

Auto

Engineering Notes (02/19/18)

Session: 37
Location: Arjun's Garage
Attendance: Albert, Anish, Euan, Jamie, Jason, Parva, Rithik, Rudy, Sophie
Coaches: Raj, Srini
Note Taker(s): Yiming, Ganesh, Sophie

Objectives	**Achievements**	
Finish the new grabber design to prevent grabber from colliding with the bumpers.	The new grabber design was finished, and the compliant wheels no longer contracted the bumpers.	
Build two bars to keep the arm from falling and colliding with the robot.	Advanced progress on the arm stopping system; not finished though.	

Objectives & Work Done

- We needed to finish Jason's new grabber design to prevent the grabber from scraping and colliding with the bumper
    - The new grabber design was finished; the wheel was moved inwards
- We needed to build two posts to prevent the arm from hitting the robot.
    - The posts were completed.

Problems *What problems did we face and how did we solve or attempt to solve these?*

Research *What did we have to learn about in order to move forward?*

Decisions Made *What progress did we make? What was achieved?*

What we learned *What mistakes did we make and what can we learn from them?*

Pictures

Engineering Notes (02/23/18)

Session: 38
Location: Capeberry
Attendance:
Coaches: Srini, Raj
Note Taker(s): Aryan, David

Objectives	Achievements	Issues and Concerns
Replicate all the newly added components in the official robot onto the practice robot	Able to finalize the (mechanical method) cross bar stopper to limit the motion of the arm when descending	The dimensions had to be altered to match the practice robot as the actual chassis arm mounts were not identical
Attach motors and chains onto the new grabber with more block contact	Created chains, attached wheel, created gearbox	The length of the holes didn't correspond with a good chain length, thus the chain was either too tight or too loose
Wanted to start on the timeline and follow up companies	Aryan and Jun started working on the timeline and collecting major data points	Need to wrap up funds

Objectives & Work Done

-

Problems *What problems did we face and how did we solve or attempt to solve these?*

- The height of the arm mounts in the practice robot varied when compared to the match robot
- The width of the arms on the practice robot was not identical to the match robot's
- By replacing the motor mount, our new motor mount somewhat bumps into our side arms.

Research *What did we have to learn about in order to move forward?*

- We calculated the total surface area at a a theoretical angle of the grabber that will contact the block and estimated how likely the block will fall out.
- We had to measure the length that the arm and grabber extends out to make sure that our robot didn't violate the boundaries.

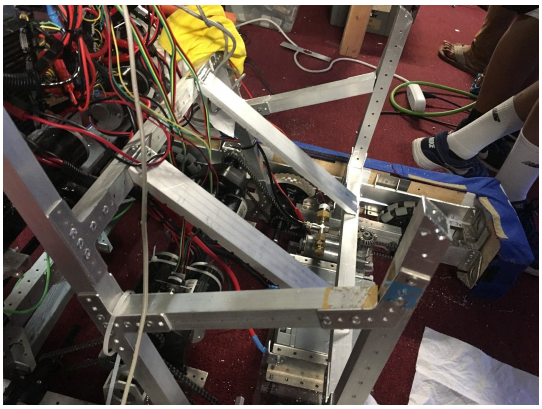
Decisions Made *What progress did we make? What was achieved?*

- Instead of replicating the grabber exactly as it is, we modified it by replacing the motor mount in a different location so that the chains no longer rub against the top of the bumper

What we learned *What mistakes did we make and what can we learn from them?*

- We learned that our practice robot has a slightly smaller width than our official robot, so our grabber doesn't necessarily conflict with the arm.
- Due to the this slight issue with our robot's dimensions, our new modification will be off and redone to configure properly with the official robot

Pictures

Engineering Notes (02/24/18)

Session: 39
Location: Arjun's Garage
Attendance: Aaron, Albert, Alex, Anish, Aryan, Jamin, Jason, Jingwen, Krish, Rudy, David, Yiming
Coaches: Srini, Raj
Note Taker(s): Jason, David, Alex

Objectives	**Achievements**	**Issues and Concerns**
Finalize the grabber and attach it onto the practice robot	Finished the grabber with slight new improvements	Chains were either too loose or too tight. When the grabber opens, the motors collide with the arm bars
Replicate all the newly added components in the official robot onto the practice robot	A work in progress, made good progress toda	Miscalculation of the length of the hard stop caused a problem to how far down the grabber can go
Create extra mount to add support to the pair of motors that rotate the arm and add washers in order to place bearings on shafts		
Complete wiring and pneumatics for grabber		

Objectives & Work Done

- Successfully finalized the practice robot's grabber with slight improvements.
- Attached the grabber onto the robot
- Modified the arm and it's hard stop as if was off by one inch
- Attached camera onto a mount on central bar
- Create extra support for the pair of CIM motors powering arm rotation
- Reassemble outer mount for pair of CIM motors by adding washers in order to accommodate forgotten bearings

Problems *What problems did we face and how did we solve or attempt to solve these?*

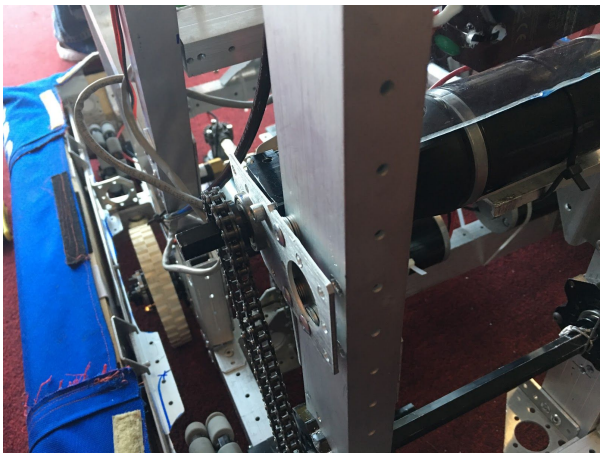
- Since the practice robot was not measure to the dimensions of the official robot, the grabber lost about 1 inch of room area for the motor to pass by
- Lack of materials caused a delay

