

**BLACK FROG  
ROBOTICS  
Team  
6134**

**Engineering Notebook**



Black Frog Robotics  
FTC Team 6134  
Novi, MI

Engineering Notebook

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Novi, MI

Engineering Notebook

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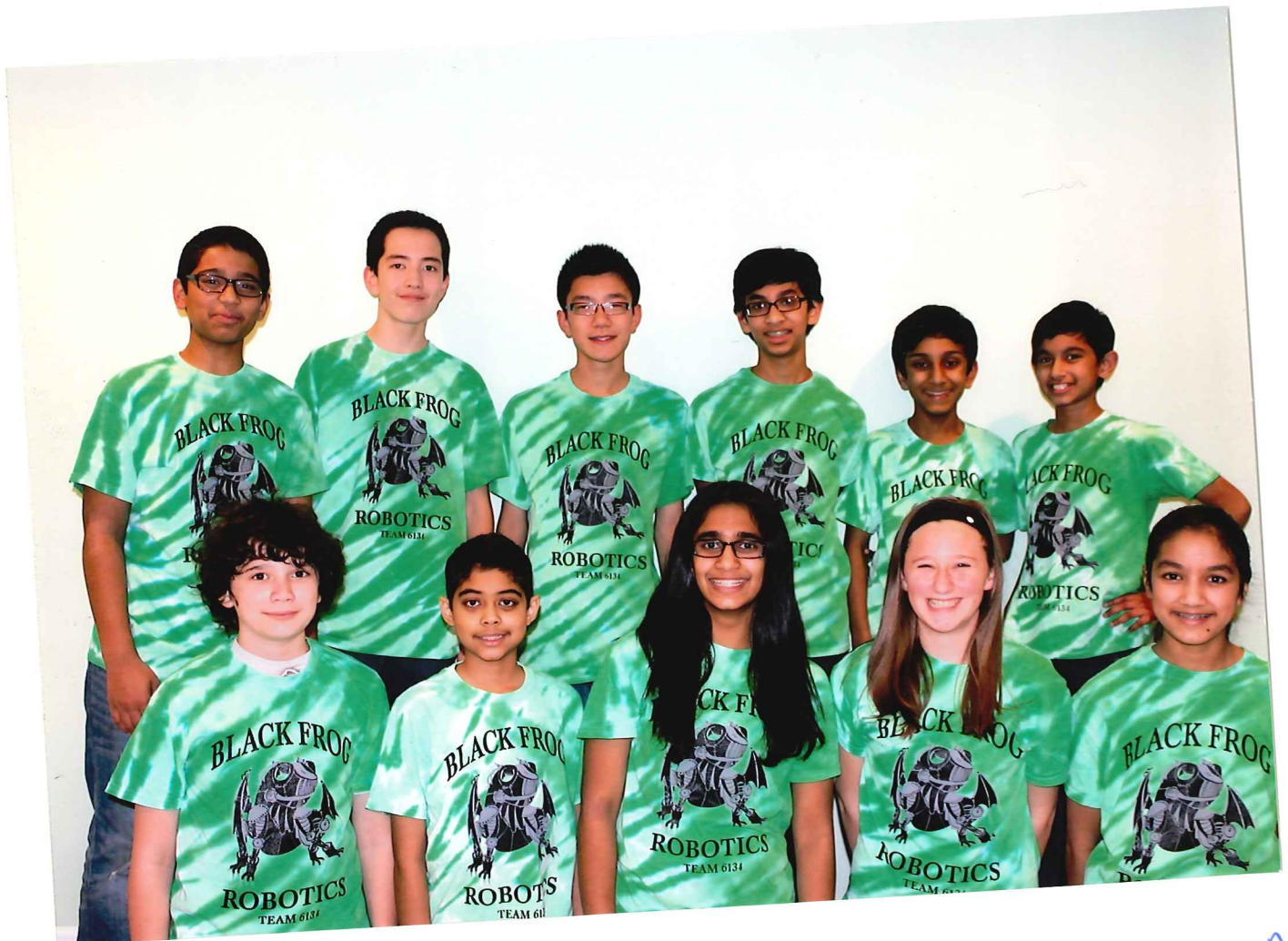
# Section A

## Team Profiles

Black Frog Robotics  
FTC Team 6134  
Novi, MI

MEET OUR TEAM

The Black Frogs are a team of eleven 7<sup>th</sup> and 8<sup>th</sup> grade Novi Middle School students. We have 4 returning team members from last year and 7 rookie FTC team members. The majority of us have participated on FLL teams in the previous years. We work great together as a team and have areas of focus such as programming, chassis, game spec, and strategy. When not busy with Black Frog meetings we are also involved in many other activities such as soccer, volleyball, tennis, basketball, and cross country. We have 2 mentors from the Novi High School FRC team Frog Force and we appreciate their guidance throughout the season.



## Alex Moore

I am 14 years old and I am in 8<sup>th</sup> grade at Novi Middle School. I was on the FLL team Techno Tadpoles for two years. I play percussion in the middle school band and enjoy gaming online with my friends. This year I've learned to use some of my dad's power tools to make props from popular video games including a retractable dagger from Assassin's Creed. I joined FTC to get ready for the high school FRC team!



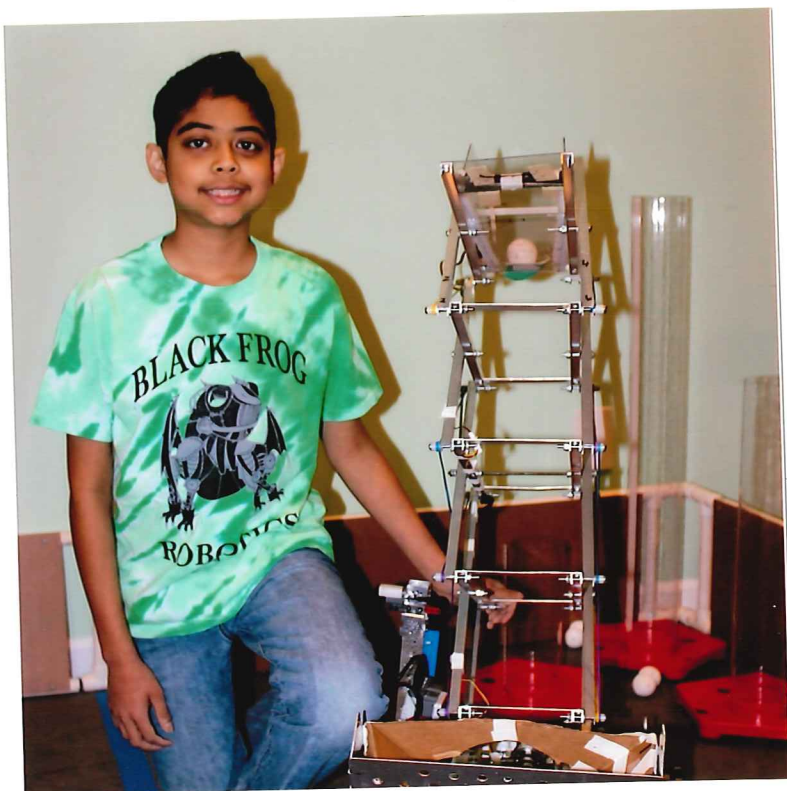
## Ankith Udupa

My name is Ankith Udupa. I'm 12 years old, and currently a seventh grader at Novi Middle school. I play the violin for the school Orchestra and also part of the cross country team. I also play the guitar, piano and tennis. For the past two years I have been part of the FLL team called "Techno Tadpoles". This is my first year as part of the FTC team, Black Frogs. I enjoy participating in FIRST challenges because it gives me opportunity to work in a team on real world problems involving science, engineering, and programming. Overall, I am excited and ready to partake in FTC!



## Anne George

I am 13 years old. I'm in 8<sup>th</sup> grade and I go to Novi Middle School. I had done FLL for 2 years and this is my 2<sup>nd</sup> year in FTC. Outside of school I play volleyball and soccer. I am in the choir and I love music.



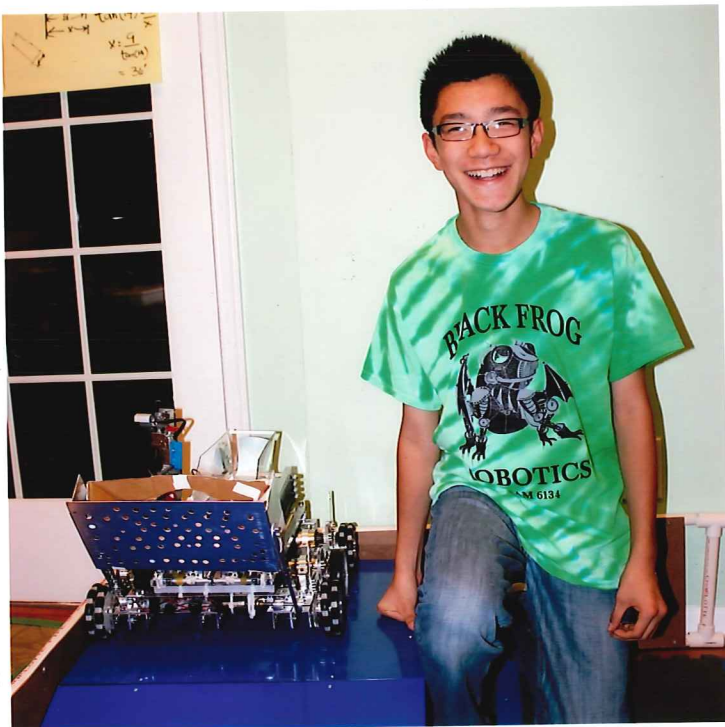
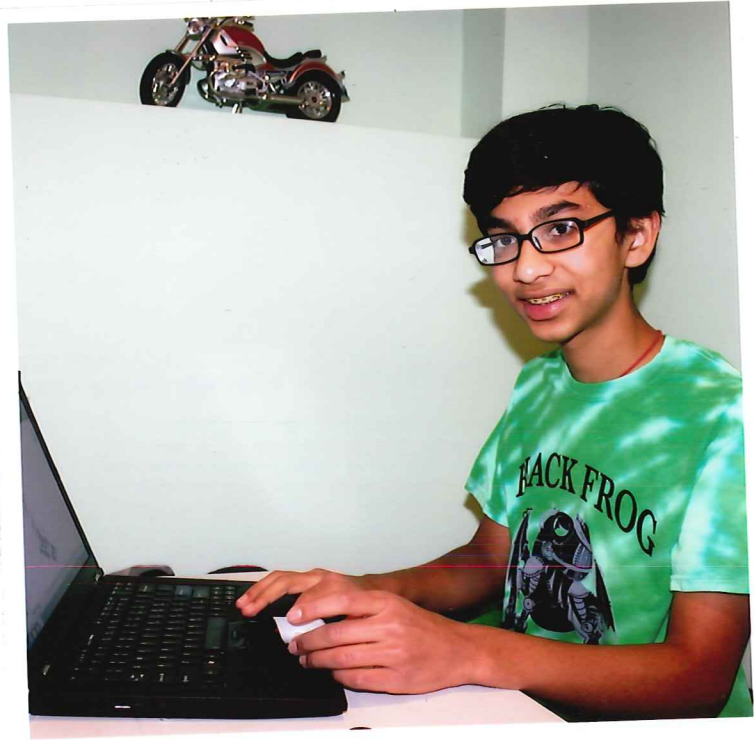
## Arnav Talukder

I am 13 years old and in 8th grade. I go to Novi Middle School. I play the violin and the piano. This is my second year on the Black Frogs. I find it interesting and fun to develop a solution to each year's challenge. Also my favorite animal is a pig.



## Arun Kammanadiminti

I'm 13 years old, and I'm in 8th grade. I go to Novi Middle School. I play the alto saxophone. I like tinkering with things I find. I'm Karate black belt and I'm interested in FTC because I want to excel in building from FLL's Legos to FTC's Tetrix parts. As you probably noticed, my last name is very long.

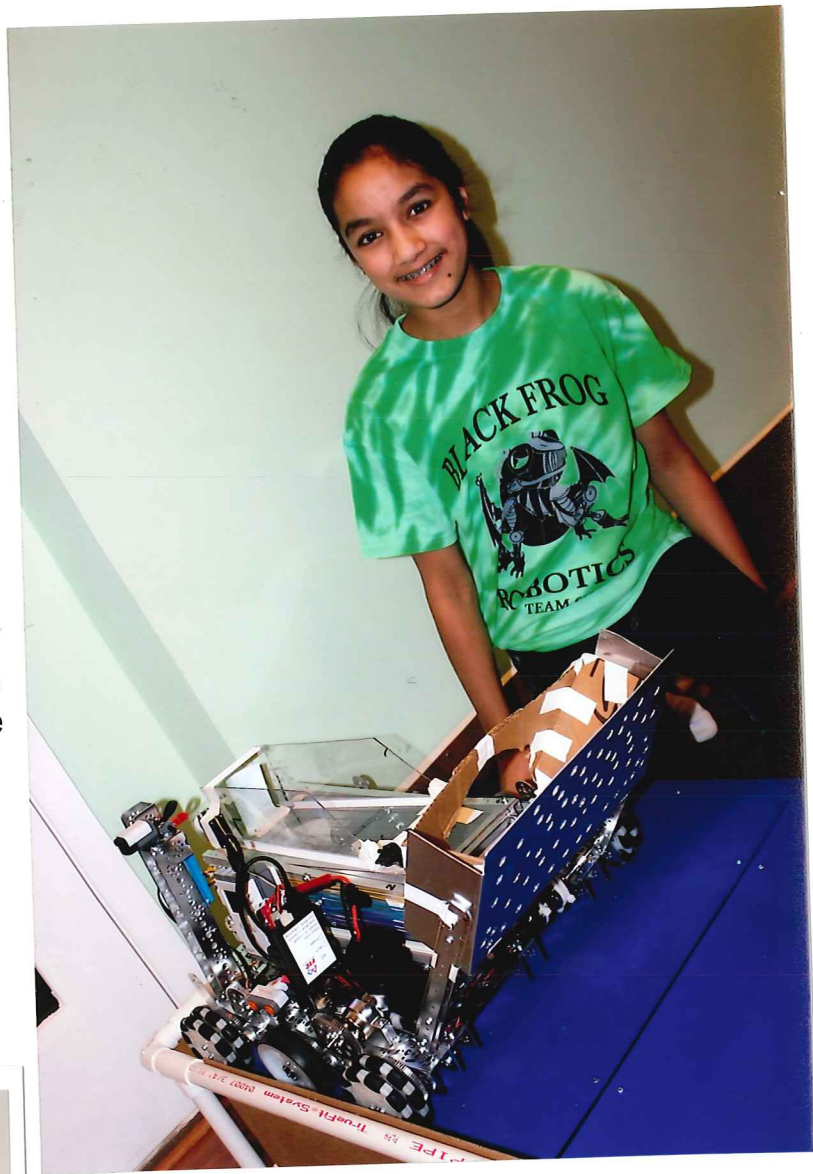


## Leon Chen

I am 13 years old. I am in the 8th grade at Novi Middle School. I used to play for Vardar South, a champion soccer team, and I enjoy playing the piano and violin. I have not had much robotics experience, however, my passion for computer programming and mechanical engineering has brought me here. I enjoy FTC because I am able to utilize my skills while working with others to achieve success.

## Nishtha Kakar

I am 12 years old. I am in 7<sup>th</sup> grade and I go to the Novi Middle School. I was on the FLL team The Techno Tad Poles for the past 2 years. My favorite sport is volleyball. I enjoying singing and I take part in the school Choir. I love to build and design which is what I enjoy about FTC. I look forward to the great season ahead!



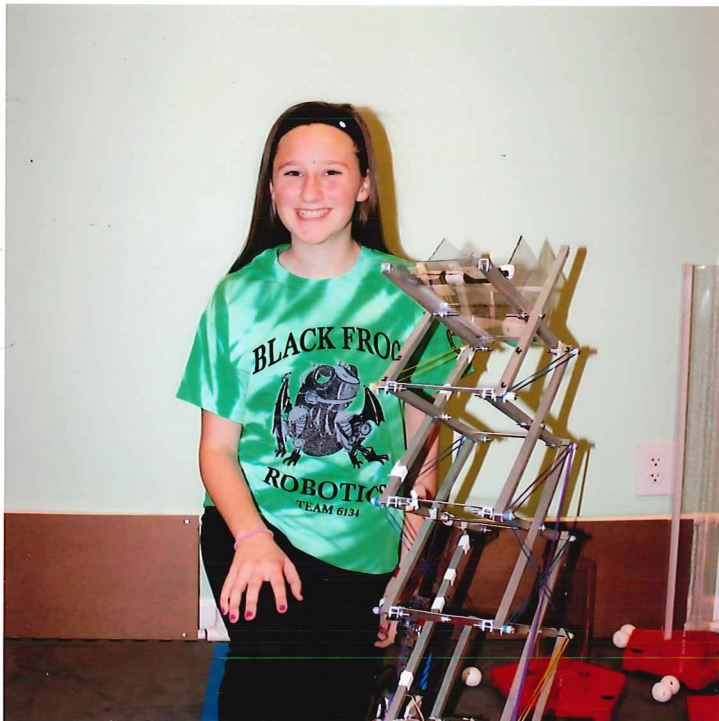
## Saketh Addanki

I'm 12 years old and attend Novi Middle School in the 7th grade. I was on the FLL team Rapid Robots for 2 years. Outside of school and robotics I like to play tennis and watch a wide array of sports. I am very excited about this year because its my first year in FTC and I really enjoyed FLL.



## Serdar Karahann

I am 13 and in 8<sup>th</sup> grade at the Novi Middle School. I was introduced to First Robotics by my friend Arnav and have loved it ever since. My favorite part of Robotics is the competitions because we get to compete with our robot. Outside of Robotics I play basketball for the Novi Wildcats. This is my 2<sup>nd</sup> year of FTC and I'm excited for the season to start!



## Sydney Grassmyer

I am an 8th grader at Novi Middle School and I am 13 years old. I was on the FLL team Techno Tadpoles last year. I enjoy playing sports such as soccer, volleyball and I enjoy to ski. I am glad I am on FTC because I like to fix and work with the robot.

## Vinay Panyam

I am 12 years old, and I'm a 7<sup>th</sup> grader at Novi Middle School. I was on the FLL team the Techno Tadpoles for 3 years. I like to program and build. I like FTC because it really improves your thinking skills.



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## **COACHES**



### **K Kammanadiminti**

I am with Ford Motor Company IT, where I have been for the past eight years and 20+ years of IT experience. I have a BS in Electronics, MS in Computer Science and hold an MBA from the University of Chicago. I coach the Black Frogs on programming the robot. This is my second year as a coach on FTC. Besides coaching on robotics, I enjoy woodworking, travel and spending time with my family.

### **Hari Addanki**

This is my first year of coaching an FTC team. I primarily focus on the mechanical aspects of the robot for the team "Black Frogs".

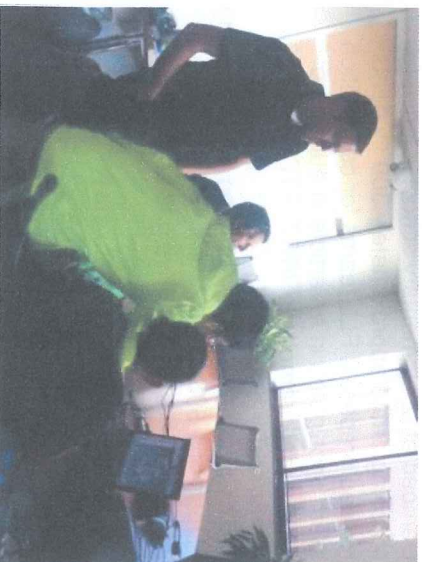
I have a B.S. and M.S. in mechanical engineering from Mississippi State University. I work for Ford Motor Company engineering battery packs for electric vehicles.

I enjoy spending time with my family and volunteering.



## CAD:

For our CAD, we used the software Autodesk. We took publically available CAD files for some standard parts such as the Samantha and NXT and we also created some of our own such as the bucket and scissor lift. After we finished the robot, we decided to animate it. We made a 1 minute animation video with what we could constrain. The animation can be viewed at our pit. We also won an EKOCYCLE 3D printer which we have used to manufacture some of our robot components.



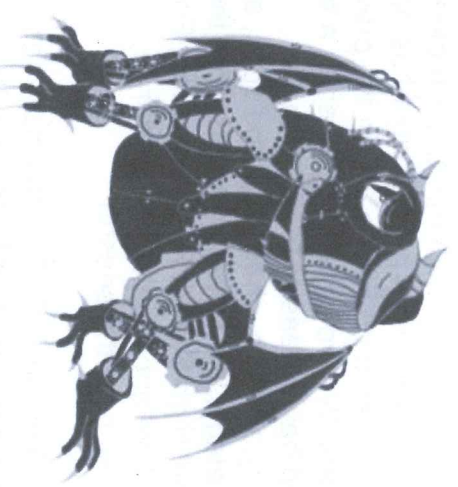
Thank you to  
all of our  
sponsors!



Black Frog Parents



Black Frog Robotics  
FTC Team 6134  
Novi, MI



<http://blackfrogrobotics.weebly.com/>



## Our Team

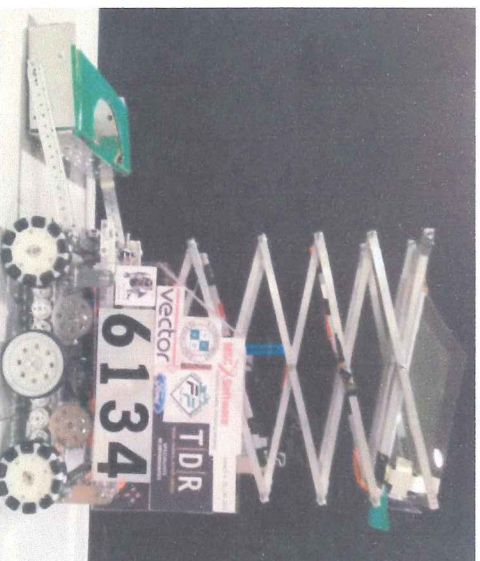
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We find the *FIRST* Tech Challenge (FTC) program to be helpful to us in the following ways:

- Strategy Development – how to score points, defend, etc
- Planning
- Problem Solving
- Time Management
- Application of Math, Science and Physics in robot build and design
- Innovation
- Developing leadership
- Communication and Public Speaking
- Collaboration / teamwork – cooperation between all members
- Gracious Professionalism
- Team Building – Have Fun!
- Respect for coaches and mentors for giving their time
- Budget Management – Cost of materials, grants, fund raising
- Negotiation
- Respect for other ideas in design
- CAD / 3D Printing

## Our Robot

The Black Frog robot is made of mostly standard Tetrix® kit parts and Lego® Mindstorms® kit parts; we also have some custom made parts. We used our EKOCYCLE 3D printer for our bucket guide mechanism. Our robot can pick up balls, dump them into the goals and it can drag around the rolling goals. We started our robot design by using NASA's design process for kids. We began by analyzing the game, brainstorming design ideas, selected a design, prototyped it, evaluated and reviewed the results. We brainstormed several ideas and solutions to the task at hand. We have learned throughout our season by discussing the problems that we have faced to improve on our robot. Some examples of prototypes we have tried include rack and pinion scissor lift, tennis ball hopper, ball sweeper and use of surgical tubing in lift design.



## Gracious Professionalism

We had several opportunities this season to promote FTC and *FIRST*, help the community and work with professionals.

### For outreach:

- We were invited by *FIRST* in MI to represent FTC in a Consumer Energy commercial to promote their "Get into Energy-Get into STEM" program. It will first be shown at MI Governors conference and later on-air
  - We presented at our school staff meeting where we encouraged the inclusion of the *FIRST* Robotics program within the STEM curriculum
  - We went to Comerica Park during Tigers baseball game and gave a demo our robot to about **40,000** people
  - We demoed at a FLL competition where we reached out to **32** teams and **8** Jr. FLL teams encouraging them to continue with *FIRST*.
  - Assisted a rookie FTC team in neighboring communities, they won the Connect award and made it to the state championship
  - Demoed at FRC kick-off event
  - Demoed at 2 elementary school science fairs reaching out to approximately **300** students
  - Helped prepare 2 FLL teams for competition
  - Were spotlighted in an article in our school newspaper promoting *FIRST* FTC
- ### For Community Service:
- We helped out at Gleaners Food Pantry netting a total of **1,595** meals
  - We did a Toys for Tot drive gathering toys for more than **70** children
  - We made cookies and blankets for cancer patients at UM Mott
- ### Working with Professionals:
- We visited FANUC and toured their facilities
  - We presented our season and toured Dallas Industries
  - We presented to MSC software and learned about their products
  - We presented to Autodesk and discussed our use of CAD and they gave us some tips
  - We visited local dentists and saw how they used robots
  - We organized can drives with Vector Software



## Our Team

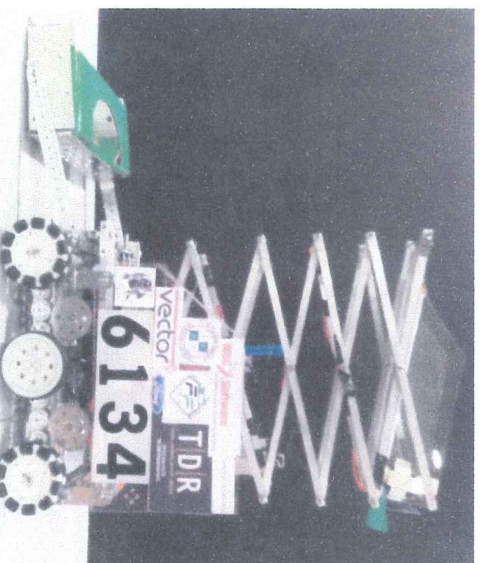
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## FTC Team 6134: Team Summary

We are the Black Frogs, team 6134, from Novi Michigan. Seven of our eleven teammates are eighth graders and the other four are seventh graders. We all go to Novi Middle School. We have eight boys and three girls. We are proud members of the FIRST family and won the INSPIRE award at the Michigan State Championship. We all love the spirit of FIRST and apply strategic, problem solving, organizational and team building skills beyond Robotics in our pursuit of knowledge in the area of STEM. Feel free to check out our profiles starting [on page A-2](#) in the engineering notebook.

At the start of the season we organized our ideas into several matrices and used NASA's engineering processes developed for kids to design and test our robot. In autonomous we originally only kicked the kickstand down. Now as we enter the super regional competition we have dared to do what we originally thought was impossible by scoring in the center goal in the autonomous stage. In teleop we drag the ninety centimeter rolling goal to the parking zone with our newly designed hooks and we score in it several times. Then we score four balls in the center goal during end game before pushing a rolling goal up the ramp. Details about our design process can be found in the engineering notebook on [pages E-3, Ea-9, Ec-3 and Ed-3](#).

To design our robot we used a Pugh Matrix and NASA's Design process. On our chassis we use a six wheel design for a smaller radius of turn. We have four omni-wheels for better turning and two regular wheels in the center for protection from being pushed around. Our robot is geared in such a way that if one of our 4 motors fails, two respond and it will not be a problem. We also can drive without two of our wheels. We can push 40 pounds and drive at little over a mile per hour. We were able to prove this on the field by pushing our alliance partner up the ramp during our regional competition. For our game spec we built a bucket with holes and a 3D printed ball guide to pick up balls and put them in our dumping mechanism which is on the scissor lift. The scissor lift is powered by a lead screw. We added rods to make it more stable and springs to help raise it. When we reach our desired height we can release the balls from our gravity powered dropping mechanism with a guiding cup to aim directly into the tube. For the hooks we used two servos directly attached to two rods. More specifics are on [pages Ee-2, Ee-4, Ef-15, Ef-24, Ef-32, Ef-52, Ef-54 and El-1](#) in our engineering notebook.

To program our robot we used robot C. In autonomous we used special variables such as Counts per Inch and Counts per Degree to accurately and easily program the robot in terms of standard measurements. We also used IR measurements to program different movements in autonomous. In teleop our goal was to program the controller to make driving easy for the drivers. We used the 3D CAD software Autodesk Inventor to model our robot including 3D printed parts. Examples of our programming strategy can be found in the engineering notebook on [pages Ej-1 and Ej-28 through Ej-30](#).

Outreach is also extremely important to us. We went to demo in front of 40,000 people at Comerica Park for a Detroit Tigers MLB baseball game. We demoed at two school science fairs to introduce kids in our community to robotics and FIRST. We shared our robot with several companies to teach them about FIRST and learn about engineering in our community. We helped a FTC team get started and coached two rookie FLL teams on what to expect at competition. We presented at our middle school staff meeting where we encouraged the inclusion of FIRST robotics within the STEM curriculum. We supported our FLL and FRC teams by demoing at our FLL qualifier and FRC kick off events. We were even invited by FIRST in Michigan to represent FTC in an upcoming Consumer Energy Commercial promoting "Get Energy-Get Stem". Highlights from our season can be found on [pages C-2, C-18, C-41, C-47 and C-49](#) of the engineering notebook.

For our business plan, we looked at our past year expenses and created this year's budget. We determined how we could reuse materials from last year to lower our expenses. Our major expenses were primarily to build the robot. To raise funds, we reached out to local businesses such as Dallas Industries and large corporations like Ford motor company. We also organized several fund raisers including California Pizza Kitchen and can drives for returnable can deposits. All our income and expenses are organized in an excel spreadsheet and reported to the team during our regular meetings and shared using our Google drive. Our updated business plan ([page D-9](#)), team budget vs. actuals ([page D-10](#)) and sponsors ([page D-11](#)) can be found in the engineering notebook.



# Section B

## Pre-Season Preparations

FTC #6134 Black Frogs

Session # 1

Attendees: Whole Team

Location: Arnav's House

Date: July 12

Plan for the day

One of the first meetings and we talked about the robot and other stuff.

Task	Reflections
We looked at the robot from 2013-2014 year.	<ul style="list-style-type: none"> <li>The old members explained the basics of our robot and game-spec items.</li> </ul>
We talked about First Pitch on July 30.	First Pitch is an event where the Novi High School Robotics Team, Frog Force, built a robot to pitch the first pitch at a Detroit Tigers game.

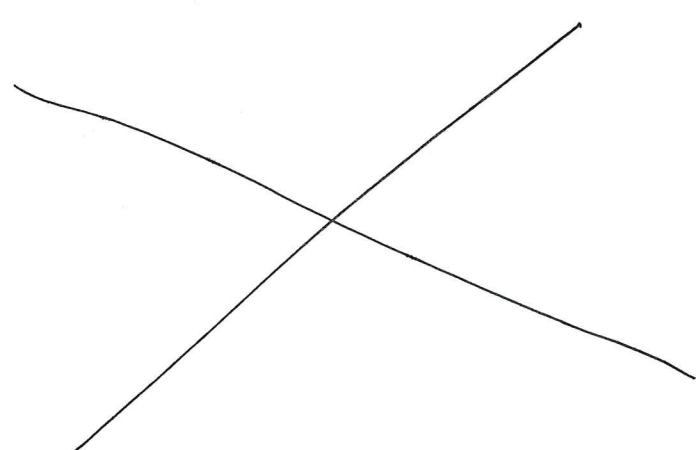
Recorded by:

Arav Kammanadiminti

FTC #6134 Black Frogs

Session # 1

Date: July 12

Task	Reflections
<p>We talked about fundraising and to talk about <del>the</del> contacting local companies.</p>	<p>Arnav volunteered to write the letter and send the draft to us. to send to companies.</p>
<p>We discussed if anybody could get into contact with other FTC teams and if they needed our help.</p>	<p>We gave that job to Mrs. Moore who will contact Tammy Domrath to <del>see</del> see if any teams needed our help.</p>
	

Recorded by:

Arav Kommanadinthi

FTC #6134 Black Frogs

Session # 2

Attendees: Whole Team

Location: Arnav's House

Date: August 15<sup>th</sup>

Plan for the day

Do things that will lead us into the season.

Task	Reflections
- Discussing the disassembly of the robot.	* We decided that we would disassemble the robot after at least one meeting with the engineering companies Mr. Kakar had arranged
- Can collection from Vector	* We collected over \$248.80

Recorded by:

Saketh.

FTC #6134 Black Frogs

Session # 3

Attendees: everyone

Location: Arnow's House

Date: August 19<sup>th</sup>

Plan for the day

To have an introduction to programming. ALSO, we got some new things

Task	Reflections
-programming concept	We covered additional concepts in programming and ran through some sample code.
-New things	<p>- <del>new</del> We got a new sponsor! It's Alex's orthodontist and he uses autodesk.</p> <p>- we now have a website!</p> <p>- we also put our input in on the website.</p>

Recorded by:

Anne George



Session # 4

Attendees: Whole Team

Location: My House

Date: 8-28-18

Plan for the day

Pre-Season Inventer Software  
and MSC recap

Task	Reflections
Learn about the Inventor Software	We learned the basics of the Inventor software from Sendar's dad who <del>was the</del> would be helping us on C.A.P this year. We learned a lot of the basics such as making constraints.
Recap MSC visit	We all sat down and talked about what we did and learned at MSC. We also discussed the notes Nishita took.

Recorded by:

Arnav Talukder

# Section C

## Outreach

# FTC #6134 Black Frogs

Session # 1

Attendees: Arun

Location: Howell, Michigan

Date: July.

## Plan for the day

We went to Howell, Michigan to demo. our robot and explain what FTC is to people who were interested.

Task	Reflections
We had to demonstrate at Howell	We set up our robot, but their internet wouldn't work. We switched a few wires and it started. We demoed our robot and watched their FRC team's robot.

Recorded by:

Arun Kammenediminti

FTC #6134 Black Frogs

Session # 2

Attendees: Arnnav, Anne, Ankith, Nishita,  
Alex

Location: Comerica Park

Date: 7-31-14

Plan for the day

- Demo our robot at the ~~the~~ Tiger's game
- Participate/help in the first pitch

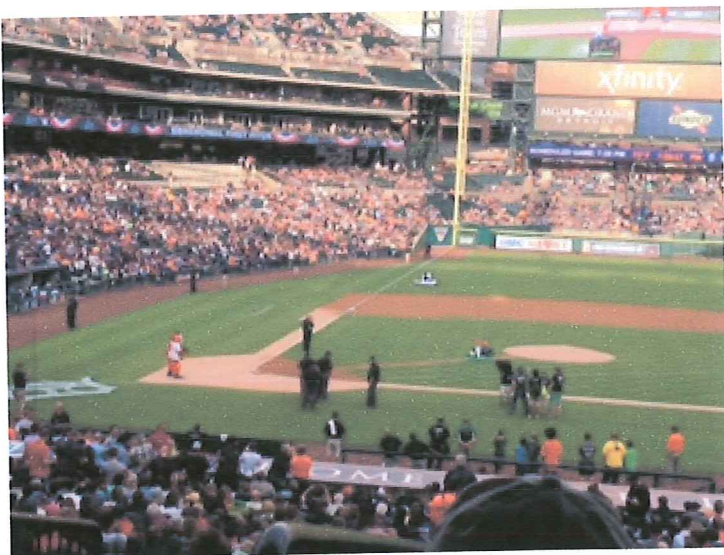
Task	Reflections
Demo our robot	We set up a field in an area of the stadium to demo our robot. We told people about FTC and explained how to join FIRST robotics. Also we drove the robot around and let other people who wanted to drive get a turn at driving.
Help in the first pitch	Our high school FRC team Frog Force had a robot that would be throwing out the first pitch at the game. Each team sent a kid on to the field to represent the team. Before the pitch a video about FIRST was played and then the robot threw the pitch.

Recorded by:

Arnnav Talukder



# Robots In The D



# FTC #6134 Black Frogs

Session # 3

Attendees: Alex, Anne, Sydney, Nishtha, Arun,  
Ankith

Location: MSC Software

Date: Tuesday, August 26, 2014

## Plan for the day

visit to MSC software

Task	Reflections
Showed Robot	We showed our robot and shared what it can do. We also answered their questions about how we designed our robot.
Shared First	We shared what First is about and the different programs. We explained how it helps us in STEM related activities.

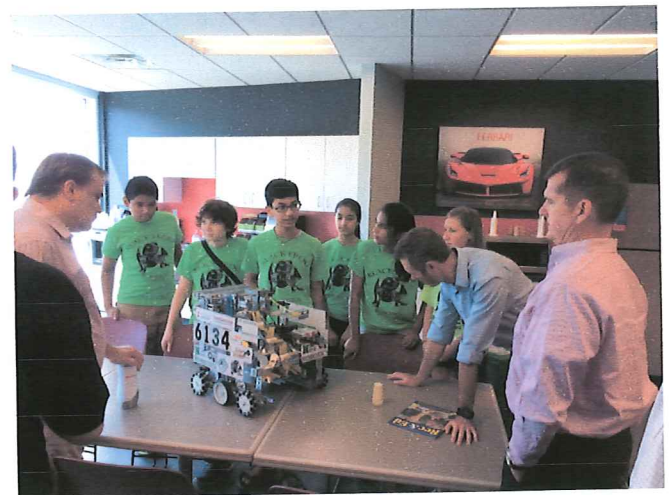
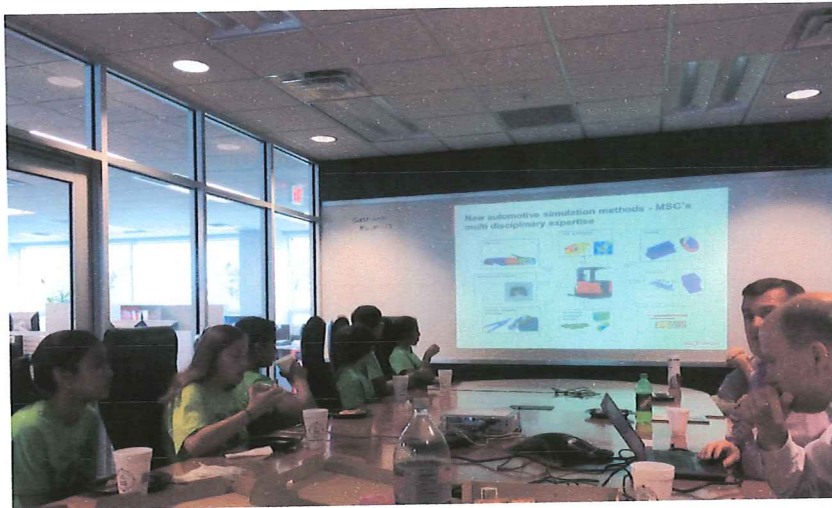
Recorded by:

Sydney and Nishtha



# MSC Software®

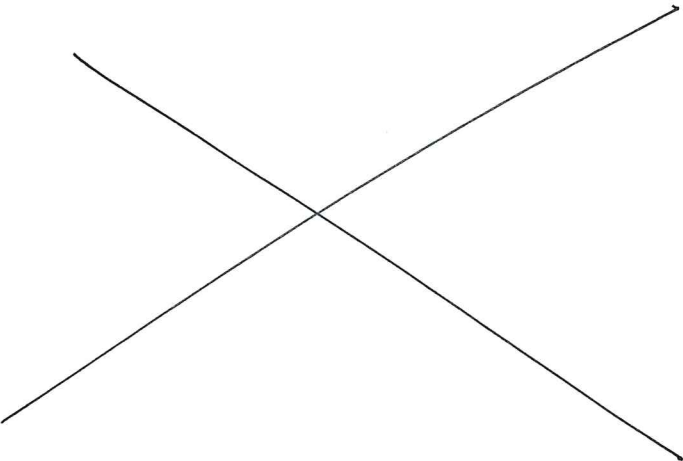
Simulating Reality, Delivering Certainty™





Session # 3

Date: Tuesday, August 26, 2014

Task	Reflections
Searched about MSC	The MSC Team showed us a power point about what they do. They also showed us how simulation helps to test and improve other <del>companies</del> companys products before the product is built. This process helps to save companys time and money.
MSC Software can help us	The MSC Team shared how they could help us. One way they said was they could help create components that would less likely break using their software. One of the team members offered to help mentor us and help test our robot by using their simulation software.
	

Recorded by:

Sydney and Nishtha

FTC #6134 Black Frogs

Session # 4.

Attendees: Arun, Saketh, Arnav, An  
Alex

Location: Autodesk office Navi Date: Sep 16

Plan for the day

Learn more about the Autodesk  
CADing software

Task	Reflections
Show robot design (last years)	We showed the robot from last year and revealed what certain functions would effect the competition.
Learn how to use the software	One of the Autodesk employees showed us a link to a special Youtube page full of tutorials that made it much easier to design the robot this year.

Recorded by:


Alex





Session # 5

Date: 9/21/14

Task	Reflections
<p>To provide an overall design for our website.</p>	<ul style="list-style-type: none"> <li>- The way we designed the website was made to be easily navigatable and showed team spirit at the same time.</li> <li>- We learned the drag drop technique of the Weebly website</li> <li>- 3 possible designs were evaluated and applied in the end we <del>st</del> chose a design with a horizontal menu bar at the top, and gave the menu's names ("Home", "Sponsors", "Contact", etc.)</li> <li>- Now every one is able to work on their specified areas after we organized them!!</li> </ul> <div data-bbox="571 1384 1417 1742"> <p><b>BLACK FROG</b></p>  <p><b>ROBOTICS</b> <a href="http://WWW.BlackFrogRobotics.weebly.com">WWW.BlackFrogRobotics.weebly.com</a></p> </div>

Recorded by:

Leon &amp; Ankit

FTC #6134 Black Frogs

Session # 6

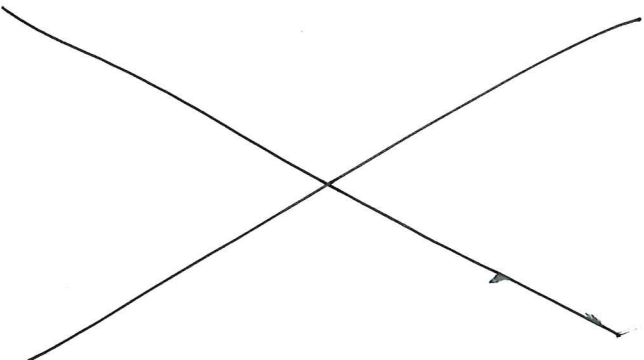
Attendees: Vinay

Location: Vinay's house

Date: 11/9/14

Plan for the day

Work on the website

Task	Reflections
Document field trips	We typed up what we did on the visit to MSC
	

Recorded by:

Vinay Pangam

FTC #6134 Black Frogs

Session # 7

Attendees: Alex

Location: Alex's House

Date: 11/10/14

Plan for the day

Work on the Black Frogs Website by adding graphics and Captions.