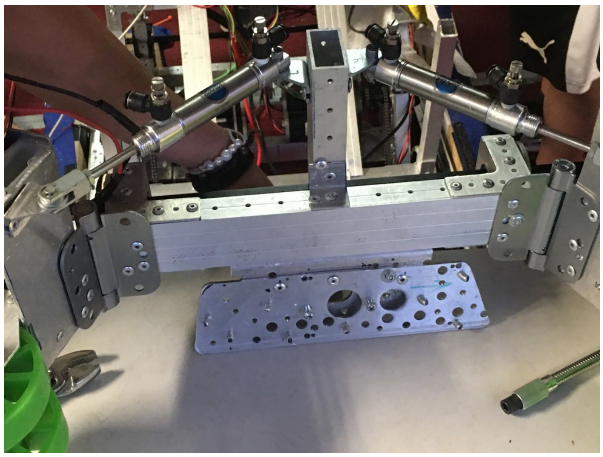
Research *What did we have to learn about in order to move forward?*

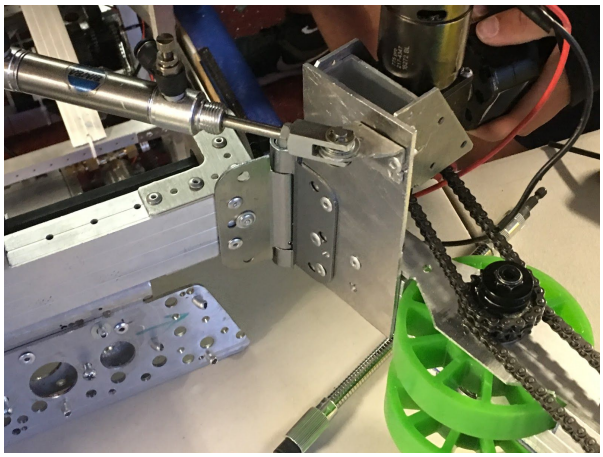
Decisions Made *What progress did we make? What was achieved?*

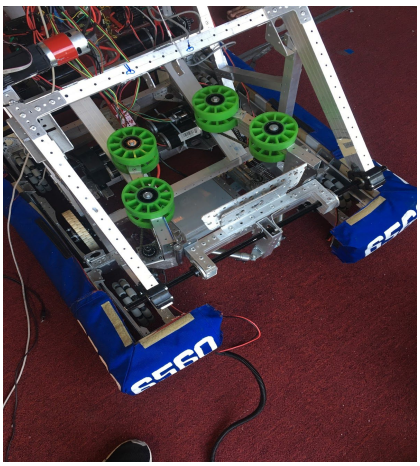
What we learned *What mistakes did we make and what can we learn from them?*

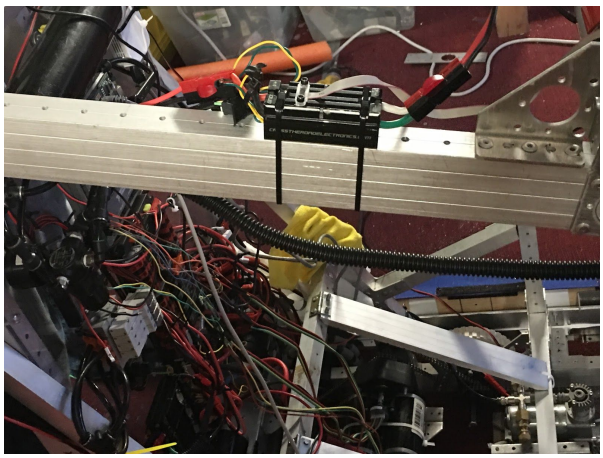
Pictures

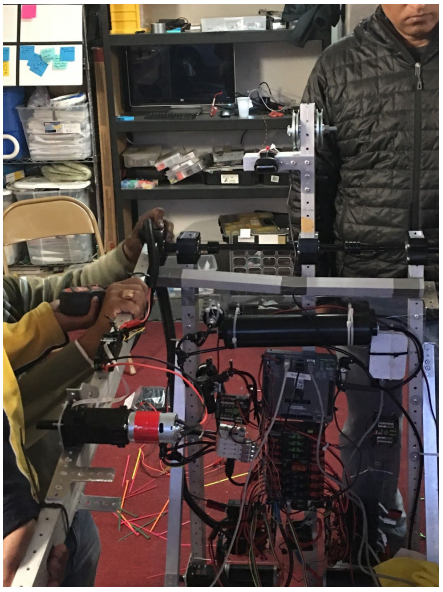












Engineering Notes (02/25/18)

Session: 40
Location: Arjun's Garage
Attendance: Arjun, Anish, Euan, Albert, Parva, Alex
Coaches: Srini, Raj, Raja
Note Taker(s): Euan

Objectives	Achievements	Issues and Concerns
Work on autonomous phase coding	Some bugs in the code were fixed Controllers were added to the motors for the auto phase	The auto phase hasn't been completed yet, still in progress
Finish arm and make it ready for assembling onto robot (adding chains, bars, etc)	Successfully added the required chains to the arm which would make it able to move smoothly	Not finished yet, taking more time than expected because difficulty with the chains
Make new motors for the hanging phase	Discussed design for the hanging and created gearbox for the motor and created a chain for it	Motor and chain isn't attached to the robot yet.

Objectives & Work Done

- Some code bugs were fixed
- New chains were added for the arm movement
- A gearbox and chain is created for the hanging phase
- Controller wires were attached to the wheel motors

Problems *What problems did we face and how did we solve or attempt to solve these?*

- The chain for the arm was extremely loose. Turns out the sprockets were not identical.
- A wire for the grabber's motor kept getting disconnected because it kept latching on to a part of the robot. So, we zip-tied the wire down.