Task	Reflections
Create a banner for field trips	The banner was a combination of an MSC meeting and logo. The Banner fit perfectly into the field trip banner slot.
Create the page for field trips	The photos were very difficult to position the way the team wanted to, but eventually we had the website working

Recorded by:

Alex



# BLACK FROG (/)

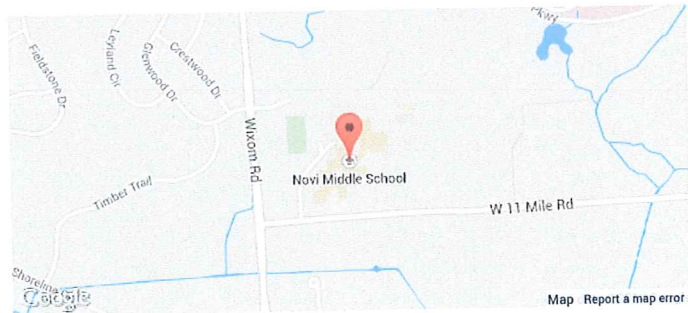


## ROBOTICS

[Home \(/\)](#)[Events \(/events.html\)](#)[Contact \(/contact.html\)](#)[About us \(/about-us.html\)](#)[Support Us \(/support-us.html\)](#)

### Black Frog Robotics

Novi, Michigan



Session # 8

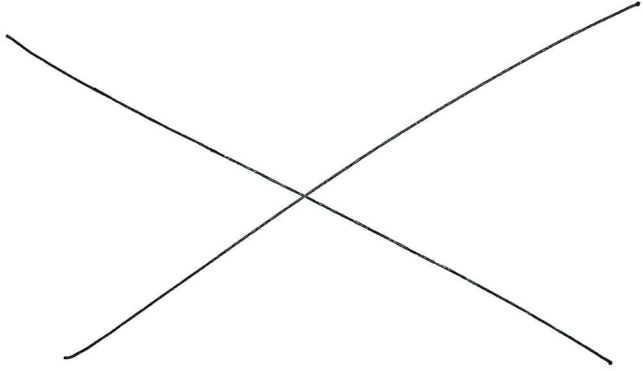
Attendees: Arun, Arnav, Sydney, Vinay

Location: South Lyon High School

Date: 10-6-14

Plan for the day

We are going to go to a South Lyon FTC Team and see ~~how~~ what they needed help with.

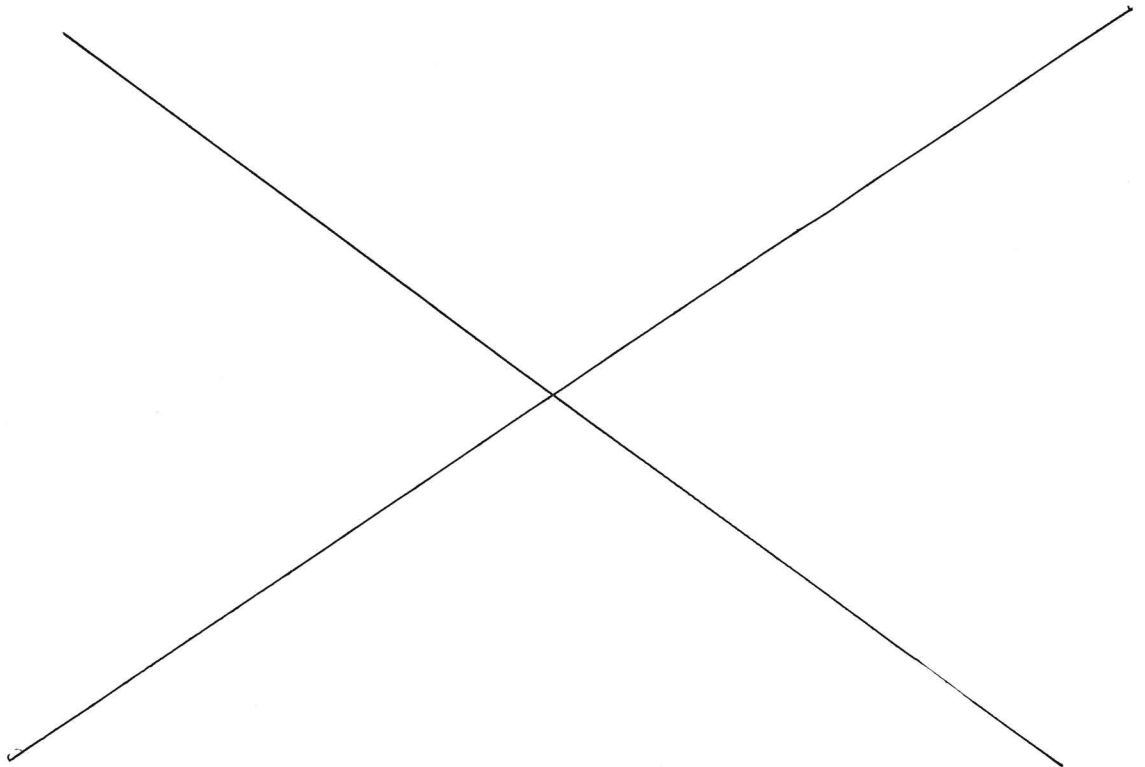
Task	Reflections
We went to the team and saw what they needed help with.	We first introduced ourselves and saw what we could do to help. They had <del>been</del> recently joined together and had gotten their parts today. <del>They</del> They were sorting out stuff, so we saw how they were doing it. We are hoping to help them more next week.
	

Recorded by:

Arun Kammanadiminti

First Lego League Team 6006

Electro Force





Session # 9

Date: 11/3/14

Task	Reflections
Share our experiences with FLL team	we went to an FLL team to mentor them and tell them what to expect at an FLL competition. We introduced ourselves and shared our experiences with them. They were really good listeners.
We gave them a team challenge	We gave them a practice team challenge to do and judged them based on how they did. They were successful in finishing the task and had good teamwork. We told them what to improve in <del>team</del> terms of roles during the challenge. Overall they did really well on the challenge.
We discussed the core values with them.	We revised all the core values with them and asked them to answer certain questions that may be asked during judging. We told them how to answer as a team each question asked by the judges. We gave them a mini judging session which went well.

Recorded by:

Nishtha Kakar

## First Lego League Team 2638

### Team Wired



FTC #6134 Black Frogs

Session # 10

Attendees: Sydney, Vinay, Saketh

Location: Team Wired Meeting Date: November 3, 2014

Plan for the day

To help the FLL team Wired to prepare for the competition.

Task	Reflections
Lead them in a team challenge.	We led team wired in 2 team challenges and we gave them suggestions on what they could improve on so they could <del>succeed</del> succeed at competition.
We watched some of their robot runs	We watched them run some missions. After we watched we gave them some pointers on how to be more efficient on saving their motors and using less attachments.

Recorded by:

Sydney Grassmeyer



FTC #6134 Black Frogs

Session # 27  
 Location: Novi Middle School

Attendees: ● All Black Frogs  
 Date: 11-22-14

Plan for the day

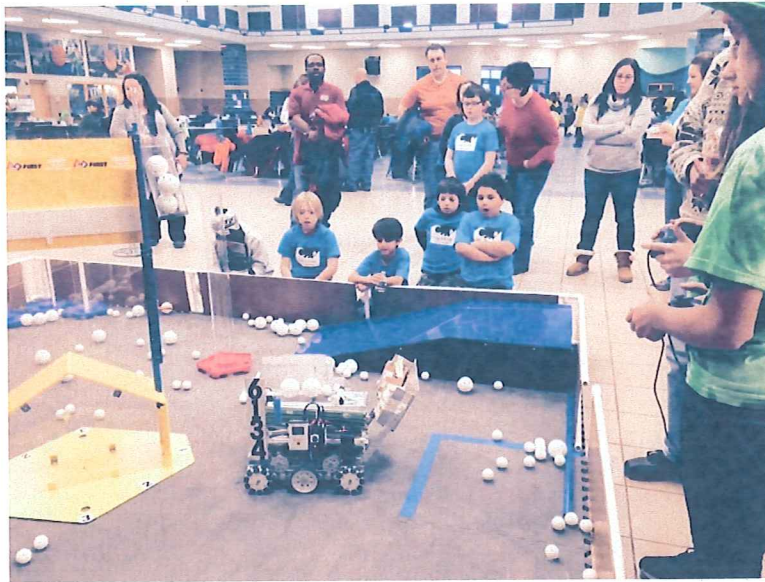
- demo at Frog Force Frenzy

Task	Reflections
- demoing at Frog Force Frenzy.	We demoed at Frog Force Frenzy which is an FLL competition hosted by Novi's FRC team. Around 50 people came to watch our demo. There were people <del>for</del> from FLL and JR. FLL and were excited to see our robot.
- Collect toys for "Toys for Tots" drive.	- Our team decided to do a "Toys for Tot" drive. Almost all of the teams donated one or more toys. In total we collected <u>48</u> toys for the drive, and collected about \$70 in donations.

Recorded by:

Anne George, Nishtha Kakkar, Vincy Panyam











# *Certificate of Appreciation*

Presented in gratitude to

## Black Frog Team 6134

For Outstanding Support of



### United States Marine Corps Reserve



December 25, 2014

*Date*

*Rebecca P Garbrugh*

Regional Area Coordinator

FTC #6134 Black Frogs

Session # 36

Attendees: Ankit, Nishita, Anni,

Location: FANUC ROBOTICS Date: 12/16/14

Saket, Leon,  
Amar, Vinay

Plan for the day

- Talk about visiting FANUC

Task	Reflections
• Talk about visiting FANUC.	• We discussed about what we learned and found interesting at our visit to FANUC robotics. During our visit, FANUC told us about what they did involving robots. We learned that their robots help in the manufacturing of about 60% of the world's products. After they told us what they did we told them about FIRST and FTC. We showed them a video from our Sterling Heights qualifier. After we talked about what each of us did FANUC gave

Recorded by:

Amar Talukder



Session # 35

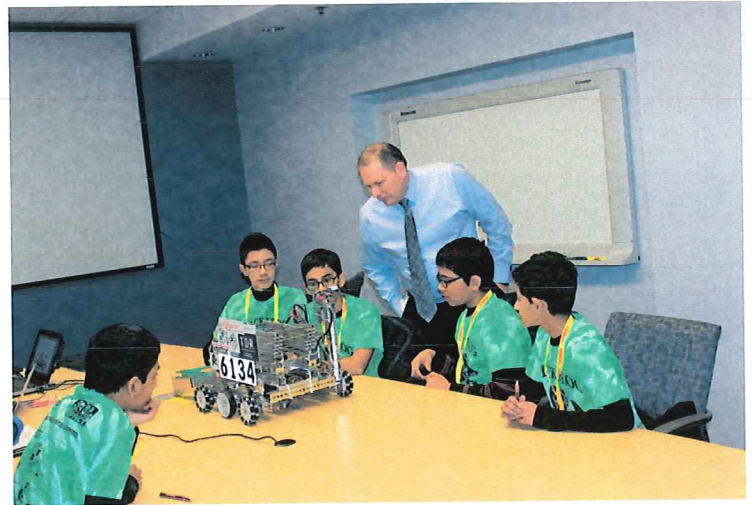
Date: 12/16/14

Task	Reflections
<p>talk about visiting FANUC.</p>	<p>us a tour of their facility. They taught us about the seven axis of motion which were X-axis, Y-axis, Z-axis, yaw, pitch, and roll, and a axis of lateral motion. They also showed us a robot that could lift a car chassis and a robot that sorted out small pull sized objects by color. They told us about how they had three main types of robots ones that paint, ones that manufacture robots, and ones that handle food. We ended the visit with the FANUC employees allowing us to drive their smaller robots.</p>

Recorded by:

Arnav Talukder







FTC #6134 Black Frogs

Session # FRC Kickoff 2015  
 Location: Novi High School

Attendees: Sydney, Anne, Saketh, Arnav, Ankit, Ann, Nisha, Sedar, Alex, Vinay  
 Date: January 3, 2015

Plan for the day

Shared our robot at  
 FRC Kickoff.

Task	Reflections
Sell Novi Robotics stickers	We used this <del>opportunity</del> opportunity to sell our Novi Robotics stickers to help our fundraising efforts.
Share about our robot	We shared our robot with FLL teams from Novi, other FTC teams, FRC students and other interested parents. We explained why we choose the scissor lift and demoed our rack and pinion to show the improvements we have made.

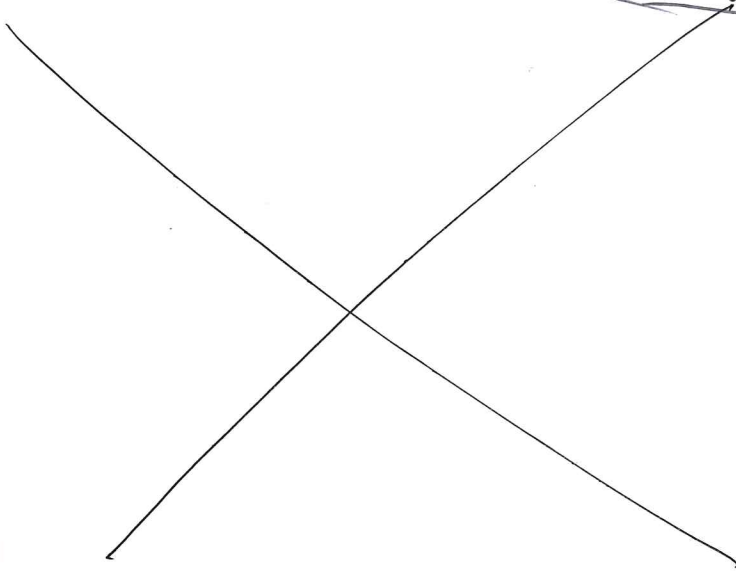
Recorded by:

Sydney and Anne

FTC #6134 Black Frogs

Session # FRC Kickoff

Date: Jan 3, 2015

Task	Reflections
Watch <del>the</del> FRC Kickoff videos	We were inspired by the FRC Kickoff videos. They inspired us to work hard and to join FRC <del>in the future</del> in the future.
Listen to FIRST alumni share their experiences	We listened to FIRST alumni share their experiences and how FIRST has helped them with their future. One alumni had really inspired us to continue with F.I.R.S.T. and move on to FRC in the coming years. He shared that F.I.R.S.T. had taught him things that others didn't know at his work.
	

Recorded by:

Anne George & Sydney Grassmyer



FTC #6134 Black Frogs

Session # FRC Kickoff

Date: 1/4/15

Task	Reflections
create a lumber on the bucket	In order to increase the strength of the lumber we created a wooden lumber. We used Balsa wood and shaved <del>the</del> off wood and made a curved ramp shape. The curved wood allow the ball to get in the bucket and not allow it to come out.
Not Running Robot	We didn't run our competition robot because <sup>learning</sup> from our past experiences we did not <del>not</del> want to burn our motors from overuse of them as we did at Frog Force Frenzy.
Build a demo chassis	We were building a demo chassis so that we wouldn't burn motors on our competition robot. <del>It</del> It also gave a chance for the rookies to get <del>experience</del> experiences building a new chassis.

Recorded by:

Nishtha Kakar



# FRC 2015 Kick Off





FTC #6134 Black Frogs

Session # 43

Attendees: whole team

Location: Amav's house

Date: 1/11/15

Plan for the day

- Get interviewed by our school newspaper "the Pawprint."

Task	Reflections
- do the interview.	- we were interviewed by the "Paw Print" reporter Dhiya Senenu Murgan. She asked us many questions about our team, FTC, and F.I.R.S.T. She was very interested in our team, and wrote an article. *(see next page) *
	She published the article, and it was sent out to more than 1000 families from our school. It was also put on the district website, for the entire district to see!!

Recorded by:

Anne George



## Clubs & Activities

[\(Return to the Table of Contents\)](#)

### Outstanding orchestra performs at MMC

By: Jessica Paul

On January 22 and 23, the eighth grade orchestra students went to the Michigan Music Conference (MMC) in Grand Rapids. At the conference, the students performed several songs, which set an example for other schools to follow.

Last year, the orchestra received all ones on their MSBOA festival performance, qualifying for the conference. Then, the tape of their performance was sent in to the people who selected the performers for MMC.

Mrs. Rais, the NMS orchestra teacher, was notified last June that the orchestra was accepted to play at the conference. Since then, the orchestra has been hard at work learning their new songs and performing them in various concerts.

The whole orchestra was excited to go to this conference. It was a once in a lifetime experience since our eighth grade orchestra was the only middle school orchestra in the state to be accepted into such a prestigious conference.

However, the conference was not all just hard work for the students. It was a chance for the students to have fun with friends and learn new techniques on their instruments.

One orchestra student commented, "It was truly a once in a lifetime experience and I had lots of fun!"

"I enjoyed the experience and I got to miss school, although it was stressful figuring out when I would catch up on all of the work and tests that I missed," another student said.

This experience has definitely shown that the Novi Middle School orchestra is a role model orchestra for other middle school orchestras across the state to look up to, especially considering that many members of the orchestra have only been playing for three or four years.

### 21<sup>st</sup> Century robotics

By: Dhivyashree Senthil Murugan

The idea of technology has really found its true potential in the 21<sup>st</sup> century, and it is still evolving. People are working on developing that into reality to this day. Robotics is even a step further, a really big step; but it requires vast thinking.

FIRST is very renowned in this impressive development. FIRST stands for For Inspiration and Recognition of Science and Technology. It is an international organization that combines middle school and high school students in the world of robotics; they come together to compete in robotic competitions. It was founded in 1989 and began in 1992. 1/4 of a million youngsters were involved ever since. The high school students compete against other teams from other locations, just like the middle school team. Their mission is to inspire young people into becoming future leaders of science and technology. The organization has levels of robotics competitions according to the age of the competitors. The awards go by the type of competition that is taking place (regionals, district competitions, championships, etc.). The FTC is currently the middle school level of competition. It stands for FIRST Tech Challenge. The level has teams from different locations. The Novi Middle School team-the Black Frogs-were interviewed to talk more about this hands-on activity that most of you are probably not aware of.

The Black Frogs built their first robot and it was 18 inches tall. They were recognized out of 60-100 other teams because they won the 1st place "Inspirational award." They also won 1st place in the Regionals Tournament out of a 100 other teams. The members said that they got their name to go with the frog theme of the Novi high school robotics team: Frog Force.



The team was asked to compare the STEM skills needed for competitions to the STEM course taken by the Novi Middle Schoolers. They replied that the STEM skills needed for the competitions were much more advanced: "It's like a mental sport, like a brain game; it's basically really advanced."

Another team member said, "In STEM, we drive roller coasters, but in the competitions, we have to come up with our own things with the help of our mentor."

The team has meetings before each competition where they talk about "the plan for the day; we analyze the mistakes made by other teams in prior competitions, rather than complaining about them." The team also discusses what strategies each of the members has to develop for upcoming competitions.

They also design robots and they "think of all the pros and cons of building it," explained their coach.

Their goal is to score as many points as possible, so they have to really look for all ideas their teams can offer. The team has to practice with their robot to see what way or plan works best.

How do the competitions make them feel? After each competition, regardless of the outcome, a team member stated that they "feel accomplished at the end."

Another member said that they "feel relieved after our accomplishment."

The team specified that robotics have a lot of influence in their lives. One of them said that it "helps us figure out time management, and think outside the box; [to] think of things the other teams didn't."

The team also said that it was actually different from schoolwork in many ways. "Robotics is hands-on and application. It also gets you to think more. You get to experience with new things [robots] that most of your peers have not worked with. It can keep you mentally challenged."

Koundinya Kammanadiminti is an engineer and the mentor of this amazing team. He was also asked about his task and the role he plays in helping the team score as many points as possible. What does he teach specifically...what does he do for the team to help them succeed? He answered that the team leads itself. That all he does is talk to them about the things that are available (the tools and resources they could use) and then assembling that to bring out a proper finished product.

"What I try to do is, basically, is that kids have got a challenge, what I do is guide them into thinking about what is good and what is bad about the challenge. Are we playing by the rules or [not]? So as a mentor, I do not make decisions, but guide them..."

He emphasizes the fact that experience and investigating the problem is ultimately better and more helpful than just telling the members what to do. "Telling them is...well, they're not learning anything, the idea is for them to learn something...we tell what are the resources available and how to put the things together and then they can work on their own. Kids also have their own ideas. As coaches and as engineers our job is to see what is available out there, and let them realize to themselves if such is an idea that will work."

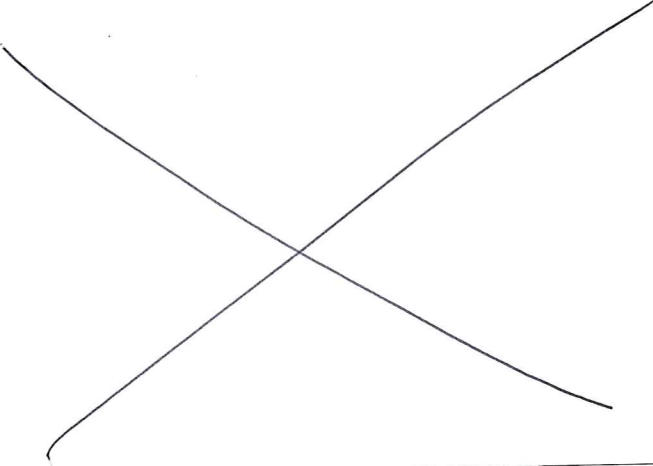
In conclusion, the coach said that he'd like to see more kids involved in FTC. "I'd like to see more kids in robotics, more FTC [involvement]. We'd like to see the middle school recognize us as a school activity, FTC as a school activity. For example: FTC is recognized as a school activity in high school, the school actually assigns a coach ...and our teacher is on our team (if you're a high school participant, then you can possibly have your teacher on your team). We'd like to see something like that happen in the middle school level."

Clearly, Robotics can be quite inspirational and amazing. By how finely the interview progressed, a person can safely infer that the team members really enjoy being in such a unique and helpful activity! Make sure to check out the team!