Research *What did we have to learn about in order to move forward?*

- Discussed different possibilities on what to do for the hanging phase

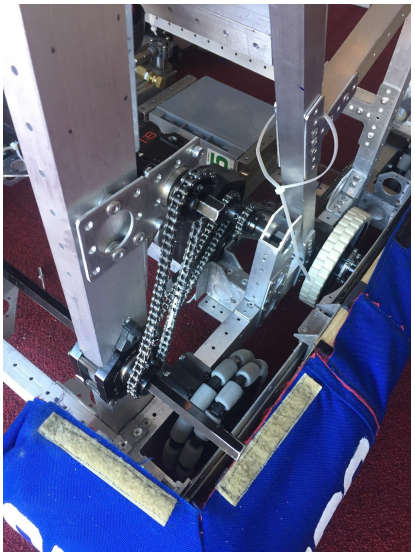
Decisions Made *What progress did we make? What was achieved?*

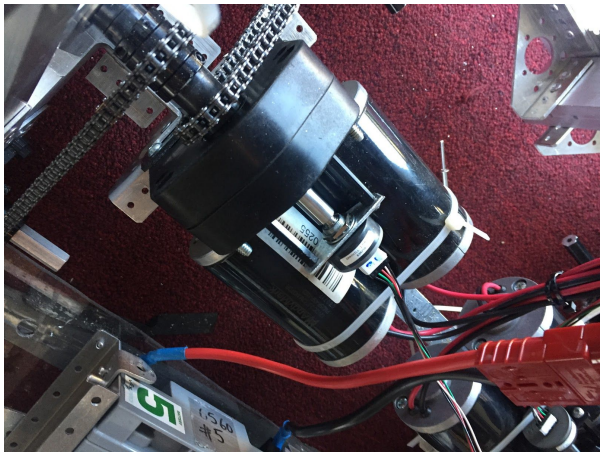
- Some code bugs were fixed
- A new chain was made for the arm
- A motor and a chain was created to prepare for the hanging phase
- Controller wires were attached to the wheel motors

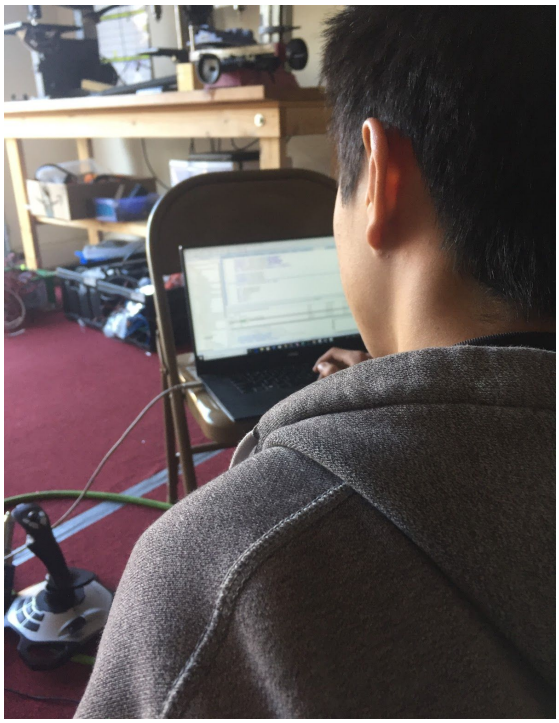
What we learned *What mistakes did we make and what can we learn from them?*

- We didn't check if the sprockets were the rights sizes before creating a chain for it

- We didn’t consider the possibility for the loose wire to hook onto a part of the robot and become disconnected.







Engineering Notes (02/27/18)

Session: 41
Location: Arjun's Garage
Attendance:
Coaches: Srini, Raj, Raja
Note Taker(s): Alex

Objectives	Achievements	Issues and Concerns
Continue autonomous testing		

Objectives & Work Done

- Complete several autonomous runs

Problems *What problems did we face and how did we solve or attempt to solve these?*

- The chain for the arm was extremely loose. Turns out the sprockets were not identical.
- A wire for the grabber's motor kept getting disconnected because it kept latching on to a part of the robot. So, we zip-tied the wire down.

Research *What did we have to learn about in order to move forward?*

Decisions Made *What progress did we make? What was achieved?*

- Some code bugs were fixed
- A new chain was made for the arm
- A motor and a chain was created to prepare for the hanging phase
- Controller wires were attached to the wheel motors

What we learned *What mistakes did we make and what can we learn from them?*

- We didn't check if the sprockets were the rights sizes before creating a chain for it
- We didn't consider the possibility for the loose wire to hook onto a part of the robot and become disconnected.

Pictures

Engineering Notes (03/02/18)

Session: 42
Location: Arjun's Garage, Code Orange
Attendance:
Coaches: Srini, Raj
Note Taker(s): Yiming

Objectives	**Achievements**	**Issues and Concerns**
Fix gearboxes on the practice robot and make backup gearboxes	We made two backup gearboxes and fixed the gearboxes on the practice robot.	
Finish member bios for website	Member bios finished, still awaiting revision by their subjects	
Test robot at the Code Orange field	We tested some basic robot functions at the Code Orange field.	