Session # 45

Date: 1/18/15

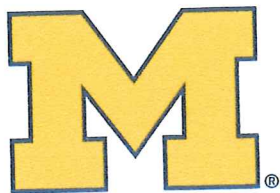
Task	Reflections
Make blankets for Cancer Patients	We made fleece tie blankets for the University of Michigan Cancer we made five blankets in total.
Make Cookies for Cancer Patients	We made several batches of cookies for cancer patients, <del>to make it</del>
	

Recorded by:

Ankith Udapa







**University of Michigan  
Comprehensive Cancer Center  
Patient & Family Support Services**

1-30-15  
Dear members of "Kaptor" & "Black Frog",  
On behalf of the Cancer Center,  
Thank you for the recent  
donation of WONDERFUL fleece  
blankets for our patients. Your  
thoughtfulness will help  
brighten the day for many.  
With Appreciation,  
Mary McCully

X



University of Michigan  
Comprehensive Cancer Center

Mary Tansel McCully, CVA  
Program Coordinator  
Volunteer and Community Resources  
C427 Med Inn Building  
1500 E. Medical Center Dr, SPC 5843  
Ann Arbor, MI 48109  
(734) 936-8307 phone  
(734) 615-8219 fax  
mmccully@med.umich.edu  
www.mccancer.org



Session # 46

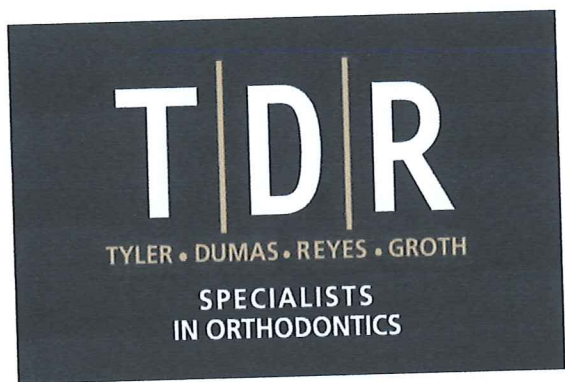
Date: 1/19/15

Task	Reflections
Orthodontist Visit	
Plan for the Day!	Visit one of our biggest sponsors Tyler, Dumass, and Reyes an Orthodontist company. Show them our robot.
- Visit the Orthodontist company.	- We went and visited Tyler, Dumass, and Reyes, to tell them about our robot and demo it. We wanted to visit them because they were one of our very big sponsor of our team. We showed them our robot and explained to them about the
	game and our competition. They were very impressed with our robot and how far we have come. They showed us their tools that they use to make models of teeth. They used CAD and 3D Printing just like we do. It was really cool that we got to see stuff we do in the real world!

Recorded by:

Anne George





# FTC #6134 Black Frogs

Session # 47

Attendees: ~~Vinay~~, Whole team

Location: Vector

Date: 1-23-15

## Plan for the day

Visit Vector and share our progress over the season.

Task	Reflections
Share our progress with Vector.	We visited Vector, a company that makes software and embedded electronics. We talked to them about what F.I.R.S.T. is, and what the challenge this year is. We then gave them a short demo of the capabilities of our robot while talking about our season.

Recorded by:

Vinay Panyam



# vector



Session # 54

Attendees: Whole Team

Location: Dallas Industries Date: Feb 17

Plan for the day

Go to Dallas Industries to share the word of ~~the~~ FIRST and see a tour of their facility.

Task	Reflections
<del>We</del> Talk about our season	- We talked to Mr. Chacko about our robot, season, and all our competitions. He had prior knowledge on FIRST but was very impressed.
Touring the Facility.	- We got to tour the amazing Facility of Dallas Industries. We got to see their equipment and what they made (machines that <del>the</del> <del>the</del> flatten metal and coils wires.)

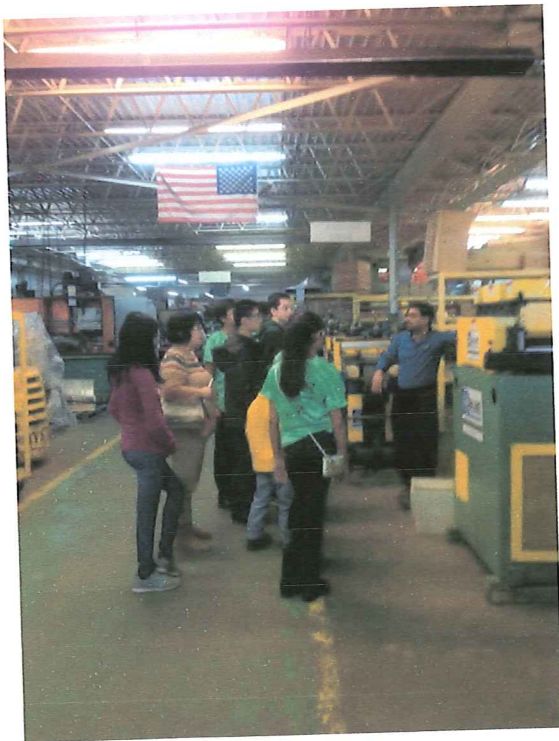
Recorded by:

Saketh Addanki, Anne George

Sydney Grassmyer,



The Dallas Difference



FTC #6134 Black Frogs

Session # 55

Attendees: Sydney, Anne, Alex, Arun, Nishtha, Leon, Vinay, Ankith

Location: Gleaners Food Pantry

Date: Feb. 18

Plan for the day

To help sort food for Gleaners

Task	Reflections
Learn about Gleaners	Gleaners is a community food bank which helps give food to people in need of food. Gleaners gives food to schools, soup kitchens, food pantries, senior centers and shelters. They gather food from people, large companies like Kroger, Walmart and Costco, farms, factories and USDA. It is a corporation in South East Michigan.
Distribute food into boxes	<del>We</del> We helped them sort the different types of food into boxes. We had to sort it into soup, dairy, fruits, vegetables, and protein. They had to be exactly 22 lbs, and had to be labeled, closed, and sorted. Out of 5 <u>huge</u> bins, we emptied 3. We did 87 boxes, which was <del>1,914</del> 1,914 pounds. That's 1,545 meals.

Recorded by:

Sydney Grassmeyer, Anne George



# Kids Helping Kids

## Solving Hunger Together



### KHK Programs

The KHK program offers a tour of the Gleaners facility, participation in an educational session on hunger awareness and nutrition, and a hands-on packing experience packing food for their hungry peers.

KHK efforts support two vital Gleaners programs that reach hungry children with nutritious food.

#### SmartBites Program

The SmartBites program provides schools with healthy snacks to distribute to hungry students during the school day and at after-school enrichment programs.

#### BackPack Program

Gleaners partners with local schools to distribute BackPacks filled with nutritious food for the weekend to children who rely on school-provided meals during the week. The Backpack program provides about six meals to children who may otherwise go without.

### Get Involved!

Groups are generally 10-25 people in size, with one adult chaperone for every 10 kids/young adults. K-2nd grade groups need one adult for every five students. Families are also welcome to volunteer. KHK volunteers are 5-17 years of age.

#### **Schedule Your Group Today!**

##### Detroit KHK

Reggie Williams

(313) 923-3535 ext. 231

[rwilliams@gcfb.org](mailto:rwilliams@gcfb.org)

**Tu, W, F:** 9:00-11:30 a.m. and 12:30-2:30 p.m.  
**Sa:** 9:00-11:30 a.m. and 1:00-3:15 p.m.

##### Pontiac KHK

Jenna Yuhase

(313) 923-3535 ext. 403

[jyuhase@gcfb.org](mailto:jyuhase@gcfb.org)

**Tues-Sat:** 9:00-11:30 a.m. and 12:30-2:30 p.m.

##### Warren KHK

Reggie Williams

(313) 923-3535 ext. 231

[rwilliams@gcfb.org](mailto:rwilliams@gcfb.org)

**Thurs Only:** 9:30-11:30 a.m. and 12:30-2:30 p.m.

### Empty Bowls

A potter assists school age participants (ages 6 – 17) in making one clay bowl to take home and one to donate to the food bank to be used at an Empty Bowls fundraiser to help feed hungry neighbors. This fun filled day takes place at our Detroit Distribution Center. To participate in Empty Bowls, a \$5 donation to cover the program costs for each participant, paid in advance is requested.

Empty Bowls sessions are held on the 2nd and 4th Saturday of each month from 9:00 – 11:30 a.m. or 1:00 - 3:30 p.m. Groups are generally 10-16 people in size, with one adult chaperone for every 10 kids/young adults.

#### Empty Bowls Contact

Reggie Williams

(313) 923-3535 ext. 231

[rwilliams@gcfb.org](mailto:rwilliams@gcfb.org)



### There are many ways to help!

- Volunteer and Help Pack Food
- Hold a Food Drive Before/After Volunteering
- Adopt a School
- Donate a Financial Gift
- Get started at [www.gcfb.org](http://www.gcfb.org)



C-42







# *Certification of Appreciation*



*Presented to*



## FTC Team Black Frogs Novi Mi

Your hard work sorting donated cans  
of food yielded 87 - 22lb boxes or the  
equivalent to **1, 595 meals!**

Kids Helping Kids  
"Hunger can be reduced by the deeds of children"

FTC #6134 Black Frogs

Session # ~~57~~ ~~Novi Meadows Science~~

Attendees: Vinay, Ankit, Anne, Saheth, Sridhar, An

Location: Novi Meadows

Date: 2-26-15

Plan for the day

Novi Meadows Science Fair Presentation.

Task	Reflections
Present at the Novi Meadows Science Fair.	We set up outside of the science fair projects and drove around our robot. We brought a rolling goal and a couple of balls, and scored in front of the crowd. We gave them information about FIRST and this year's FTC challenge. We even got three <del>girls</del> who were extremely interested in FIRST and wanted for information. We sent them the website link and they said they were planning on starting an FLL team next season.

Novi Meadows is our city's upper elementary school.

Recorded by:

Ankit Udupa, Vinay Pangam





Session # 58

Attendees: Full Team

Location: Novi Middle School

Date: March 5<sup>TH</sup>

Plan for the day

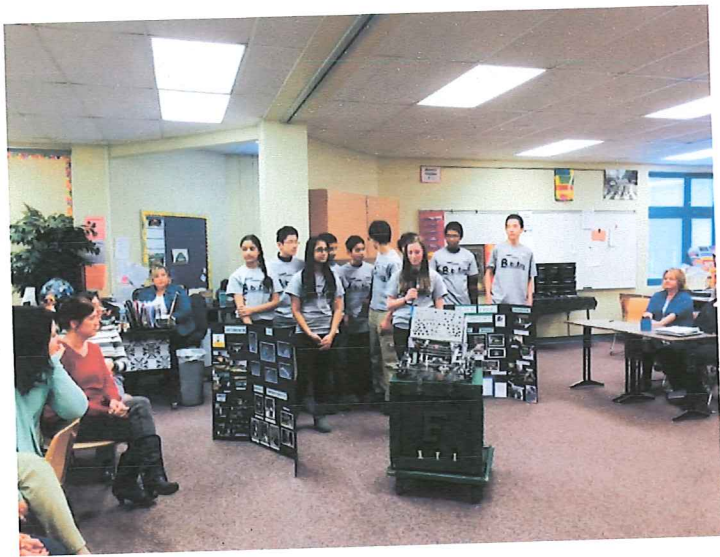
TO explain to the Novi Middle School staff about ~~the~~ FIRST and our season

Task	Reflections
Explain FIRST to our teachers	We explained <del>to</del> the FIRST robotics basics to the NMS staff. They <sup>were</sup> <del>was</del> very impressed and <del>was</del> this enthusiasm followed through the whole presentation
Talking About our season to <del>the</del> our teachers	We told our teachers about our whole season such as our Outreach, our design, and our programming.

Recorded by:

Saketh Addanki Sydney Grossmyer







FTC #6134 Black Frogs

Session # 59

Attendees: Whole team

Location: Seaholm Highschool Date: March 7th, 2015

Plan for the day

Be a movie star #commercial

- We were invited by Consumers Energy and FIRST in Michigan to help film a Consumers Energy commercial promoting FTC and STEM.

Task	Reflections
Shoot Computer Lab Scene	We went to the computer lab to do our first scene. We had to type and pretend we were saving the world. They thought we were amazing and adorable and were really impressed with our acting skills.
Shoot Cascade Effect Match Scene	We went to the gym where the field was set up. We were with another FTC team called the Viko- <del>Dragon</del> Psychos. We were split into 3 teams and we used our robots to reenact a competition match. This was a great experience and we are honored that we got invited.

Recorded by:

Sydney Grassmeyer & Anne George





Waiting for wardrobe...

Look out our stylish  
happy shirts...



# FTC #6134 Black Frogs

Session # 61

Attendees: Alex, Arun, Vinay, Ankith, Sydney

Location: Deerfield elementary school

Date: March 18<sup>2020</sup>

## Plan for the day

Demo our robot at the Deerfield Science Fair.

Task	Reflections
Demo Robot	The Demo started poorly when a bar in the scissor lift came loose and stopped the use of the lift until we could fix it later. After that mishap we were able to demo our robots movement and ball pickup, we even let the kids drive. Most of those who saw were anxious to join first.

Recorded by:

Alex





# FTC #6134 Black Frogs

Session # 62

Attendees: Everyone

Location: Nova High School

Date: 3/19/15

## Plan for the day

Present to our high school FRC team, Frog Force, and ask for a sponsorship.

Task	Reflections
Present our season to the team	We talked through our judging, and we made some adjustments to our presentation when we were talking about them, and they were extremely impressed with how much we had done and how well we presented it.

Recorded by:

Vinay Panyam





# FTC #6134 Black Frogs

Session #

Attendees: Vinay, Ankith, Nishtha

Location: Iowa Events Center

Date: 3/28/15

## Plan for the day

Promote FIRST, FTC, and the North Super Regional Championship for a local Iowa news channel, KCCI

Task	Reflections
Talk to interviewer from KCCI	We talked to the interviewer about what FIRST and STEM meant to us, what we thought the most unique part of our robot was and what the most important thing <del>at</del> that we learned from our FIRST experience was.



Recorded by:

Vinay Panjyan



# FTC #6134 Black Frogs

Session #

Attendees: Full Team

Location: FRC Michigan State Championship Date: April 9-11

## Plan for the day

To help Consumers Energy promote FTC in Michigan

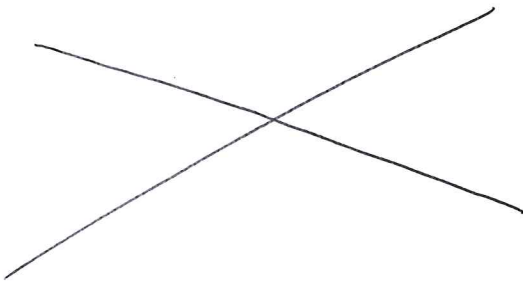
Task	Reflections
<del>Wanna</del> Promoting First & FTC in Michigan	We were invited to help Consumers Energy promote FTC and stem in a TV commercial that will premiere in April. We showcased <del>First</del> First
	in our ad and taught all <del>the</del> the other actors about FIRST. They were very impressed and we hope to have inspired them <del>and</del> and all the viewers to join a FLL FTC or FRC <del>7</del> team.

Recorded by:

Saketh Addanki

Session #

Date: April 9-11

Task	Reflections
<p>Help Consumers Energy Promote FTC through their <del>bea</del></p>	<p>At the FRC Michigan Championship Consumers Energy sponsored a FRC field. They were <del>th</del> promoting FTC at the event and Black Frog members and our robot were featured <del>on</del> on all their promotional materials.</p>
<p>Generation Genius campaign.</p>	<p><del>~~~~~</del> On the Consumers Energy website there are two articles promoting First and FTC. The article about girls in STEM jobs shows Sydney working on the robot. The other article about 6 reasons why you</p>
	<p>Should join FTC also shows our robot.</p> 

Recorded by:

Saketh Addanki



Why STEM?

Why we're  
involved

How to get  
involved

STEM Talk

# STEM jobs are in demand: Girls need apply

by Consumers Energy | Mar 16, 2015 | Girls & STEM | 0 comments



## What do the most powerful women in business have in common?

The top five women listed in [Fortune Magazine](#) Most Powerful Women in Business 2014 studied at least one STEM discipline. Ginni Rometty, chairman, president and CEO of IBM, majored in computer science and electrical engineering. GM CEO Mary Barra earned a bachelor's degree in electrical engineering. And Indra Nooyi, chairman and CEO of PepsiCo studied physics, chemistry and mathematics.

## Could STEM skills prove the ultimate tool to shattering the proverbial glass ceiling?

Perhaps, but because women are grossly underrepresented in STEM fields, don't expect much shattering activity just yet. Women have close to half of all jobs in the U.S., but less than a quarter of those jobs have been in science, technology, engineering or math.

Women represent 57 percent of college undergrads, but few pursue STEM disciplines. And those who do graduate with STEM degrees are less likely than their male counterparts to ultimately work in a STEM occupation.

Why? It's not likely because of the pay.

Overall, STEM occupations are [high-paying](#). When last reported in 2009, the average annual wage for all STEM jobs was \$77,880. Women in STEM jobs earn 33 percent more than those in non-STEM jobs.

## Job opportunity isn't likely a factor discouraging women from pursuing STEM careers.

STEM occupations have some of the best opportunities for job growth today and in the future. Currently, they make up more than one out of every 10 jobs in the U.S. and are growing at 1.7 times the rate of non-STEM jobs. By 2022, U.S. employers are planning to have added 9.2 million jobs that require some level of STEM skills.

So, what's preventing girls from taking advantage of high-pay, high-demand STEM jobs?

There are plenty of theories. Lack of female role models. Gender stereotyping. The nerd factor. Social pressure.

**There are some promising signs that times are changing.**

At MIT, the [share of female undergrads](#) has grown from 42 percent in 2003 to 45 percent in 2012, and new tools are inspiring younger girls to recognize that talent and enthusiasm trump gender-linked stereotypes. (It might be a necessary realization, as families see the job market get tougher and STEM jobs become more in demand.)

The Mega Bloks Barbie-branded line of construction toys, GoldieBlox and Lego Friends, for instance, aim to demonstrate that building blocks can be pastel-colored without compromising originality or creativity. And Roominate challenges girls to craft a custom-built home, complete with details like electric lights and fans. For more STEM toy ideas, consider Mashable's [Top 7 STEM toys](#).

**There's a badge for that.**

Young female free agents are stepping in as role models to illustrate that science can be fun, engaging and a girl thing. Girl Scout leaders-in-training have added a video game coding merit badge for young developers and a Geek Squad Summer Academy to foster enthusiasm for technology. Consumers Energy recently put a Junior Girl Scouts badge to work, sparking interest in robotics.

Partnering with Michigan FIRST Robotics, Consumers Energy hosted Junior Girl Scout events where girls earned their Product Designer badge by building robots. One event even coincided with a statewide competition, giving the Scouts a front seat to the middle school robotics experience.

In order to meet the growing market demands for STEM jobs, girls will have to step up and take a swing. And just like boys, they'll need help from a young age getting there.

**Fortune Magazine 2014 Most Powerful Women in Business:**

1. Ginni Rometty, chairman, president and CEO, IBM
2. Mary Barra, CEO, General Motors
3. Indra Nooyi, chairman & CEO, PepsiCo
4. Marillyn Hewson, chairman, president and CEO, Lockheed Martin
5. Ellen Kullman, chairman and CEO, DuPont

Get involved



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## Recent Posts

Six reasons your student  
should join the robotics team



# Six reasons your student should join the robotics team



by Consumers Energy | Mar 16, 2015 | Girls & STEM | 0 comments



People are talking about the need for STEM talent. The president. Governors. Corporate executives. Business owners. University presidents. But reports, findings and proclamations will do little until parents start talking about it.

Parents have the biggest influence on their children, of course. From a young age, they control the toys, play dates and extracurricular activities. They do so with the very best intentions.

This often means accentuate the positive, eliminate the negative.

So kids who flourish in science, technology, engineering and math are naturally encouraged to join the robotics team. And the artists, writers and otherwise liberal arts inclined are not.

Big mistake, says Gail Alpert, president of Michigan FIRST Robotics.

Teamwork flourishes when the members have diverse talents. A football team won't go far with a roster full of quarterbacks. And without a decent center, point guards wouldn't get close to the net. Robotics is no different, Alpert said.

"When people think robotics, they immediately think left-brain skills—math, engineering, tech," Alpert said. "But STEM talent is only part of the equation. Successful teams use creativity and persuasion to develop winning ideas and promote those ideas within the team and ultimately sponsors and judges. It takes all kinds of talent to make it work well."

Michigan FIRST Robotics encourages all students to consider joining a robotics team, whether their sights are set on STEM careers or not. The team experience will serve them well no matter their ultimate career pursuits. Here are six reasons why:

1. **Fire on all cylinders.** Robotics is a multi-discipline program. It can be incorporated into every subject area—math, English, art, science, history...
2. **Work as a team.** Robotics facilitates teamwork, critical thinking and problem solving. Teams work together throughout missions, from concept to promotion, building to competition.
3. **Hit the road.** Teams have the opportunity to compete locally, regionally and nationally. Those that excel might even be

invited to compete internationally.

4. **Build transferable skills.** The skills learned via this program can be readily applied and transferable to work in any industry.
5. **Access scholarship opportunities.** Colleges, universities, professional associations and corporations offer college scholarships to FIRST Robotics students. More than \$20 million in college scholarships are available. [Take a look.](#)
6. **Have fun.** Robotics students meet during school or after school, puzzling together over missions and building lifelong memories. There's rarely a dull moment.

**Enter your ZIP Code to see if your school has a team.**

Submit

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### Recent Posts

Six reasons your student  
should join the robotics team

STEM jobs are in demand:  
Girls need apply

### Archives

March 2015

### Categories

Engineer

Girls & STEM



# Section D

## Business Plan

## BLACK FROG ROBOTICS- Team 6134

# BUSINESS PLAN

As a team, we discussed and reviewed what kind of expenses we would incur during the FTC season. We brainstormed fundraising ideas and figured out different ways and the amounts of how much we would need to cover our expenses. We came up with the following figures.