Objectives & Work Done

- Fix installed gearboxes and make backup gearboxes for the practice robot
    - Two backup gearboxes made and gearboxes on the practice robot had gear ratios changed
- Finish the team member bios for the website
    - The team member bios were finished, but are still waiting for revision for accuracy

Problems *What problems did we face and how did we solve or attempt to make?*

Research *What did we have to learn about in order to move forward?*

Decisions Made *What progress did we make? What was achieved?*

- We were able to test out the robot at the Code Orange field

What we learned *What mistakes did we make and what can we learn from them?*

Pictures

Engineering Notes (03/03/18)

Session: 43
Location: Code Orange Facility
Attendance: Ganesh, Alex, Anish, Jason, Yiming, Euan, Jingwen, Rithik, Parva
Coaches: Srini, Raja, Raj
Note Taker(s): Yiming

Objectives	Achievements	Issues and Concerns
Test out robot on the playing field	We had drivers get used to the controllers and drive; tested picking up blocks and throwing/dropping them into the switch/scale/exchange. We also tested a successful autonomous that could deliver a powercube to the switch.	
Fix problems with the robot that emerged while driving	We adjusted the snails slightly to tighten the chains to prevent slipping. We also reconnected a few anderson powerpoles that came loose during testing.	
Optimize controls and code for teleop mode	We added four controls onto the controller and shifted a few controls on the joystick. The code was adjusted to be smoother and made driving and moving the arm more stable.	

Objectives & Work Done

- Test the robot with the proper field elements and practice field
    - We tested delivering cubes to the exchange zone, the switch, and the scale.
        - All three were successful and achievable
    - We successfully tested autonomous; the robot can deliver the cube to both the left and right side of the switch
- Fix emerging problems with the robot during driving
    - We fixed slipping in the roller chains by adjusting the snails.
    - We fixed a few loose connections in the anderson powerpoles
- Redistribute controls and optimize the code for teleop mode
    - Four new controls were added to the controller
    - The code was adjusted to be smoother and improved overall handling of the robot

Problems *What problems did we face and how did we solve or attempt to solve these?*

- After a few driving tests, the connections between the anderson powerpoles on a few of the wires came loose
    - We redid the connections to re-tighten the wires
- After the first test, the chains on the drivetrain were slipping
    - We tighten the chains on the drivetrain by re-adjusting the snails.
- The controls on the controller were somewhat unoptimized while there were too many controls on the joystick
    - We redistributed controls from the joystick to the controller and simplified the joystick's controls slightly

Research *What did we have to learn about in order to move forward?*

Decisions Made *What progress did we make? What was achieved?*

- We decided to add four new controls to the controller
    - Drive straight with one button, drive straight with one button, grab/drop a cube, and shoot a cube
        - We decided to keep grabbing, dropping, and shooting on the joystick, but the controllers should be the one performing those functions

What we learned *What mistakes did we make and what can we learn from them?*

Pictures

Engineering Notes (03/04/18)

Session: 44
Location: Arjun's Garage, Code Orange Facility
Attendance: David, Yiming, Krish, Jamie, Jason, Jingwen, Parva, Alex, Arjun, Anish, Aryan,
Coaches: Srini, Raj
Note Taker(s): David, Aryan, Jingwen, Jamie, Parva, Yiming

Objectives	**Achievements**	**Issues and Concerns**
Add clips to the grabber arm to hold the carabiner and the rope.	We added five clips to hold onto the climbing mechanism, the carabiner and the rope.	The initial four clip design was too spread out to hold the carabiner, so we added the fifth clip.
Assemble and attach the hanging bar	We add a motor onto a 2" x 1" bar with four screws and attach the bar unto the arm support mounts with 8 L-brackets	
Reattach cross-bar stopper in a position to restrict arm from reaching a vertical position	The crossbar stopper was reattached in a position that prevents the arm from reaching the vertical position.	There was miscommunication over where to place the bar so that it would effectively restrict the motion of the arm
Create a mechanism to prevent the robot from tipping backwards	We created a mechanism with a ratchet wrench and some wheels to prevent the robot from tipping backwards.	The ratchet caused many problems, as getting the correct tightness was difficult. Also, the motor first crackled due to not having any help, then completely burned.

Objectives & Work Done

- Construct a mechanism that prevent the robot from tipping backwards when the arm is fully extended upward
    - An extension was created with a ratchet wrench and small wheels to prevent the robot from falling backwards while still allowing the robot to roll along the ground
- Attach clips to one of the grabber arms to hold the hanging mechanism
    - Five clips were riveted onto the left arm of the grabber to hold the carabiner and the rope for the hanging mechanism
- Reattach the crossbar stopper to prevent the arm from reaching a vertical position
    - The crossbar stopper was reattached to prevent the arm from reaching a vertical position
    - The likelihood of the robot tipping backwards is reduced due to the prevention of the arm lifting too high.

Problems *What problems did we face and how did we solve or attempt to solve these?*

- The motor crackled due to not having any support, so we added a ratchet to reduce strain on motor. However, we still burned the motor due to trying to hang incorrectly .

- We were unable to attach the hook via the arm

Research *What did we have to learn about in order to move forward?*

- We can't have weight on the motor before it starts. If we have to keep running the motor to stay up, it won't work, so we need a ratchet

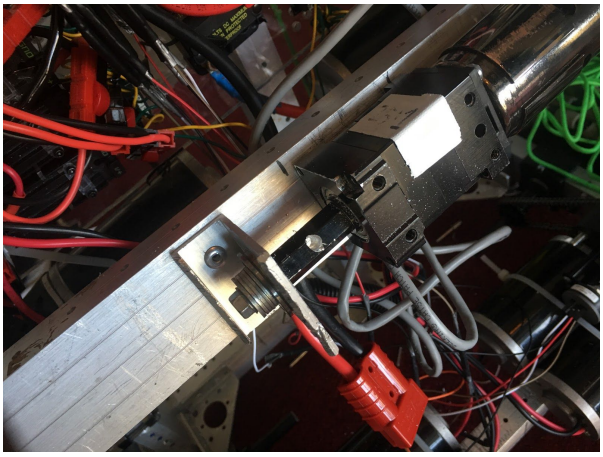
Decisions Made *What progress did we make? What was achieved?*

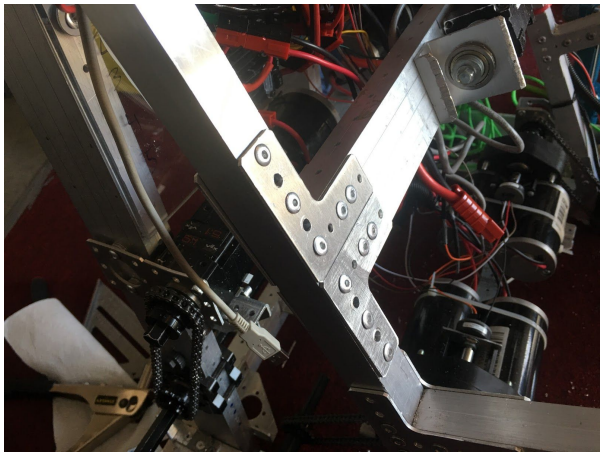
- Hanging was accomplished by placing the carabiner onto the hanging bar by hand

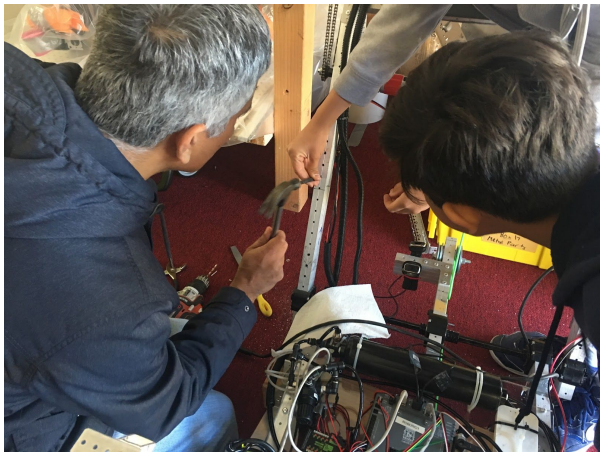
What we learned *What mistakes did we make and what can we learn from them?*

- We need a ratchet for hanging mechanism

Pictures







Engineering Notes (03/16/18)

Session: 45
Location: Arjun's Garage
Attendance: David, Yiming, Arjun, Albert, Jason, Euan, Ganesh, Jun, Sophie, Jamie, Jingwen, Aaron
Coaches: Raja, Raj, Srini
Note Taker(s): Yiming, David, Jamie

Objectives	**Achievements**	**Issues and Concerns**
Prepare a new climbing hook	New, bigger carabiner was cut, rope was tied, velcro was attached	
Removed and replaced the original support for the arm with a more lightweight variation	Successfully removed the support for the arm getting rid of some weight, experimented with two different lightweight arm support variations	There were two variations of the lighter support and we were unsure of which style of support to attach on
Work on a strategy and analysis for each of the Ventura teams that can be found	Analysis and statistics chart created for each team competing in Ventura that has competed in prior regionals	Some teams compete first for the first time at Ventura, so we can't do any research
Substitute the arm rotation motors with 775 pro motors	We were able to successfully replace the CIM motors with 775 pro motors	

Objectives & Work Done

- Prepare a new climbing hook with a larger carabiner
    - The carabiner was cut
    - The green rope was tied to the new motor
    - The velcro was attached
- Work on a analysis and strategy for each of the Ventura teams that we could find past matches from
    - Created an offense and defense strategy for the teams
    - Created statistic and analysis sheet for the teams
- Replace the current setup for arm support with a new lightweight system
    - The current crossbar setup was removed without compromising robot stability
    - The new support system involved attaching two 2" x 1" bars toward the top of the vertical arm support chassis bars two brace the arm closer to their point of rotation
    - Two different designs were proposed:
        - One design involved cutting a slanted indent into the 2" x 1" bar to match the slant of the arms in their initial position

        - The other designs involved riveting on a slanted L-bracket at an angle that matched the initial position of the arms
- Exchange the CIM motors used for arm rotation with 775 pro motors

Problems *What problems did we face and how did we solve or attempt to solve these?*

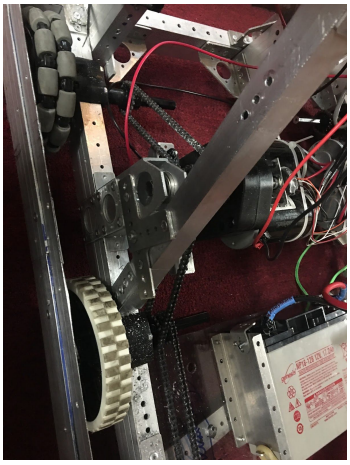
- Some teams we that were competing at Ventura did not perform in any of the prior regionals this year
    - We looked at some of the robot reveal videos to get a somewhat decent idea of how the robot would perform

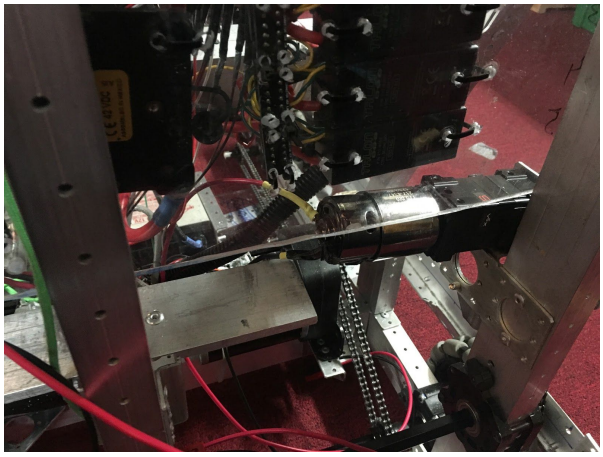
Research *What did we have to learn about in order to move forward?*