<u>INCOME</u>		<u>EXPENSES</u>	
	<u>BUDGET</u>		<u>BUDGET</u>
Fund Raising		Team registration	275.00
Cans	500.00	Robot C	99.00
CPK	100.00	Robot supplies	1,000.00
Sponsors	1,000.00	Field kit supplies	500.00
Sticker Sale	100.00	Misc supplies	100.00
<b>Total</b>	<b>1,700.00</b>	Misc Tools	100.00
		Pictures	20.00
Family Dues	\$1,100	T-Shirts	225.00
		Regional	150.00
<b>Total Income</b>	<b>2,800.00</b>	<b>Total Expense</b>	<b>2,469.00</b>

Our fundraising sources are:

- **Sponsor donations -**
  - **Vector Engineering** is a company in Novi, MI. They help us by contributing their pop bottles/cans. They call us about once a month to pick them up.
  - **Orthodontist** Tyler Dumas and Reyes provide state of the art orthodontic treatment, which includes use of robotic technology.
  - **MSC Software** makes products that enable engineers to validate and optimize their design using virtual prototypes. They were impressed by our demonstration and are keenly interested in our project.
  - **Dentist** Dr. Zelin is a dentist specializing in child dentistry and deeply interested and fascinated by robotics.
- **Activity Fundraiser -**
  - **Novi Robotics Window Stickers** – We created Novi Robotic stickers to promote robotics and raise funds for our team. It cost us \$1 to make the stickers, and our plan is to sell them for \$5.



FTC #6134 Black Frogs

Session # |

Attendees: Full Team

Location: Arnav's house

Date: 9/7/14

Plan for the day

~~Task~~ Brainstorm  
Fundraising ideas,  
and make a goal.

Task	Reflections
Decide how much money we will spend this season.	We decided to brainstorm the big ticket items that would take up the most room in our budget. The main ones that we thought of were registration, field parts, robot parts, and competition. We decided that we would spend about 2000\$.
Brainstorm Fundraising Ideas	We thought of numerous ideas to raise funds for our team. We thought of can collecting, sponsorships, and selling Novi Robotics stickers. We also thought of doing a California Pizza Kitchen

Recorded by:

Anne George, Arnav Talkuder, Saketh Addanki,  
And Nishta Kakar.

Session # /

Date: 9/7/14

Task	Reflections
Get sponsorship from Vector.	We set up a deal with Vector, an engineering company. They would ask their employees to keep their cans to give to us when we would cash in for money. This sponsorship transferred over from last year.
Alex's Orthodontist's visit for sponsorship.	Alex thought that many kids on our team have braces. The orthodontist uses CAD software and robots to make braces. This is a good example of robotic outside of FTC. We asked him to sponsor us, and he agreed.
Future Events	We are planning to do a California Pizza Kitchen event, in where on one night we get a certain amount from the total meal price.

Recorded by:

Anne George, Arman Talkuder, Saketh Addanki,  
and Nishita Kakar.



FTC #6134 Black Frogs

Session # 2

Attendees: ~~Ananya~~, Nishtha

Location: Nishtha's House

Date: 9/18/14

Plan for the day

Review draft letter to sponsors

Task	Reflections
Wrote letter to MSC nastran.	We asked them if they were interested in becoming our sponsors. We gave a brief introduction about ourself and what FTC is all about. We shared First and told them about Sponsorship for our team.
attained a <del>sponsorship</del> Sponsorship	MSC got back to us and provided us with \$250 after we sent them a letter. The letter requested them for a sponsership for any amount of money they would like to provide us with and in return we would display their logo in several <del>team</del> places.

Recorded by:  
Nishtha kakar

Dear Mr. John Janevic and Mr. Tom Downey,

Thank you for allowing us to visit MSC Nastran office and taking the time to understand our robotics program. We also received and truly enjoyed the Mars Video link and CAD simulation link from Mr. John.

The Black Frogs is a middle school robotics team that participates in FTC (*First Tech Challenge*). The goal of FTC is to encourage middle school children to take part in and be exposed to Science, Technology, Engineering and Math (STEM) related activities. Teams work together to build a robot to perform the specified tasks while spreading the word about robotics, learning about teamwork, taking part in various competitions, and displaying gracious professionalism.

Last week we received our challenge (see attached link- <http://www.usfirst.org/roboticsprograms/ftc/game>). Our season has started and we are working on multiple tasks. We have also started to reach out for sponsorships. If you are interested in becoming our sponsors, we have three levels of sponsorship based on individual budget. We kindly request you to consider helping us with your generous donation.

Level 1- \$100. Includes company logo on our website and brochure.

Level 2- \$250. Includes all the above and logo on our Robot and T-shirt.

Level 3- \$500 or more Includes all the above and company logo on the banner in our pit during the competition.

All donations go to Novi Educational Foundation and are tax exempt per IRS rules.

If you are interested in becoming our sponsor, please contact

Janelle Moore at [jmoore12@twmi.rr.com](mailto:jmoore12@twmi.rr.com)

Thank you.

Respectfully,

The Black Frogs Robotics Team

<http://www.blackfrogrobotics.weebly.com>



## FTC #6134 Black Frogs

Session # 3

Attendees: Entire Team

Location: Arnav's House

Date: 11-10-14

### Plan for the day

- brainstorming fundraising ideas

Task	Reflections
- raising money	- we have an arrangement with the company Vector where they put aside returnable cans and as soon as they get 2-3 logs they tell us. We then <del>return</del> deposit the cans and raise money for our team.
- fundraising ideas	- we decided to reach out to the company Vector and organize a can drive. We decided to also do many other fundraising such as Toys for Tot.

Recorded by:

Nishtha Kakkar

# BLACK FROG ROBOTICS- Team 6134

## BUSINESS PLAN as of 01/18/2015

When we were selected to advance to the Super Regional Competition in Iowa we realized that we would run into large sums of expenses and needed to make a tremendous amount of effort to raise a lot of money. We brainstormed fundraising ideas and figured out different ways and the amounts of how much we would need to cover our expenses. We came up with the following figures.

INCOME		EXPENSES	
ITEMS	BUDGET	ITEMS	BUDGET
<b>Fund Raising</b>			
Food Donation	150.00	Team Registration	275.00
Cans Drive	100.00	Robot C	99.00
Cans	750.00	Robot Supplies	1,200.00
CPK	100.00	Field Kit Supplies	500.00
Sponsors	4,000.00	Misc Supplies	120.00
Sticker Sale	100.00	Misc Tools	100.00
<b>Total</b>	<b>\$5,200.00</b>	Pictures	25.00
		T-Shirts	425.00
		Misc	600.00
		Regional	150.00
		State	100.00
		Super Regional	500.00
		Team Fun	200.00
<b>Total Income</b>	<b>\$5,200.00</b>	<b>Total Expenses</b>	<b>\$4,294.00</b>

Our fundraising sources are:

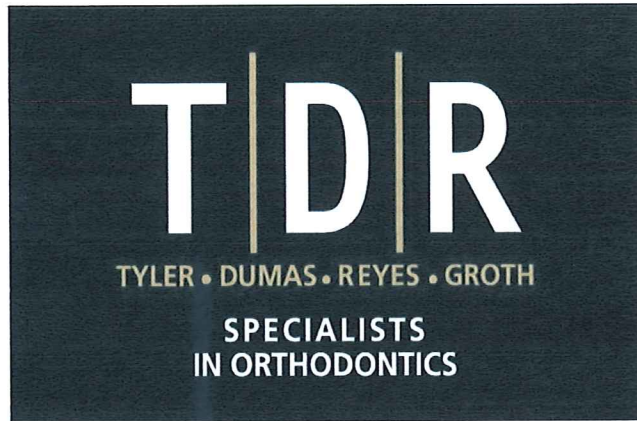
- **Sponsor donations -**
  - **Dallas Industries** is engaged in stamping and forming operations with precision press feed and coil handling systems for 50 years.
  - **Ford Motor Company**
  - **Frog Force**, the Novi High School Robotic Team.
  - **MI State MDE Grant** awarded to us as a result of being selected to advance to the North Super Regionals.
- **Can Drive and Collection -**
  - **Can drive** to be undertaken in the neighborhood
  - **Vector** is an ongoing relationship which donates cans every few weeks
  - **Team Detroit** and other such industries approached
- **Food Donation -**
  - **Costco and Sams** are warehouse Clubs that give donations in form of cash cards or kind to organizations engaged in STEM.

Our potential expense are:

- **Robot Supplies**-We expect to incur more expense in this area as we plan to prototype new ideas.
- **T-shirts** will have to be redone to include new sponsors.
- **Miscellaneous Expenses** to provide for some fun items in the display area.
- **Travel and Expenses at Iowa** will need to be covered by additional sponsors.
- **Team Fun** and spirit building activities will need additional funds.



# Thank you to our Sponsors



Black Frog  
Parents



NANCY A. ZELLIN, DDS

# BLACK FROG ROBOTICS- Team 6134

## BUSINESS PLAN as of 01/18/2015

When we were selected to advance to the Super Regional Competition in Iowa we realized that we would run into large sums of expenses and needed to make a tremendous amount of effort to raise a lot of money. We brainstormed fundraising ideas and figured out different ways and the amounts of how much we would need to cover our expenses. We came up with the following figures.

<u>INCOME</u>		-	<u>EXPENSES</u>	
<u>ITEMS</u>	<u>BUDGET</u>		<u>ITEMS</u>	<u>BUDGET</u>
<b>Fund Raising</b>			<b>Team Registration</b>	275.00
Food Donation	150.00		Robot C	99.00
Neighborhood Can Drive	100.00		Robot Supplies	1,200.00
Cans from Vector Eng	750.00		Field Kit Supplies	500.00
CPK	100.00		Misc Supplies	120.00
Sponsors	4,000.00		Misc Tools	100.00
Sticker Sale	100.00		Pictures	25.00
<b>Total</b>	<b>\$5,200.00</b>		T-Shirts	425.00
<b>Parent Contribution</b>	<b>\$4,600</b>		Misc	600.00
			Regional	150.00
			State	100.00
			Super Regional	500.00
			Travel and Expenses at Iowa	5,500.00
			Team Fun	200.00
<b>Total Income</b>	<b>\$9,800.00</b>		<b>Total Expenses</b>	<b>\$9,794.00</b>

Our fundraising sources are:

- **Sponsor donations -**
  - **Dallas Industries** is engaged in stamping and forming operations with precision press feed and coil handling systems for 50 years.
  - **Ford Motor Company**
  - **Frog Force**, the Novi High School FRC Team.
  - **MI State MDE Grant** awarded to us as a result of being selected to advance to the North Super Regional.
- **Can Drive and Collection -**
  - **Can drive** to be undertaken in the neighborhood
  - **Vector** is an ongoing relationship which donates cans every few weeks
  - **Team Detroit** and other such industries approached
- **Food Donations -**
  - **Costco and Sam's** are warehouse Clubs that give donations in form of cash cards organizations engaged in STEM.

Our potential expenses are:

- **Robot Supplies**-We expect to incur more expense in this area as we plan to prototype new ideas.
- **T-shirts** will have to be redone to include new sponsors.
- **Miscellaneous Expenses** to provide for some fun items in the pit area.
- **Travel and Expenses at Iowa** will need to be covered by additional sponsors.
- **Team Fun** and spirit building activities will need additional funds.

D-9



## BLACK FROG ROBOTICS- Team 6134

### TEAM BUDGET AND ACTUALS as of 04-18-15

#### INCOME

ITEMS	BUDGET	ACTUALS
<b>Fund Raising</b>		
Food Donation	150.00	75.00
Neighborhood Can Drive	100.00	106.90
Cans from Vector	750.00	816.20
CPK	100.00	146.89
Sponsors	4,000.00	
Dumas & Reyes		500.00
Dallas		500.00
Frog Force		500.00
Ford Motor Co.		800.00
MI State Grant		
others		350.00
Sticker Sale	100.00	145.00
<b>Total</b>	<b>\$5,200.00</b>	<b>\$3,939.99</b>
<b>Parent Contribution</b>		<b>\$2,200</b>
<b>Total Income</b>	<b>\$5,200.00</b>	<b>\$6,139.99</b>

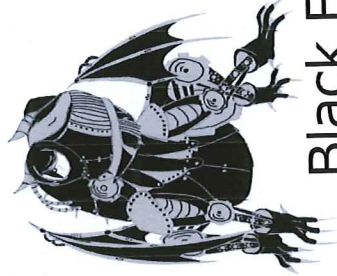
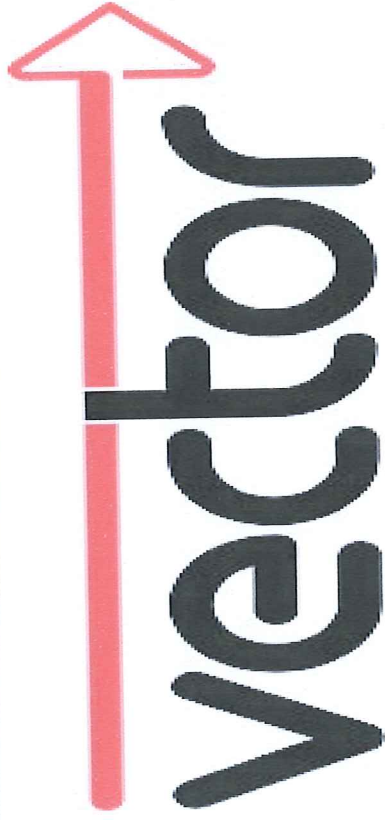
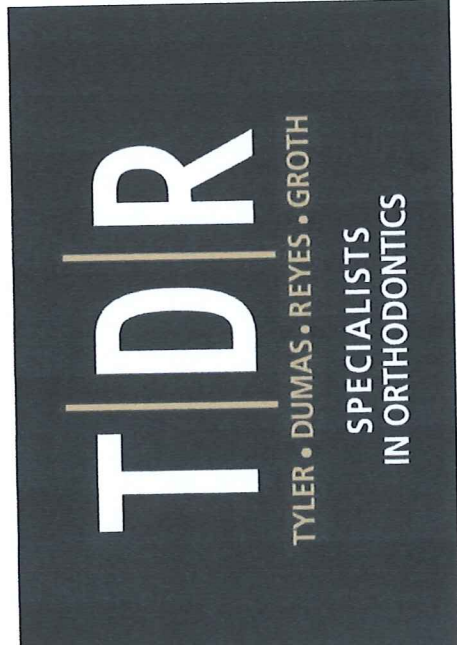
#### EXPENSES

ITEMS	BUDGET	ACTUALS
Registration	275.00	275.00
Regional	150.00	150.00
State	100.00	100.00
Super		
Regional	500.00	500.00
Worlds		1,000.00
Robot C	99.00	79.00
Robot		
Supplies	1,200.00	1,356.58
Field Kit	500.00	552.70
Misc Supplies	120.00	173.82
Misc Tools	100.00	-
Pictures	25.00	23.50
T-Shirts	425.00	406.28
Misc	600.00	502.04
Team Fun	200.00	219.38
<b>Total</b>		
<b>Expenses</b>	<b>\$4,294.00</b>	<b>\$5,338</b>

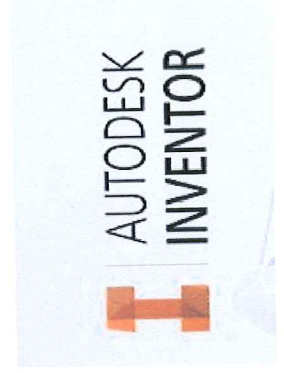
Task	Reflection
To Compare Actual to Budget	<ul style="list-style-type: none"> <li>○ We are waiting for MI State Grant of \$2150 to cover the registration and reimburse the parent contribution.</li> <li>○ Our can drive initiative was successful despite bad weather!</li> <li>○ We were able to collect addition cans from Vector Engineering and Team Detroit.</li> <li>○ Our robot expenses were higher than expected because we bought extra supplies to prototype new ideas.</li> </ul>

# Thank you to our Sponsors

The Dallas Difference



Black Frog  
Parents



NANCY A. ZELLIN, DDS



# Section E

## Engineering

Black Frog Robotics  
 FTC Team 6134  
 Engineering Notebook  
 Engineering Section (E)

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Black Frog Robotics  
 FTC Team 6134  
 Engineering Notebook  
 Engineering Section (E)

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Session #53 (2/11/15)	Ej-28
Session #56 (2/22/15)	Ej-31
Sample Programs	Ej-43
Session #65 (4/10/15)	Ej-44
Session #66 (4/11/15)	Ej-45
Session #67 (4/12/15)	
Design Validation (k)	Ek-1
Session #23 (11/11/14)	
Test Results (l)	El-1
Session #15 (10/23/14)	El-4
Session #19 (11/1/14)	El-7
Session #21 (11/7/14)	El-9
Session #22 (11/10/14)	El-11
Session #37 (12/17/14)	
Innovation (m)	Em-1
Session #22 (11/10/14)	
BOM (n)	En-1
Bill of Materials	



FTC #6134 Black Frogs

Session #

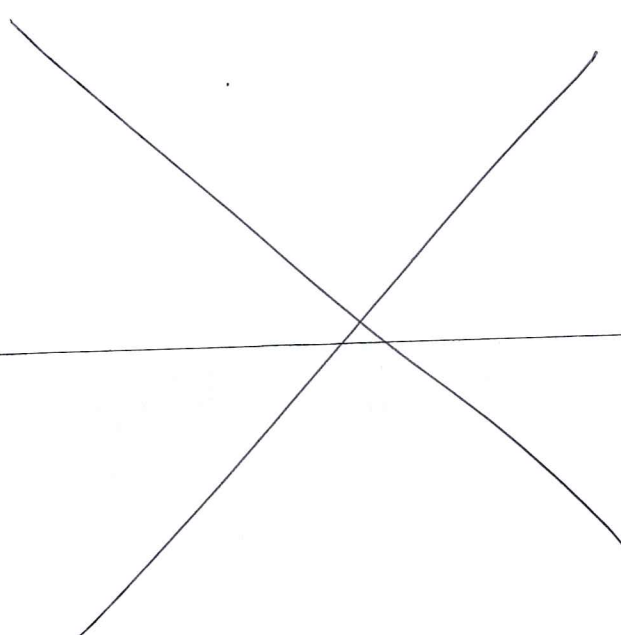
Attendees: Entire Team

Location: Arnav's House

Date: ~~11/10/14~~ 11/10/14

Plan for the day

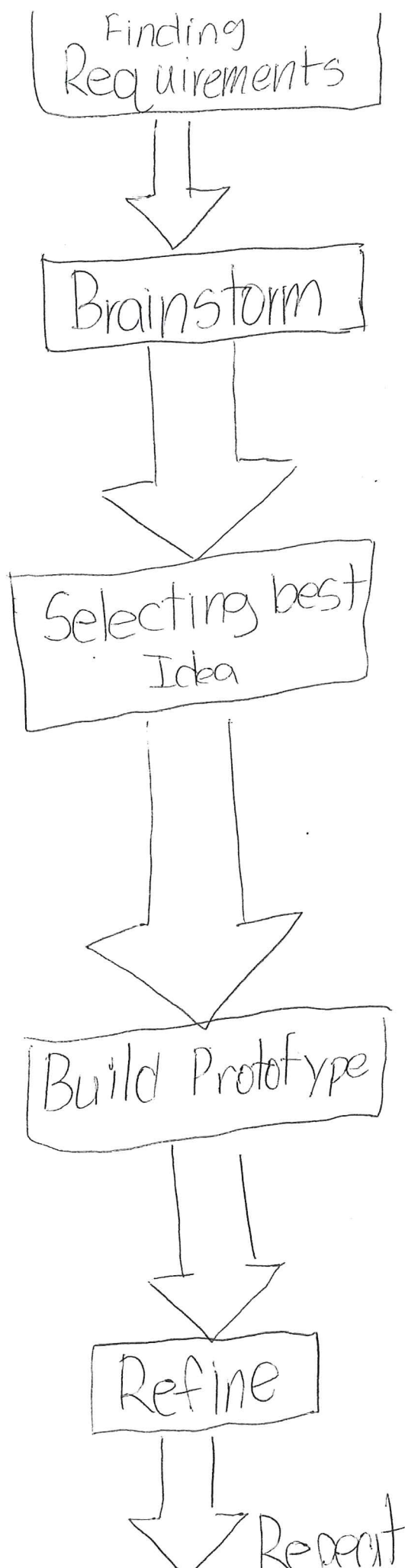
The Engineering Process

Task	Reflections
	

Drawing on back

Recorded by:

Saketh





# Section Ea

## Requirements

# FTC #6134 Black Frogs

Session # 1

Attendees: Entire Team

Location: Arnav's House

Date: 9-7-14

## Plan for the day

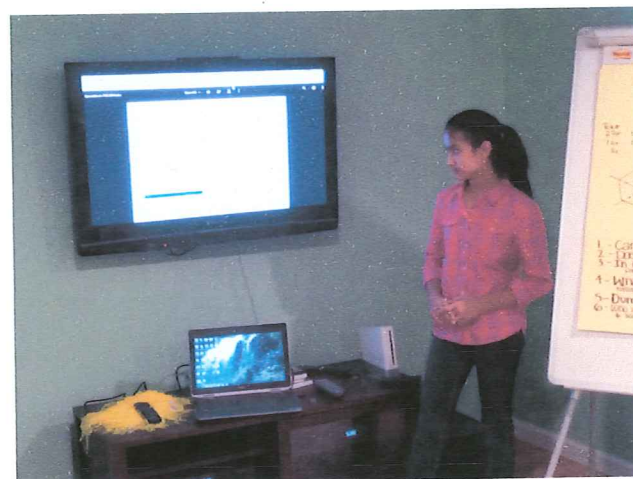
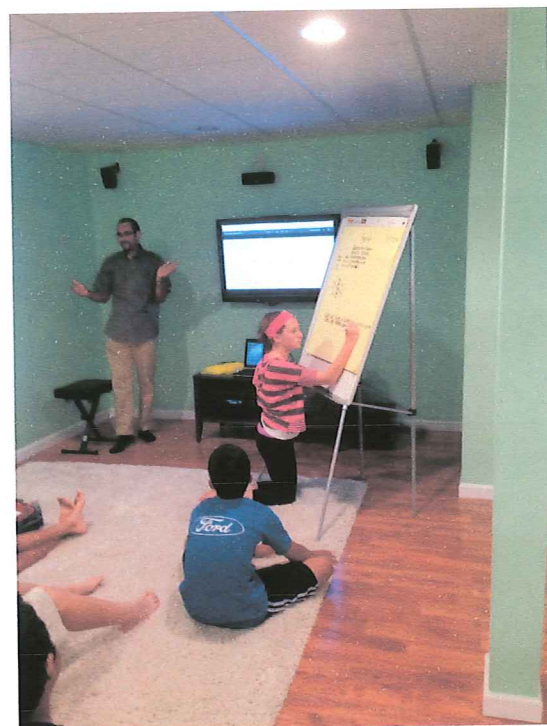
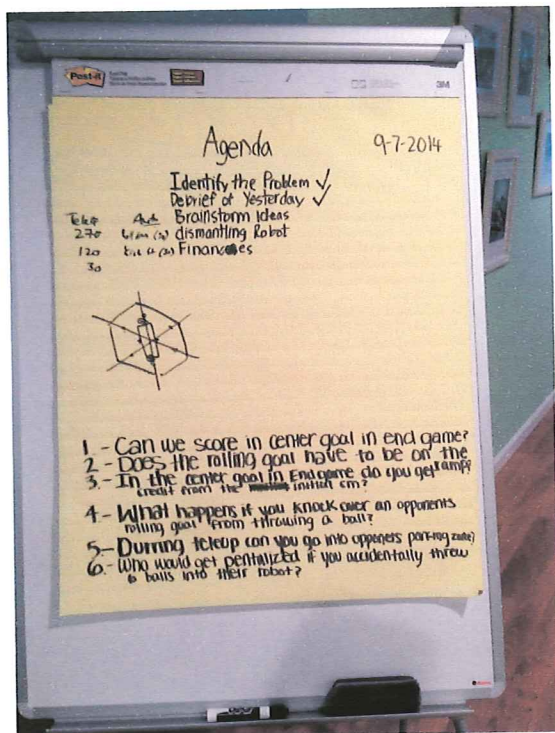
- Identify the Problem
- Debrief of Kickoff
- Talk about Finances

Task	Reflections
Identify the Problem	After yesterday's revealing of the game we sat down to clearly identify the problem. We listed different ways to score different amounts of points. We also wrote questions about
	certain parts of the game we were unsure about.
Debrief of Kickoff	We discussed what each one of us learned from the various classes that we all went to at Kettering University's FTC Kickoff.