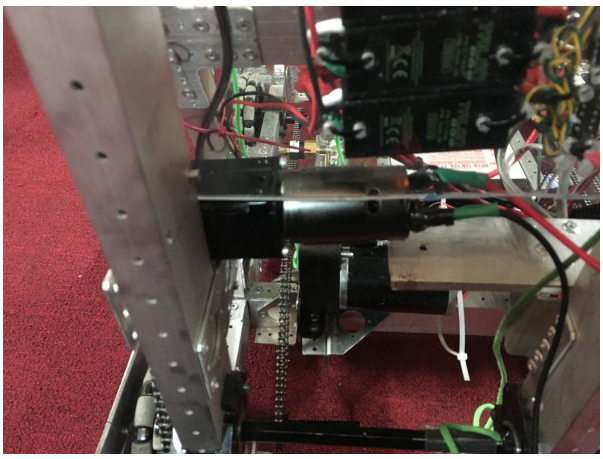
Decisions Made *What progress did we make? What was achieved?*

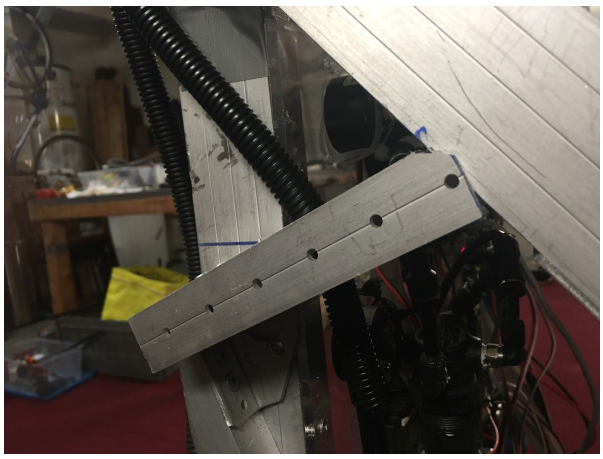
What we learned *What mistakes did we make and what can we learn from them?*

Pictures









Engineering Notes (03/17/18)

Session: 46
Location: Arjun's Garage
Attendance: David, Yiming, Arjun, Albert, Jason, Ganesh, Jun, Sophie, Jamie, Jingwen, Krish
Coaches: Raja, Raj, Srini
Note Taker(s): Sophie

Objectives	**Achievements**	**Issues and Concerns**
Test autonomous and practice robot control in field	Tested the new autonomous system in the field to make sure that it worked, drivers practiced	
Change motor	Changed dangling motor into new motor; fixed it into place	It might fall out again, we can make sure all motors are fixed into their places
Work on support lift for lifting other robots	Made the layout with metal bars	Unfinished
Continue working on Scouting - watch match videos and analyze	Got through the data of all teams with updated match records and videos	Some teams will not play any matches until the Ventura competition, so they cannot be analyzed

Objectives & Work Done

- Test the new autonomous system at the field
- Change and replace motors
- Made layout of the lift system
- Analyze data of teams that are competing at Ventura Regionals

Problems *What problems did we face and how did we solve or attempt to solve these?*

- We tried to test the robot before going to the field, and found out that one of the motors was not working
    - Fixed by making and attaching a new motor
- Only about half the teams that are going to be at Ventura had a match record for this year's season.
    - We will have to wait until they have had a match, or analyze them during the competition. In the meantime we will look through past seasons' records.

Research *What did we have to learn about in order to move forward?*

- We need to figure out how to attach the metal bars and how to secure the allied robot so we can lift

- Also need to come up with different strategies according to team

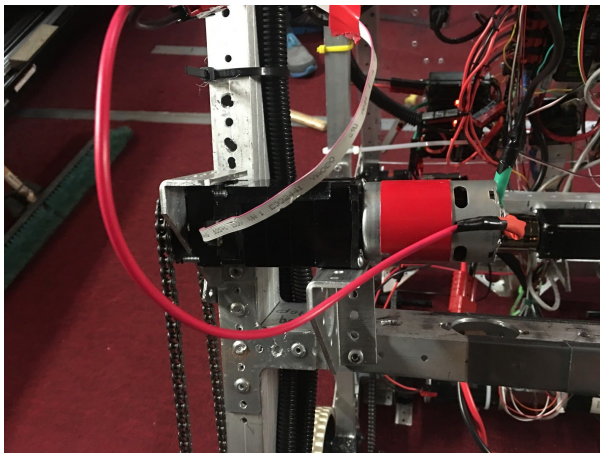
Decisions Made *What progress did we make? What was achieved?*

- Finished analyzing the teams that are going to be at Ventura Competition
- Fixed the broken motor and autonomous

What we learned *What mistakes did we make and what can we learn from them?*

- Need to make sure that the motors are securely attached to the robot

Pictures



Engineering Notes (03/18/18)

Session: 47
Location: Arjun's Garage
Attendance: Parva, Jason, Jamie, Jingwen, Albert, Alex, Arjun, Anish, Krish, Rithik, Jaimin, Sophie
Coaches: Raj, Srini
Note Taker(s): Sophie

Objectives	**Achievements**	**Issues and Concerns**
Add team names to the ventura teams sheets, the regionals they are competing this year, and past achievements/placing.	Added team names to the ventura teams sheets, the regionals they are competing this year, and past achievements/placing.	
Replace motors	Motor newly built/ replaced	
Build lift system for the robot	Completed plate for the lift system, attached it to the robot	It is not finished - will have to complete the lift next week and attach it onto the parts already made

Objectives & Work Done

- Add team names to the ventura team sheets.
- Add the regionals they they have or will compete in this year.
- Add their past placings at previous events and their achievements.
- Replace motors/ build new ones as spare
- Lift system
    - Connect a bar with multiple metal bars, attach to back of robot
    - Attach 2 metal bars used to directly lift

Problems *What problems did we face and how did we solve or attempt to solve these?*

- Some teams are pending on their game videos/ we still have no footage on them
    - Look up past year records, predict general level of teams
    - Wait until next week for the competitions to take place
- Did not have enough time to finish the lift system

Research *What did we have to learn about in order to move forward?*

- We learned how to analyze teams and predict how they would do at the competition
- Think of a design of the lift system that would have the highest chance of success and one that would be the most efficient in building

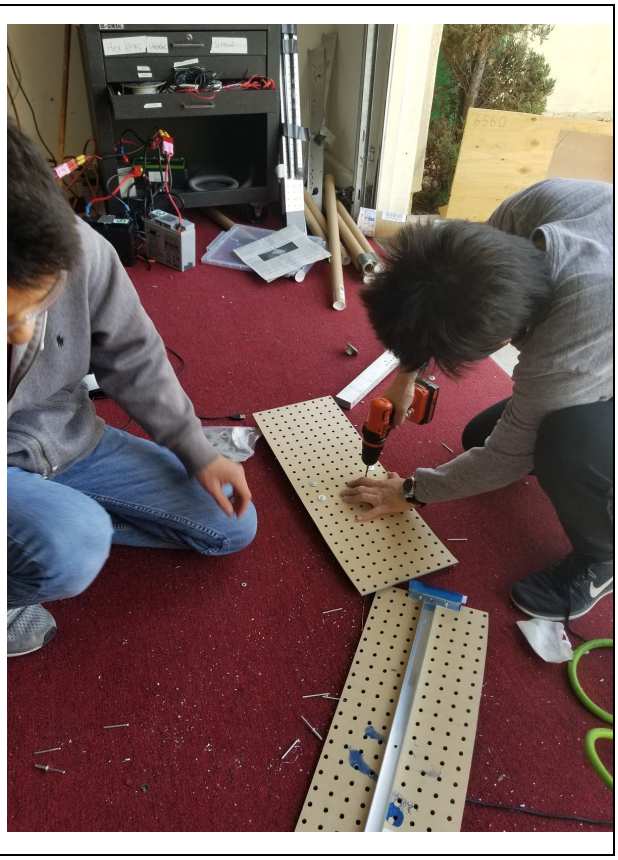
Decisions Made *What progress did we make? What was achieved?*

- Finished analyzing the teams that were at competition this week
- Mapped out plan for the lift system, started building the lift/ support for the robot

What we learned *What mistakes did we make and what can we learn from them?*

-

Pictures



Engineering Notes (03/23/18)

Session: 48
Location: Arjun's Garage
Attendance: Jason, David, Jingwen, Aaron, Arjun, Aryan, Anish, Krish, Rithik, Euan, Yiming, Ganesh, Sophie, Rudy
Coaches: Raj, Srini, Raja
Note Taker(s): Sophie

Objectives	**Achievements**	**Issues and Concerns**
Analyze teams that played today + Watch Orange County Regional for reference	Watched game footage of teams playing this week	The competition is not finished, and we will have to wait until Saturday or Sunday for the videos to be uploaded
Worked on Chairman's Award	Compiled the season's data on the team members	
Build/ attach the lift system to the robot	Built the lift system and attached it to the robot where the other part was already attached	Did not get the chance to test it out - unsure about the success rate
Make a new grabber/ arm	In progress	Need perfect alignment, needs to be a complete upgrade in specifically grip over the previous intake system, cannot slip while raised
Make spare chains for the competition robot	In progress	Needs to be tightened so the chains do not slip and break like they did on the last competition

Objectives & Work Done

- In progress of analyzing teams who are playing this week
- Watch other competition videos and come up with strategies
- Organize chairman's award and add information
- Built a lift system for lifting another robot
- Spare parts of arm and chain are being made

Problems *What problems did we face and how did we solve or attempt to solve these?*

- The competitions taking place this week are not finished; we will have to wait until tomorrow to look at the outcome and the competition videos
- The lift system is almost complete but has not been tested

Research *What did we have to learn about in order to move forward?*

- Learn about how to build and attach the lift

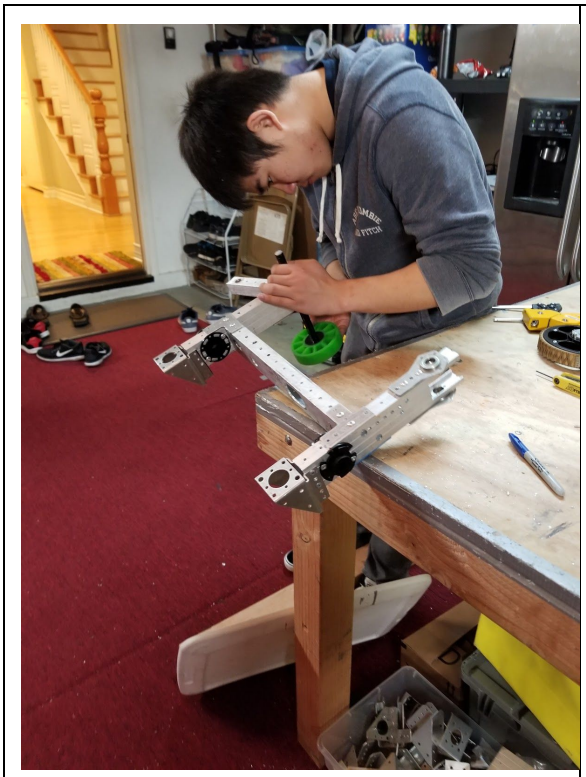
Decisions Made *What progress did we make? What was achieved?*