Recorded by:

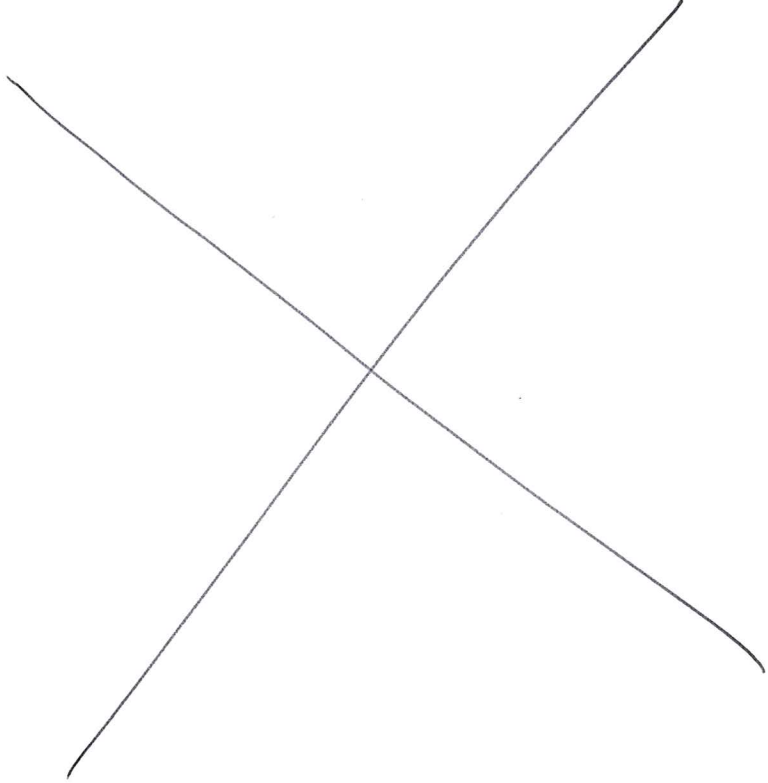
Arnav Talukder





Session # 1

Date: 9-7-14

Task	Reflections
<p>Talk about Finances</p>	<p>Our treasurer Nishita gave a debrief about our finances. We discussed how much money we had and how much we spent. We also discussed about getting sponsors.</p> 

Recorded by:

Arnav Talukder





~~Arnav Talwar~~

FTC #6834 Black Frogs

Session # 3

Attendees:

Arnav, Nishita, Arun, Vinay,  
Serdar, Anne, Saketh, Leon,  
Alex

Location: Arnav's House

Date: 9-14-14

Plan for the day

Agenda

1. Brainstorm ideas
2. Talk about visiting Autodesk on Tuesday
3. Dismantle robot

Task	Reflections
Brainstorm Ideas	Our team brainstormed what we wanted to do in each section of the game. After deciding what we wanted our robot to achieve we created a morph matrix with ideas on mechanisms to achieve each task.
Talk about Autodesk on Tuesday	The team discussed how we may be going to the Autodesk office to present our last year robot and get tips on CAB. Our robot will help us learn about the Engineering Community.

Recorded by: Arnav Talwar and Nishita



Task	Reflections
Disassemble Robot	We started dismantling the game spec items of last years robot. We learned that we should make parts on our robot more accessible this year than on last year's robot. This way if we need to take stuff apart or fix a game spec item it's easier to access.
Brainstorm Ideas Part II	While <del>the</del> brainstorming ideas <del>that</del> we learned that we can build on other people's ideas. We used two similar ideas to create a new and better <del>and</del> idea. While brainstorming we had a question on the ramp dimensions so we went <del>on line</del> online to search for them and <del>used</del> <del>the</del> <del>then</del> used <del>trigonometry</del> trigonometry to solve what our coach wanted us to solve about the dimensions of the ramp.
	<p> <math>y \tan(14) = \frac{9}{x}</math>  <math>x = \frac{9}{\tan(14)}</math>  <math>x = 36"</math> </p>

Recorded by:

Annay Talukder and Nishtha kakar



Session # 3

Date: 9-14-14

Task	Reflections
<p>Brainstorm Ideas Part II Cont.</p>	<p>We then used pythagorean theorem to find the slanted portion of the ramp</p> $a^2 + b^2 = c^2$ $(9)^2 + (36)^2 = y^2$ $81 + \cancel{1296} + 1296 = 1377$ $y = \sqrt{1377}$ $y = 37$ <p>We found the dimensions and used those to think about <del>create</del> strategies for the game.</p>

Recorded by:

Nishtha Kakan and Arnav Talukder

# Cascade Effect Morph Matrix

Function	Solutions							
	program	wheels						
move								
knock the kickstand	shock absorbers							a conveyer belt bringing to the top to be put in a chamber and then released using a trap
pick up balls	box/bucket	conveyer		tennis hopper	toilet plunger	pincher	suck balls in tube then drop into goals	
score	Elavator with trapdoor	shooter		rubber bands to store energy	suck balls in tube then drop into goals	a conveyer belt bringing to the top to be put in a chamber and then released using a trap		
move goal	shaped bumper at front	three fingered claw		platform				
pick up goals	3 fingered claw	claw with sideways wheels for friction		plate with prongs				

## FTC #6134 Black Frogs

Session # 4.

Attendees: Everybody

Location: Arnav's House

Date: 9/18/14

### Plan for the day

We evaluated our Robot designs on the Pugh Matrix.

We talked about the contents of the Engineering Notebook.

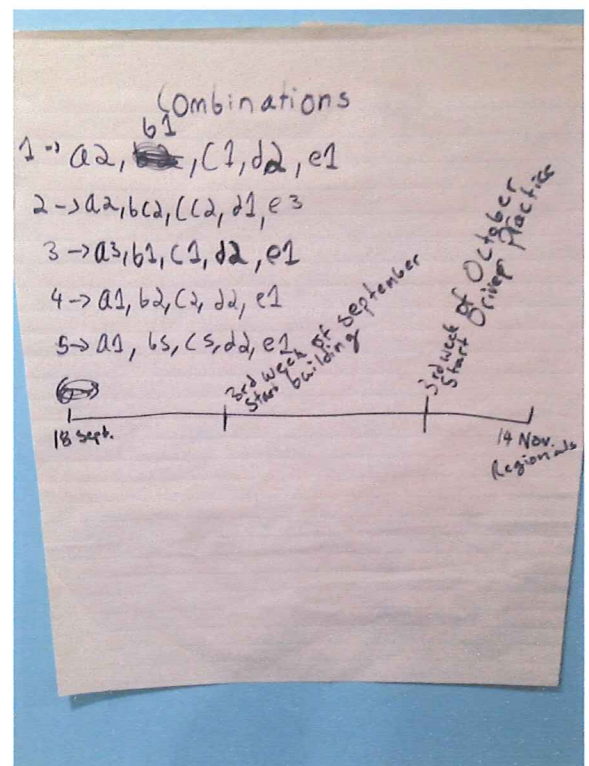
Task	Reflections
Organize Robot designs on Pugh Matrix	<del>We put</del> Like an excel spreadsheet. A lot more organised and easier to work with.
Evaluate Robot designs	We weighted each criteria based on importance. We narrowed down which Robot designs we could work with.

Recorded by:

Serdar and Vinay



# The Pugh Matrix



Agenda

1. Pugh Matrix
2. Evaluate design
- ~~3. Website design~~
4. Review draft letter to sponsors
5. Autodesk

Black Frogs Engineering Notebook

	1	2	3	4	5
Durability	2	3	2.5	3.5	1
Safety	3	3	3	3	3
Consistency	1	2	4	1	3
Website	2	3	3	4	1
Accessibility					
Affordability	3	2	3	2	3.5
Min. moving parts	1	1	2	3	1.5



FTC #6134 Black Frogs

Session # 4

Date: 9/18/14

Task	Reflections
<p>We talked about <del>what</del> what we were going to write in our Engineering Notebook</p>	<p>We agreed that we were going to write about the requirements for our robot, benchmarking, a P-Diagram to organize noise factors, Failure Mode Analysis, System Design, Component Design, Electrical system CAD, Robot Assembly strategy, Software Programming Strategy, Design Validation, and Test Reports.</p>

Recorded by:

Vinay

~~and Vinay and Vinay~~

and Serdar

FTC #6134 Black Frogs

Session # 24

Attendees: The Whole Team.

Location: Sterling Heights

Date: 11-15-14

Plan for the day

- Attend regional competition

Task	Reflections
• Attend regional competition	• On Saturday we attended our first competition of the season. <del>was</del> During the day we learned many things related to robot performance and judging. It allowed us to see how other teams have built their robot.
• <del>Go to</del> Go to the judging session.	• Our judging session went very well and in the end, we went to win Inspire award. Still, we needed more info. to <del>then</del> answer all the questions they asked. All team members are now learning everything.

Recorded by:

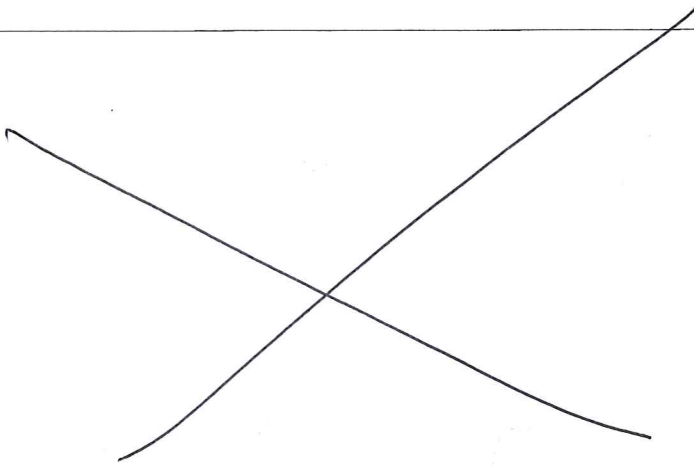
Arnav and Arun and Serdar.



FTC #6134 Black Frogs

Session # 24

Date: 11-15-19

Task	Reflections
<ul style="list-style-type: none"> <li>• Drive our robot in matches</li> </ul>	<ul style="list-style-type: none"> <li>• We drove our robot all the way to a 2nd seed captain in the elimination rounds</li> <li>• We couldn't find the IR Beacon because they used a different model, and we found a variety of differences</li> </ul>
<ul style="list-style-type: none"> <li>• Prepare for Alliance Selection</li> </ul>	<ul style="list-style-type: none"> <li>• We scouted different teams to see who would compliment us well</li> <li>• We chose surge because they could move rolling goals</li> </ul>
	

Recorded by:

~~Andrew and Anna~~ Sender.





Eq-12



FTC #6134 Black Frogs

Session # 25

Location: Arnav's House.

Attendees: Ankush, Serdar, Leon, Salween

Date: ~~11-23-14~~ 11-16-14. Aine, Alee, Sydney, Nisha, Arjun, Vijay, Arnav

Plan for the day

- come up w/ strategy for next competition.

Task	Reflections
We discussed and listed the topics for discussions	<ol style="list-style-type: none"> <li>1. Judging</li> <li>2. Robot Performance</li> <li>3. Pit Questions</li> <li>4. Alliance Selections/Scouting</li> <li>5. Strategy</li> <li>6. Engineering Notebook</li> <li>7. Team spirit/Enthusiasm</li> </ol>
Come up w/ a autonomous strategy for next competition	If starting on ramp we go and knock down the kickstand if we start on the parking zone we score in the center goals

Leon Chen

Recorded by:

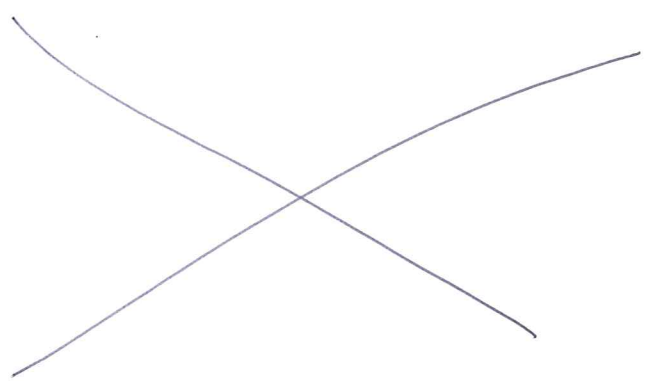
Ankush Udaya, Arun Kammandamini



FTC #6134 Black Frogs

Session # 25

Date: 11-16-14.

Task	Reflections
Tele-op Strategy (new)	Scoring at least 4 big balls in the 90 cm. rolling goal - gives us 87 points.
End Game strategy (new)	At least 2 items off the floor on to the ramp (60 points) At least 3 balls in to the center goal (130 points) If partner goes on top of ramp, then we go in the parking zone.
	

Recorded by:

Leon Chen, Arin Khammadijini

FTC #6134 Black Frogs

Session # 31

Attendees: All Team

Location: # Holmes Middle School Date: 12/6/14

Plan for the day

- Compete at our 2<sup>nd</sup> Qualifier in Livonia.

Task	Reflections
- Compete at the competition.	- At competition, our team felt that we did well in judging. Our matches throughout the went pretty well, but we know we can improve on many things. We got chosen by the team
	<del>"File not Found"</del> "File not Found" as an alliance partner. Our Scissor lift stopped working, during elimination and we lost, but we had fun! We won the Rockwell Collins Innovation Award, and was nominated for the Think Award.

Overall, the team did Great!

Recorded by:

Anne George







FTC #6134 Black Frogs

Session # 32

Attendees: All Team

Location: Arnav's House

Date: 12/7/14

Plan for the day

- debriefing our competition. Figure out what we did wrong and how we can improve.

Task	Reflections
- debrief our competition	- We had many good and not so good things. Some things that went well were judging, our scouting report, quickly fixing the robot. There were some things that we could improve on.
- Things we need to change	- We have to be better about when we make decisions and telling the entire team about it. Also, we need to improve some mechanical things. To get more points, we are going to make a device to get the rolling goals.

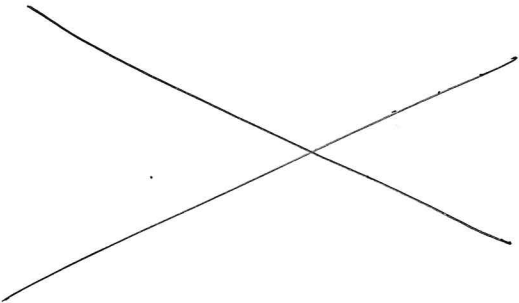
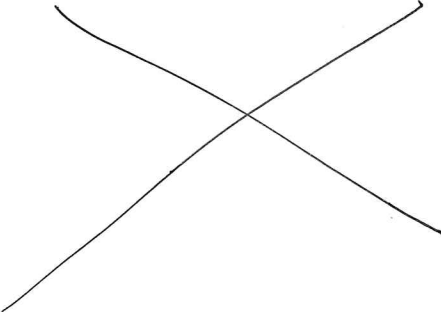
Recorded by:

Anne

FTC #6134 Black Frogs

Session # 32

Date: 12/7/14

Task	Reflections
-things to change (cont.)	<p>- we are thinking of making hooks to move the goals. <del>##</del></p> <p>Also, we want to think of a new way to kick down our kickstand.</p> <p>Finally, we realize that we need a different way to use our scissor lift, because it's not reliable. We are thinking of</p>
	<p>a rack and pinion manager.</p> 
	

Recorded by:

Anne

FTC #6134 Black Frogs

Session # 42

Date: January 10<sup>TH</sup>

Task	Reflections
Michigan State Championship!	We went to the Michigan State Championship in Battle-Creek, Michigan.
Judging	Our Judging went very well. We knew all of our material and impressed the judges with our knowledge. When they asked us questions knew the answers and were confident. After our 15 min. many groups of judges came back to our pits and were very interested.
Robot Matches	We had 6 robot matches throughout the day. During our matches we did very well. At the end of the day we were 5-1. <del>was</del> In the end we were 3 <sup>rd</sup> overall in the Edison division. This meant we had the option to be an alliance captain.

Recorded by:

Anne George, Sydney Grassmeyer

& Saketh Addanki



Session # 42

Date: Jan 10<sup>th</sup> (cont.)

Task	Reflections
Elimination Matches	For the elimination matches we were partnered up with Team HexaSonic and Jr Vikobots. We were also the 2 <sup>nd</sup> <del>seeded</del> alliance. We <del>was</del> easily moved to the Edison semi-Finals. There we won the 3 <sup>rd</sup> match by 2! In the
<del>Edison Finals</del>	Edison Finals we won in 3 games. When we <del>was</del> <del>lost</del> versed the Franklin champions we lost in the 3 <sup>rd</sup> and last match. We lost because of an ESD failure in our NXT.
Awards	We were nominated for 5 major awards. But at the very end we won First Place Inspire Award!