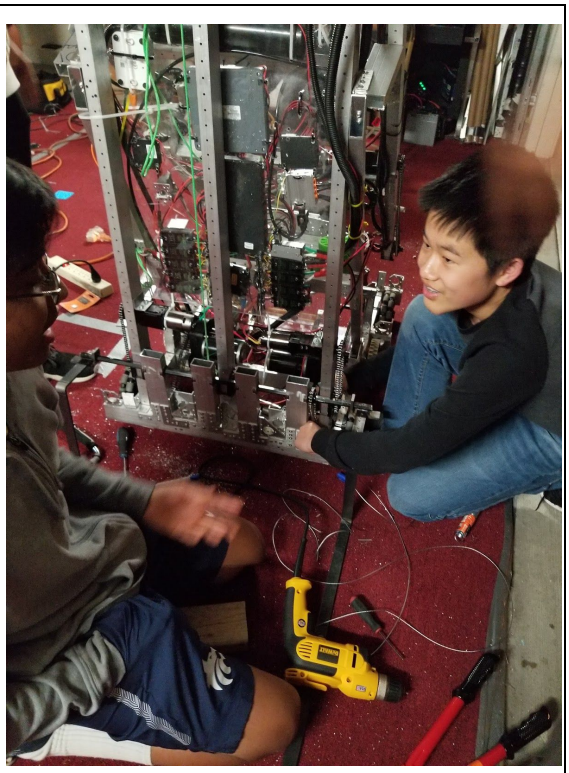
- Almost completed the lift - if this is successful it will give a huge advantage to the alliance during endgame

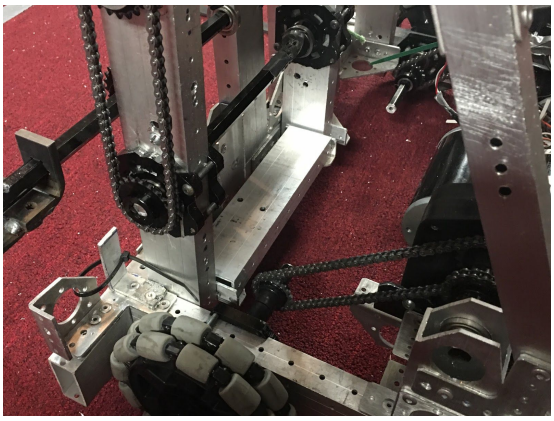
What we learned *What mistakes did we make and what can we learn from them?*

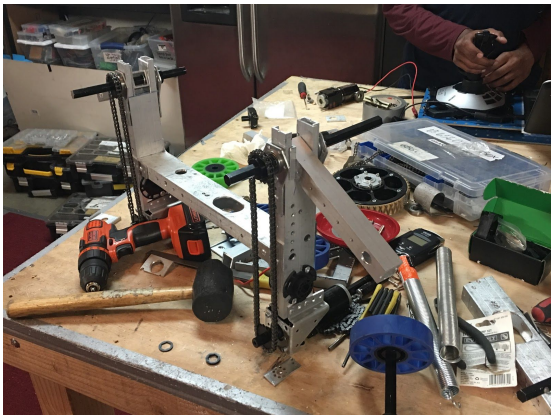
- Do not drill into a gearbox because that would cause problems, force a replace

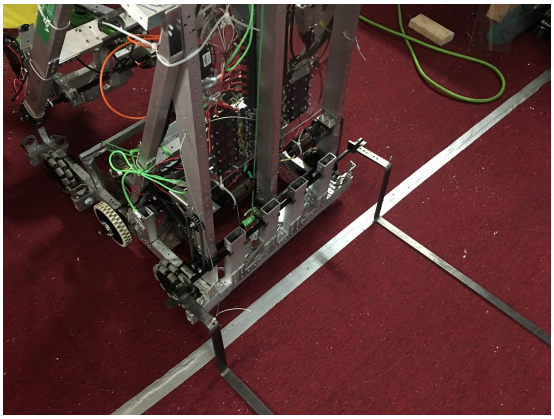
Pictures











Engineering Notes (03/24/18)

Session: 49
Location: Arjun's Garage
Attendance: Jason, David, Jamie, Jingwen, Jaimin, Albert, Arjun, Anish, Rithik, Yiming, Sophie
Coaches: Raj, Srini, Raja
Note Taker(s): Sophie

Objectives	**Achievements**	**Issues and Concerns**
Watch Orange County Regional for reference	Watched game footage of teams playing this week	
Come up with new strategies for the competition	Find priorities for the matches depending on alliance members	Still need to analyze more teams and come up with different strategies
Worked on Chairman's Award	Fixed document, added more things	
Continue building/ attaching the lift system to the robot	Made the lift system more stable	Need to test this out at field
Continuing to make a new grabber/ arm	Added new parts to the grabber to make it more efficient and effective	Needs to be tested
Coding for the arm control	Finished	Needs to be tested
Redrill holes to mount the hanging motor in a more parallel position to the bar	Completed	The holes were difficult to reposition as the changes left them about a centimeter away from the original hole mounts

Objectives & Work Done

- Analyze teams that played this week
- Acquire additional game plans from the Orange County Regional
- Edit Chairman's Award
- Fix the lift system, make it more stable
- Continue making the new grabber
- Fix code for arm control to slow it down

Problems *What problems did we face and how did we solve or attempt to solve these?*

- The lift system may not be stable enough to withstand the weight of other robots
    - Add additional bars

    - Attach the metal bars to the rods
    - Test out the system next time the team goes to the field
- We do not have enough information for a lot of the teams to come up with more complex strategies
    - we will have to wait until next week at the competition to figure out information about them

Research *What did we have to learn about in order to move forward?*

- How to make the metal bars for lift more stable
- How to code for arm to move slower

Decisions Made *What progress did we make? What was achieved?*

- Overall improvements in the robot parts - more efficient system and more sturdy
- Added functions such as lift

What we learned *What mistakes did we make and what can we learn from them?*

- Had trouble fixing the motor because we could not match up the screws with the holes and keep the washers in
    - Do these small works before attaching the big parts onto the robot
    - This will provide more space for hands, making the job easier

Pictures