Recorded by:

Saketh Addanki, Sydney Grassmyer, Anne George







FTC #6134 Black Frogs

Session # 43

Date: 1-11-15

Task	Reflections				
<p>Discuss our competition.</p>	<p>We listed <del>the</del> the things that went right and things that have gone wrong.</p>				
	<table> <tr> <th data-bbox="555 844 915 911">TGR</th><th data-bbox="915 844 1359 911">TGW</th></tr> <tr> <td data-bbox="555 911 915 1302"> <ul style="list-style-type: none"> <li>• Autonomous</li> <li>• Scoring in Center Goal</li> <li>• Judging</li> <li>• Pit Visits</li> <li>• Showing Gracious Professionalism</li> <li>• Staying <del>in</del> Calm</li> <li>• Enthusiasm</li> <li>• Spirit</li> </ul> </td><td data-bbox="915 911 1359 1302"> <ul style="list-style-type: none"> <li>• NXT froze</li> <li>• Single Option in Auto.</li> <li>• Picking up Balls:                             <ul style="list-style-type: none"> <li>- Isolated Balls</li> <li>- Small Balls were interfering</li> <li>- Missing the contact.</li> </ul> </li> <li>• Wait for Start</li> <li>• Scoring <del>Accuracy</del> Accuracy - 90cm</li> <li>• Got pushed around</li> <li>• Moving before being positioned</li> </ul> </td></tr> </table>	TGR	TGW	<ul style="list-style-type: none"> <li>• Autonomous</li> <li>• Scoring in Center Goal</li> <li>• Judging</li> <li>• Pit Visits</li> <li>• Showing Gracious Professionalism</li> <li>• Staying <del>in</del> Calm</li> <li>• Enthusiasm</li> <li>• Spirit</li> </ul>	<ul style="list-style-type: none"> <li>• NXT froze</li> <li>• Single Option in Auto.</li> <li>• Picking up Balls:                             <ul style="list-style-type: none"> <li>- Isolated Balls</li> <li>- Small Balls were interfering</li> <li>- Missing the contact.</li> </ul> </li> <li>• Wait for Start</li> <li>• Scoring <del>Accuracy</del> Accuracy - 90cm</li> <li>• Got pushed around</li> <li>• Moving before being positioned</li> </ul>
TGR	TGW				
<ul style="list-style-type: none"> <li>• Autonomous</li> <li>• Scoring in Center Goal</li> <li>• Judging</li> <li>• Pit Visits</li> <li>• Showing Gracious Professionalism</li> <li>• Staying <del>in</del> Calm</li> <li>• Enthusiasm</li> <li>• Spirit</li> </ul>	<ul style="list-style-type: none"> <li>• NXT froze</li> <li>• Single Option in Auto.</li> <li>• Picking up Balls:                             <ul style="list-style-type: none"> <li>- Isolated Balls</li> <li>- Small Balls were interfering</li> <li>- Missing the contact.</li> </ul> </li> <li>• Wait for Start</li> <li>• Scoring <del>Accuracy</del> Accuracy - 90cm</li> <li>• Got pushed around</li> <li>• Moving before being positioned</li> </ul>				
<p>Things to improve on for Iowa</p>	<ul style="list-style-type: none"> <li>• Auto - score in center goal</li> <li>• Just drive off ramp</li> <li>• Automate pick-up <del>and</del> routine</li> <li>• Add ground stop</li> <li>• Automatic adjust to scissor lift.</li> </ul>				

Recorded by:

Aren Kammamedhihi



Session # 601

Date: March 26-28

Task	Reflections
Super Regionals!	We went to the Super Regional Competition in Des Moines, IA.
Judging	<del>Our</del> Our Judging went well. We said all of our information confidently and we answered all of our questions. <del>After</del> After our judging session, many <del>the</del> groups of judges came around & we were very good at sharing our knowledge.
Robot Matches	Our robot performed well at the competition. We won 4 matches. In the end we weren't picked as an alliance.

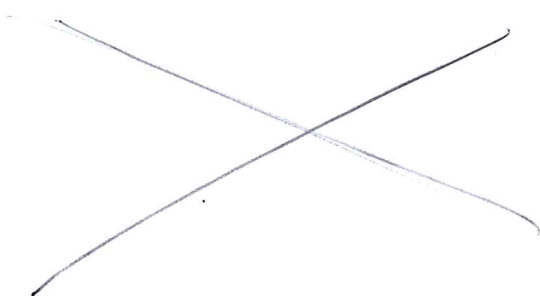
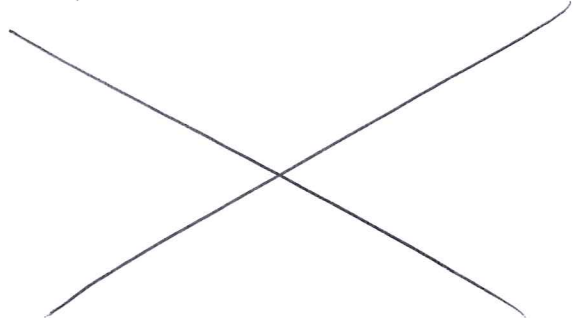
Recorded by:

Sydney Grassmeyer, Arun

FTC #6134 Black Frogs

Session # 61

Date: 3/26-28/15

Task	Reflections
Awards.	In the end, we got the Motivate Award. The award is for enthusiasm and team spirit. With that, we were going to Worlds!!
	
	

Recorded by:

Sydney, Arun Kammerediminti



# North Super Regional





Session # 63

Attendees: Sydney and Nishtha

Location: Omar's House

Date: March 30, 2015

Plan for the day

Discuss plan until Words

Task	Reflections
Brainstorm ideas from Super Regionals	Planned to fix autonomous. We wanted to add IR sensors and use triangulation. We wanted to secure the battery since we found a problem at Super Regionals and try new strategies while driving.
Debrief from Super Regionals	We discussed our problems we had in Iowa and what worked well. We then Brainstormed ideas which explained above.

Recorded by:

Sydney, Nishtha

# Section Eb

## Benchmarking

FTC #6134 Black Frogs

Session # 7

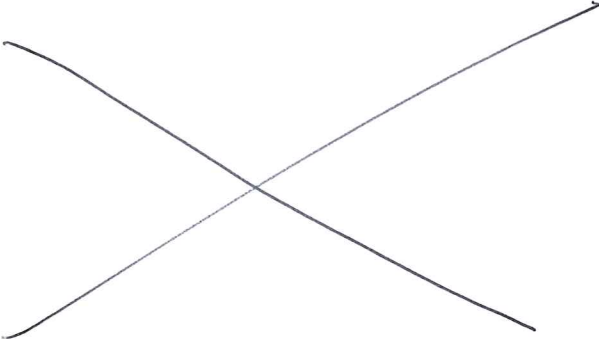
Attendees: Everyone

Location: Arnav's House

Date: 10/5/14

Plan for the day

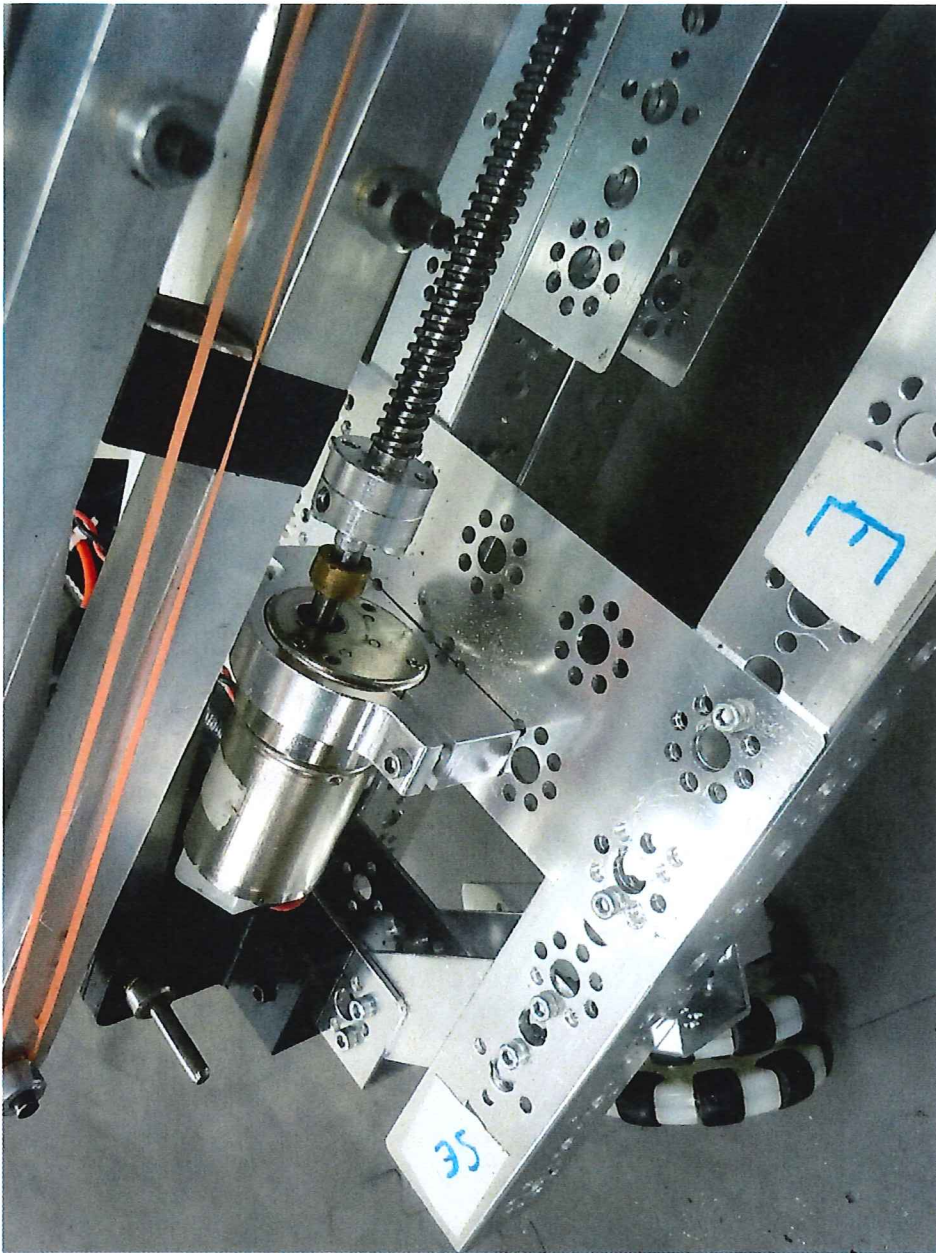
Benchmarking how to lift scissor lift.

Task	Reflections
<p>Benchmarking how other teams lifted scissor lift</p>	<p>We found a team that used a scissor lift, and they used a lead screw to pull one side, while the other side is fixed. The team agreed that this was a good solution.</p>
	

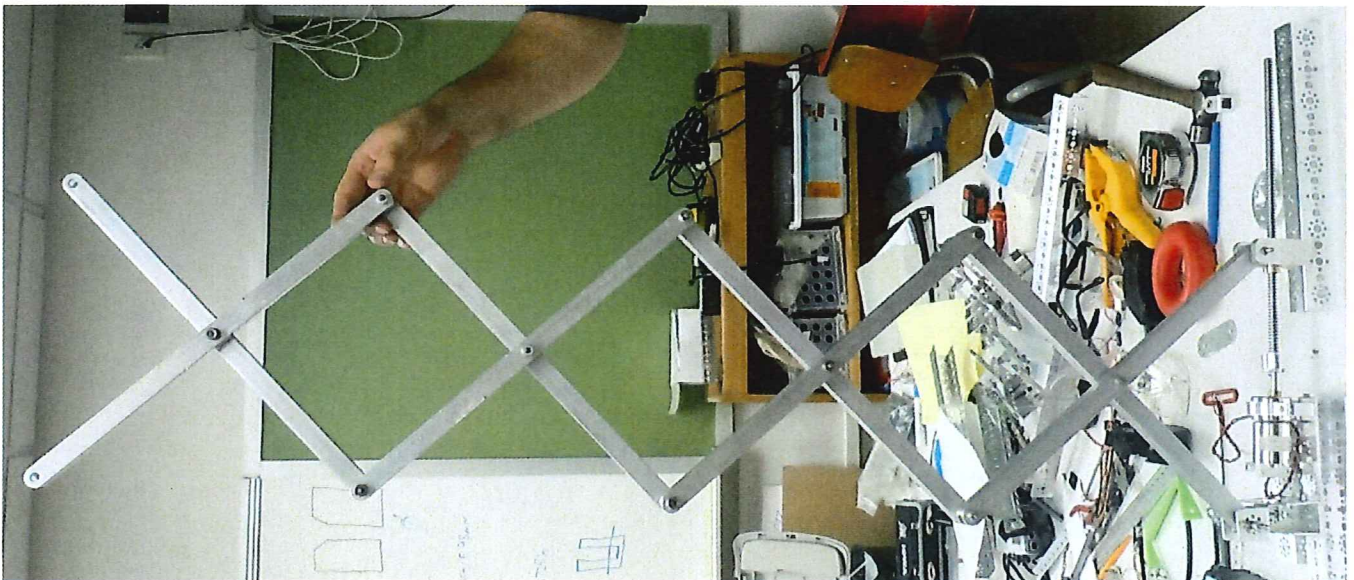
Recorded by:

Vinay Panyam





Benchmarking implementation of scissor lift.



FTC #6134 Black Frogs

Session # 19

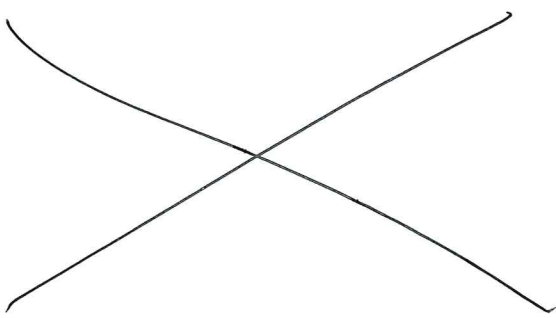
Attendees: Everyone

Location: Arnav's House

Date: 10-18-14

Plan for the day

- Benchmark Scissor Lift

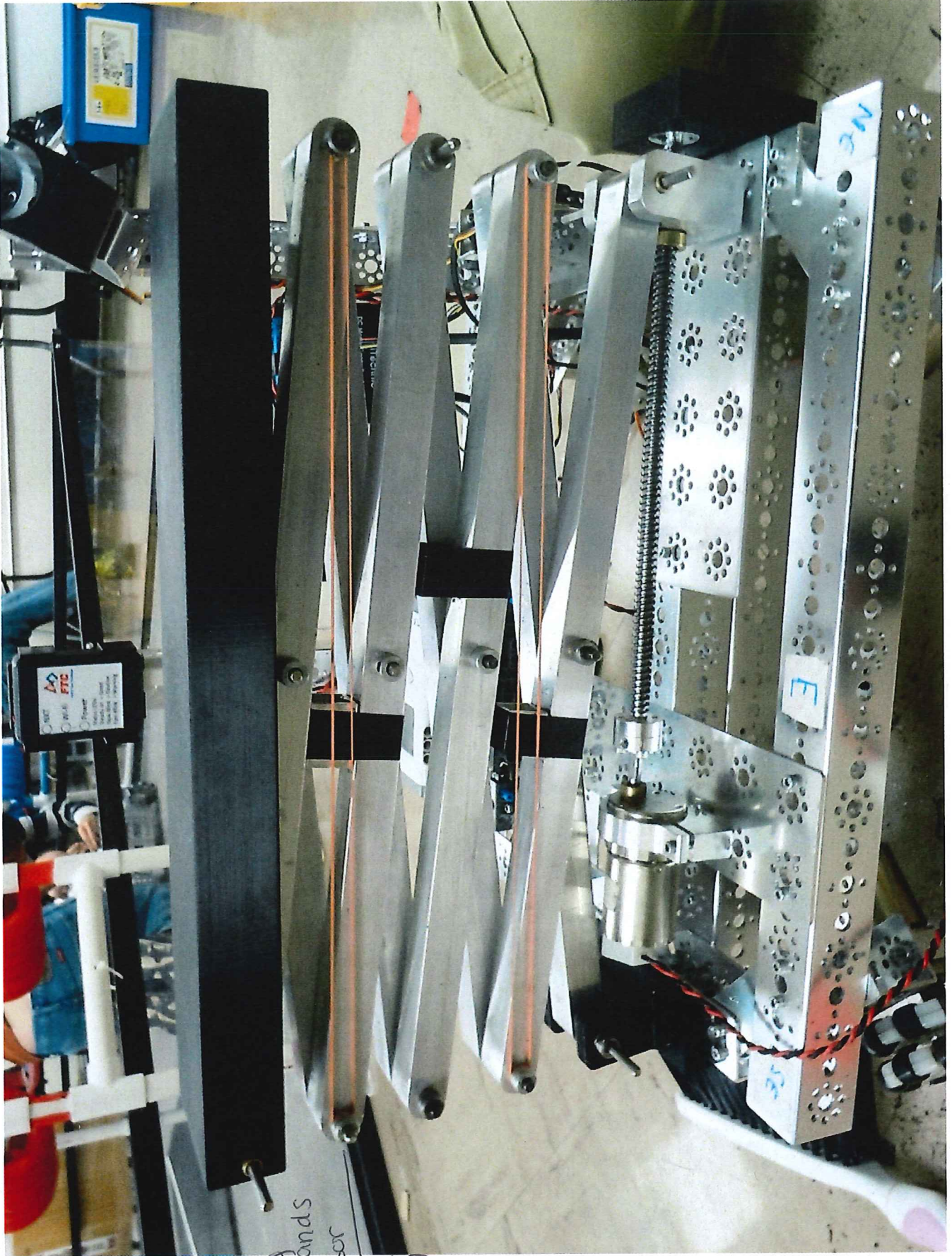
Task	Reflections
Benchmarking Scissorlift Stability	We researched <del>the</del> online and found out about the scissorlift. As the scissor lifted it wouldn't stay straight up so to increase the stability of the scissor we added rubber bands on the sides of the scissor lift.
	

Recorded by:

Nishtha and Sydney



# Benchmarking - Scissorlift Stability



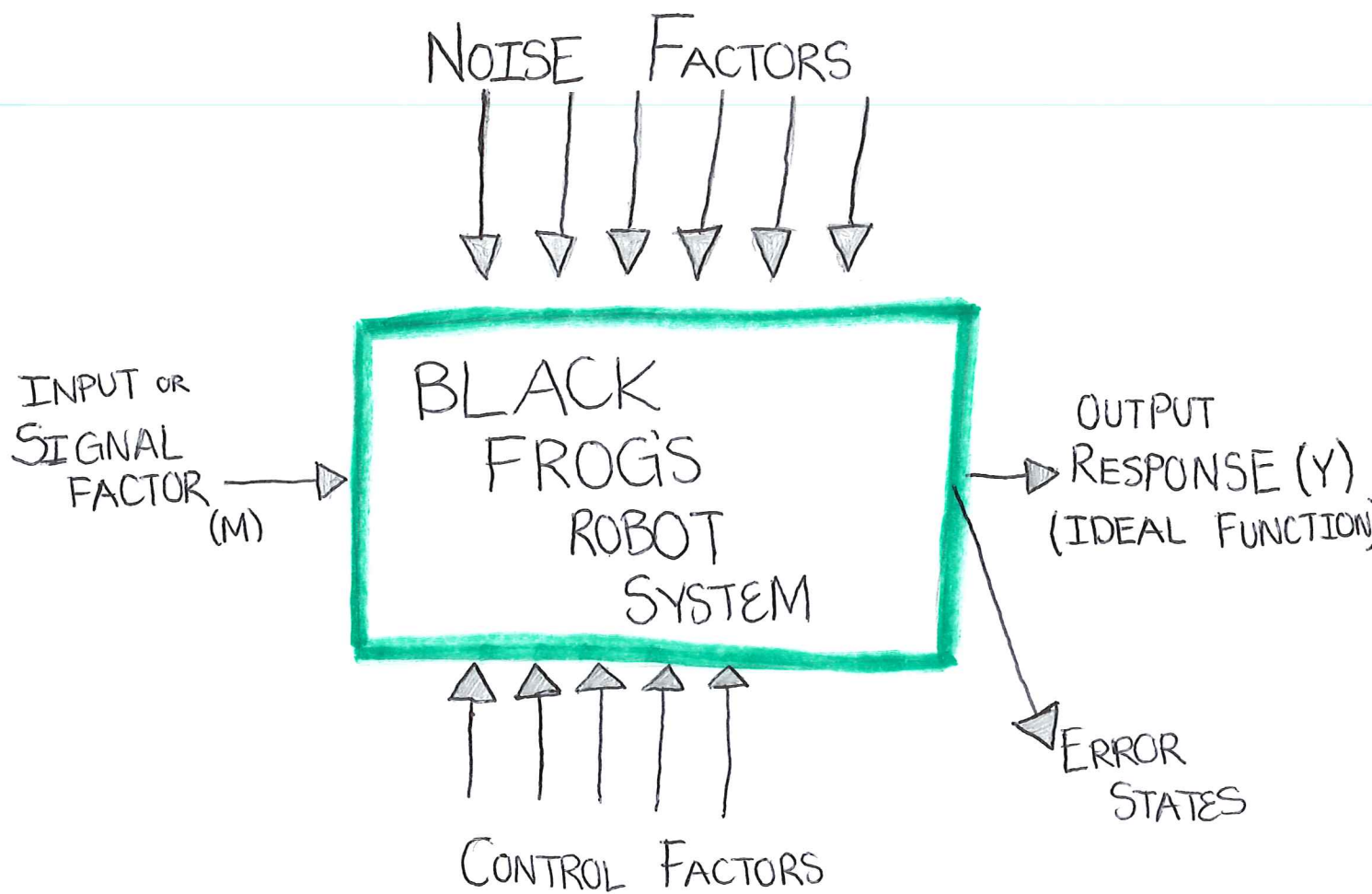
adding  
rubberbands  
to scissor  
lift to  
increase  
stability



# Section Ec

P Diagram Noise Factors

# P-Diagram



Ec-1

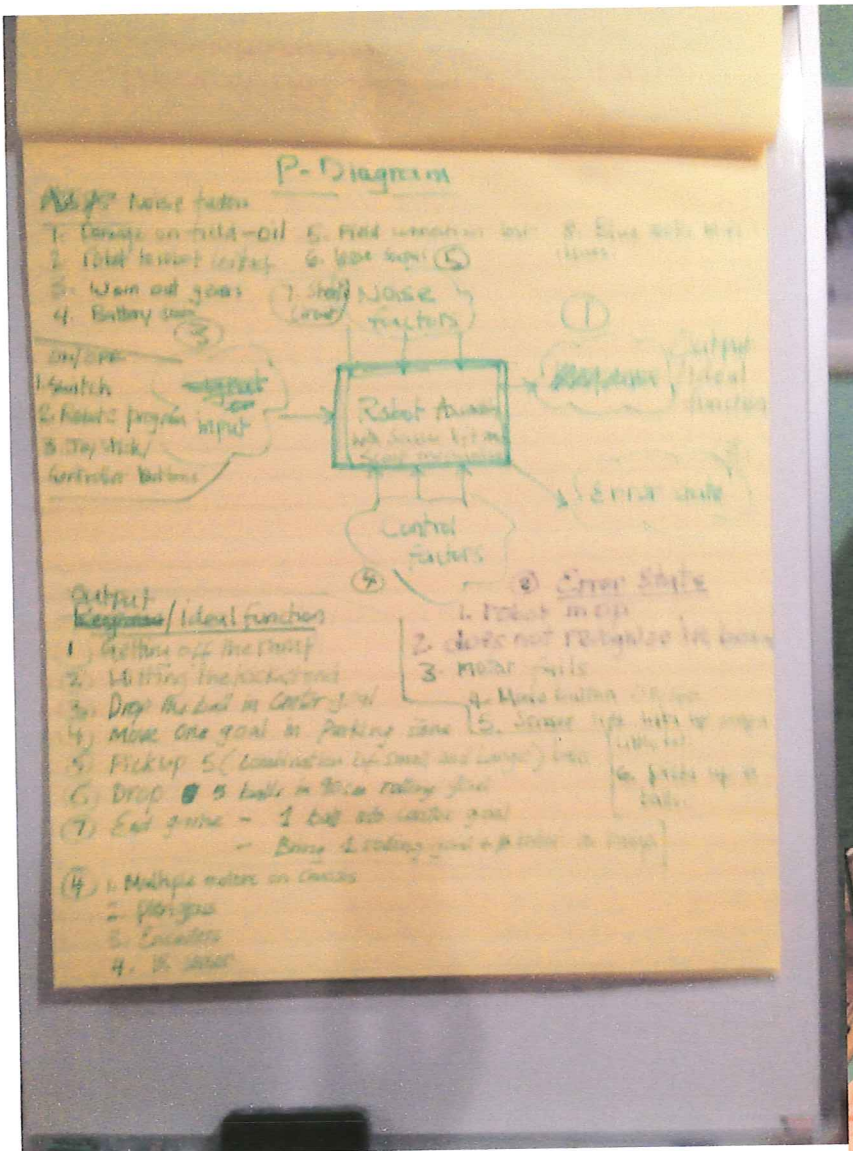
Saketh Addam

SUNNY GRASSMeyer

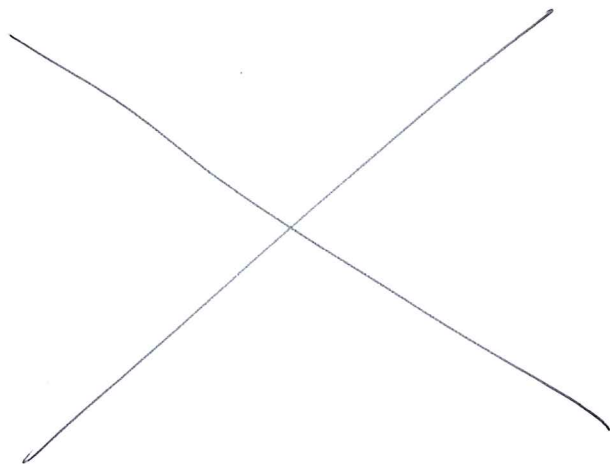
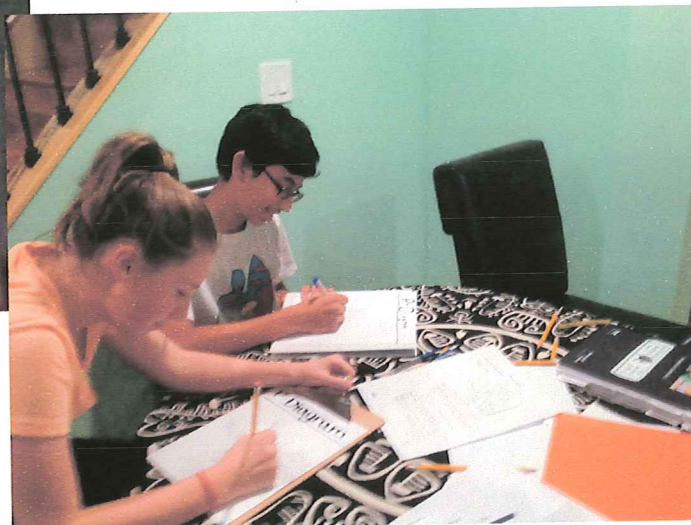
Aam Talukder

Aam K

Vinay Pangum



# P Diagram





# P-D Diagram

## Noise Factors

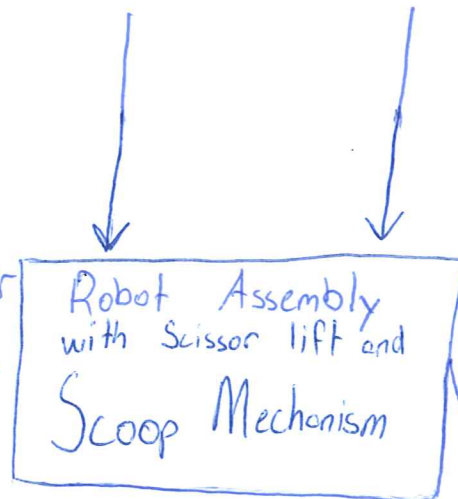
1. Damage on field-oil.
2. Robot to robot contact
3. Worn out gears
4. Field connection lost
5. Battery drain
6. Loose screws
7. Short Circuit
8. Bluetooth/Wi-fi issues.

## Input

On/Off:

- 1) switch
- 2) Robot Program

- 3) Joystick/Controller Buttons.



## Control Factors

- 1) Multiple motors on chassis
- 2) Plexiglass
- 3) Encoders
- 4) IR Sensors.

## Output/ideal function

- 1) Getting off the ramp
- 2) Hitting the kickstand
- 3) Drop the ~~goal~~ ball in center goal
- 4) Move one goal in Parking Zone
- 5) Pickup 5 (combination of small and large) balls
- 6) Drop 5 balls in the 90 cm. rolling goal.
- 7) End game - 1 ball into center goal

- Bring one rolling goal robot to ramp.

## Error State

1. Robot in op.
2. does not recognize IR beacon
3. motor fails
4. Mode Button On/Off
5. Scissor lift lifts up only a little bit
6. picks up 6 balls.

Session # 32

Date: 1/7-2015

Task	Reflections
<p>P-Diagram for Scissor lift.</p>	<pre> graph LR     MC[Motor Command] --&gt; SL[Scissor Lift]     LSR[Lead Screw motor rotation] --&gt; SL     BC[Battery Charge] --&gt; SL     LCB["• Loose connection • weight in balance"] --&gt; SL     SL --&gt; R1["• Scissor lift straight up. • Vertical lift + 120cm"]     SL --&gt; R2["• Scissor lift + bound up • Swaying to much"]     </pre>

Recorded by:

Saketh Addanki Anne George.

# Section Ed

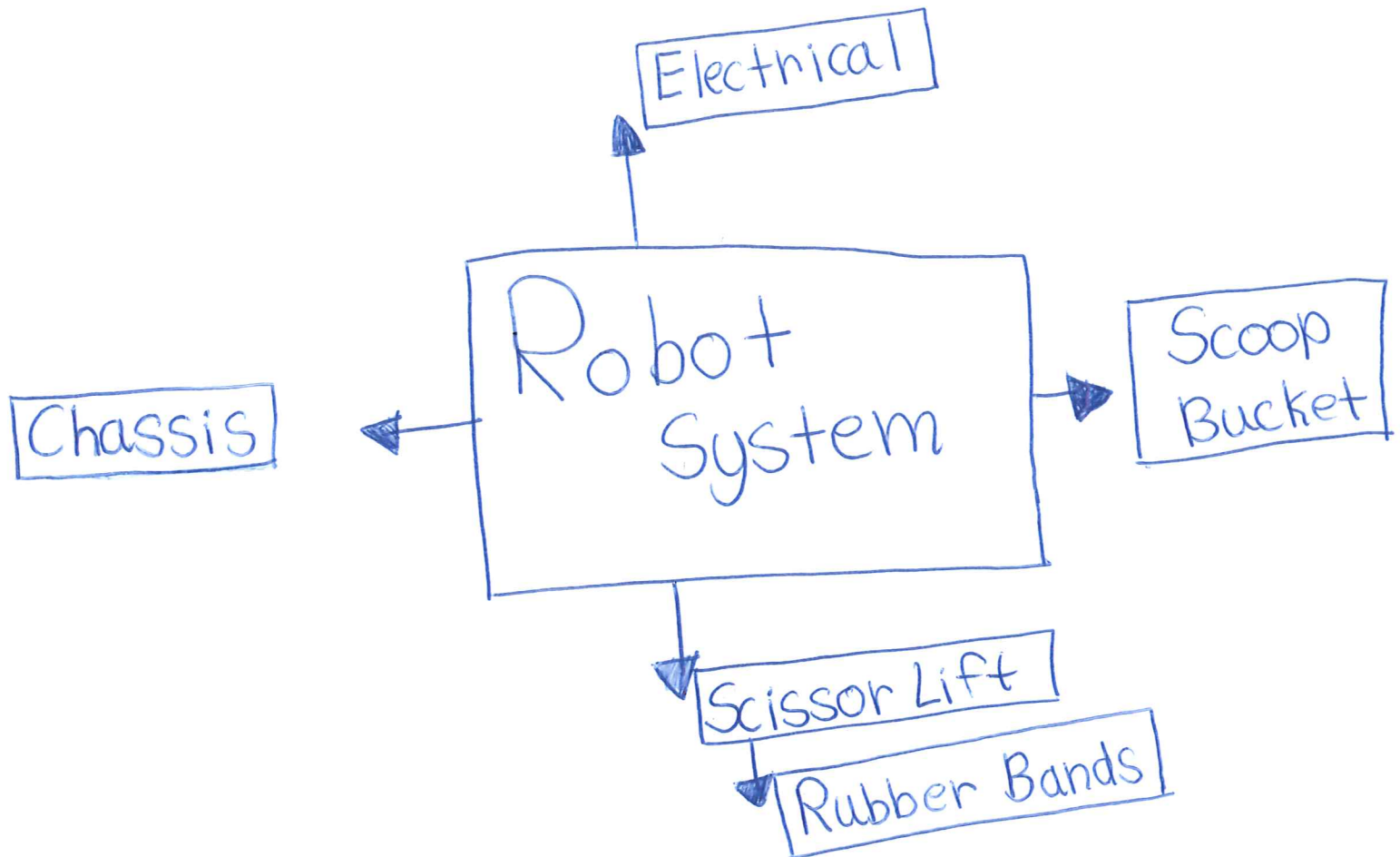
## Failure Modes



# DFMEA

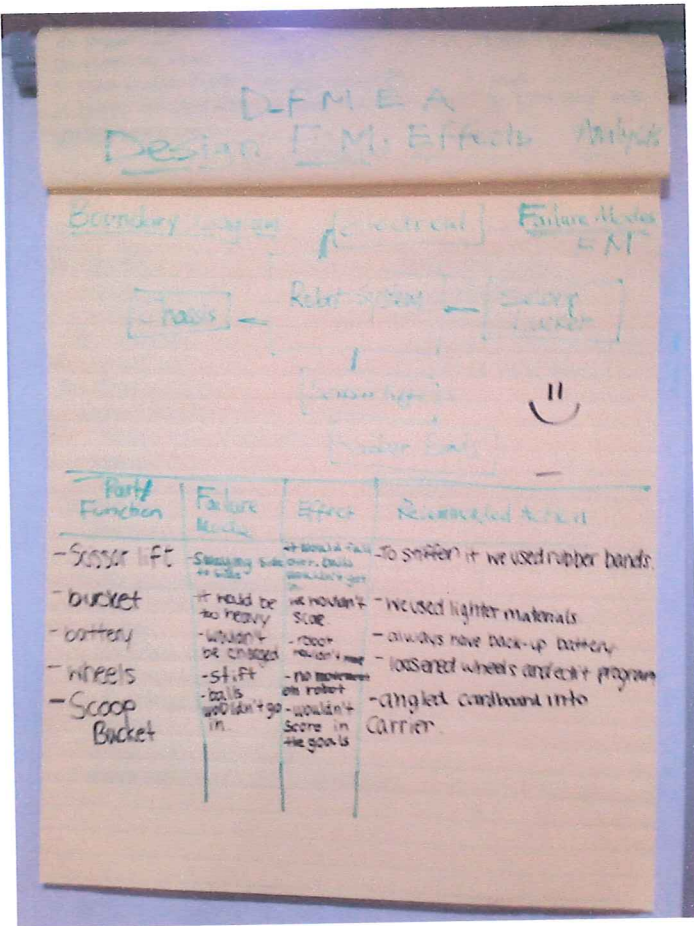
Boundary Diagram

Failure Modes  
F.M.

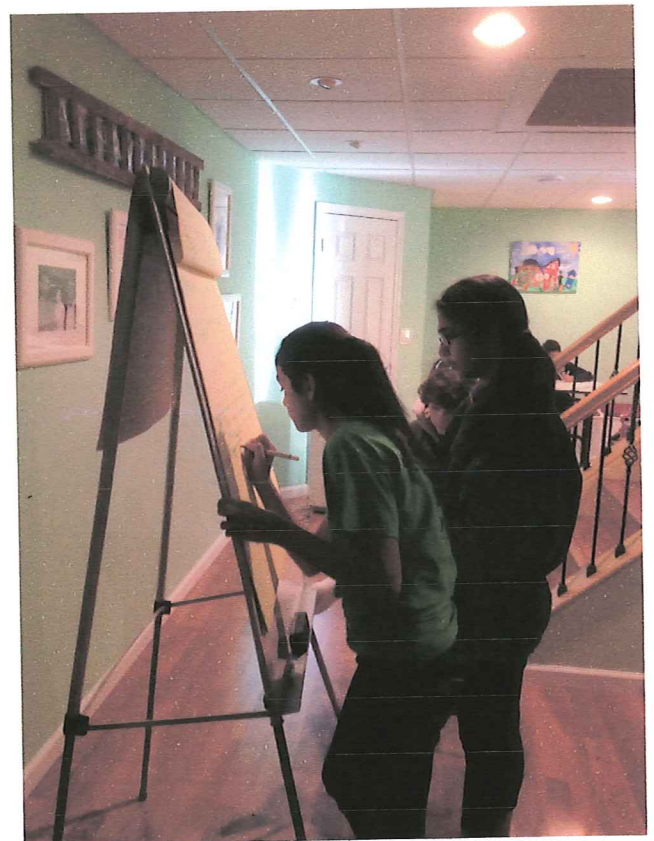


Amne George, Nishtha Kakar, Alex Moore

Ed-1



# DFMEA



# DFMEA

Boundary Diagram

Failure modes  
Fm

Part/ Function	Failure Mode	Effect	Recommended Actions
<ul style="list-style-type: none"> <li>- Scissor lift</li> <li>- bucket</li> <li>- battery</li> <li>- wheels</li> <li>- Scoop bucket</li> </ul>	<ul style="list-style-type: none"> <li>- Swaying side to side.</li> <li>- it would be too heavy.</li> <li>- wouldn't be changed.</li> <li>- too stiff</li> <li>- balls wouldn't go in.</li> </ul>	<ul style="list-style-type: none"> <li>- it would fall over. Balls wouldn't get in.</li> <li>- we wouldn't score</li> <li>- robot wouldn't move.</li> <li>- no movement on robot.</li> <li>- wouldn't score in the goals.</li> </ul>	<ul style="list-style-type: none"> <li>- To stiffen it we used rubber bands.</li> <li>- we used lighter materials.</li> <li>- always have back up battery</li> <li>- loosened wheels and edit programs</li> <li>- angled cardboard into carrier.</li> </ul>



FTC #6134 Black Frogs

Session # 28

Attendees: Viney, Ankith, Nishtha

Location: Arnav's house

Date: 11-23-14

Plan for the day

- DFMEA for bucket

Task	Reflections
What's wrong with motor and why	the motor is burning <del>up</del> out because the axles that attach the bucket were <del>misaligned</del> misaligned that allowed too much torque.
possible solutions	realigned the axles and strengthen the chassi to the <del>the</del> robot connection with hose clamps.

Recorded by:

Nishtha Kakkar, Viney, Ankith

# Section Ee

## System Design

Session # 6

Attendees:

Ankith Udupa, Arnav,  
Nishita, Alex, Sidhar, Ann, Vinay, Shrey

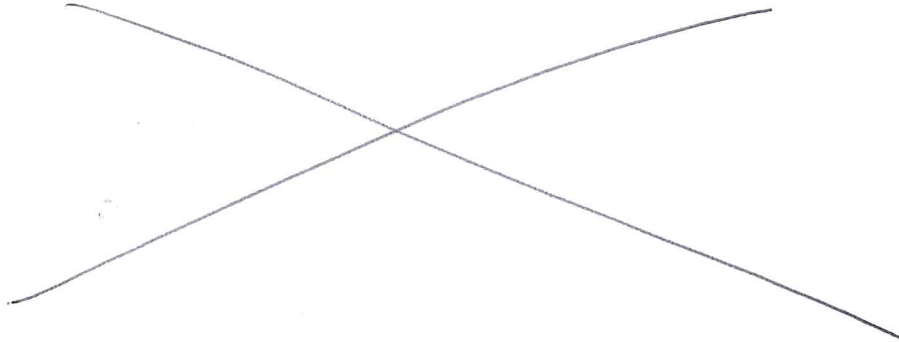
Location:

Black Frogs H.Q.  
(Arnav's House)

Date:

~~9-24~~ 9-25

### Plan for the day



Task	Reflections
Design the Chassis	We chose a four motor system so that you <del>can</del> have replacement, if one motor runs out you have an extra one.
To determine how fast our robot can	<p>6 wheel tank drive </p> <p>Gear ratio = 1:1</p> $\frac{80}{40} \times \frac{40}{40} \times \frac{40}{80}$ <p>Motor speed = 90 rev/min = 1.5 rev/sec</p> <p>What is the distance per rev = Circumference</p> <p>Wheel circumference = <math>2\pi r = 2\pi \times 2\text{in} = 12.6\text{in}</math></p> <p> <math>r = \text{feet} \times h</math></p> <p>80 + 40 + 80</p>

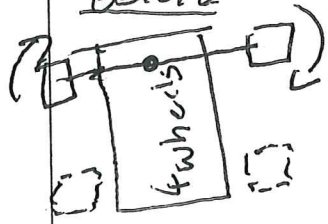
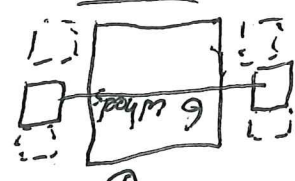
Recorded by:

Ankith Udupa, Nishita, Arnav



Session # 6

Date: 9-25

Task	Reflections
To determine how fast our robot can run cont...	<p>Speed = motor speed <math>\times</math> circle</p> $= 1.5 \frac{\text{rev}}{\text{sec}} \times 12.6 \frac{\text{in}}{\text{sec}} = \frac{18.9 \text{ in}}{\text{sec}} = \frac{? \text{ mi}}{1 \text{ hr}}$ <p>Dimensional Analysis</p> $\frac{18.9 \text{ in}}{1 \text{ sec}} \times \frac{1 \text{ min}}{60,300 \text{ in}} \times \frac{3600 \text{ sec}}{1 \text{ hr}}$ $= \frac{18.9 \times 3600}{60,300} = 1.07386 \text{ mi/hr}$
Determine pushing force	<p>- Torque = force <math>\times</math> distance</p> $\text{Force} = \frac{\text{Torque}}{\text{radius}} = \frac{320 \times 4 \text{ in} \cdot \text{oz}}{2 \text{ in}}$ $= 640 \text{ oz} = 40.16 \text{ f}$
Determine least amount of radius on turn.	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>before</p>  </div> <div style="text-align: center;"> <p>After</p>  </div> </div> <p style="text-align: center;">This is better because radius is shorter</p>

Recorded by:

Ankith Wapa, Nishita, Arnav

FTC #6134 Black Frogs

Session # 6

Attendees: ~~Everyone~~ Everyone

Location: ~~Ernar's House~~  
Ernar's House

Date: 9.25.14

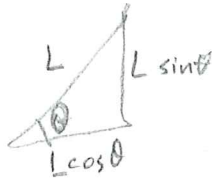
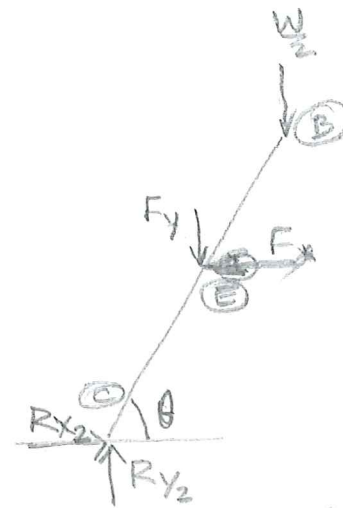
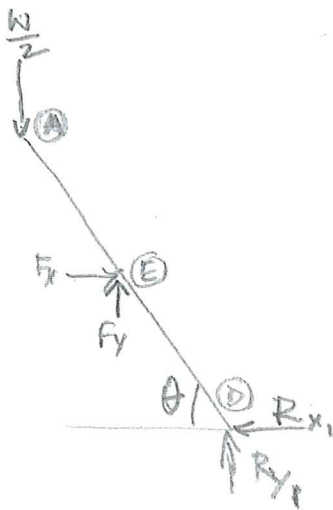
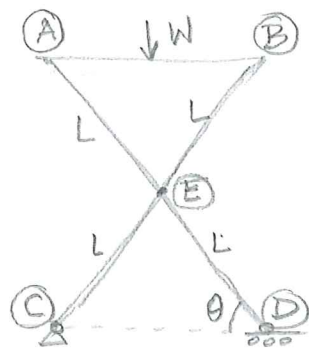
Plan for the day

Understand scissor lift "lift" force equation

Task	Reflections
Explain the equation	We went over the equation together, and we wrote up a page about it. (see back)

Recorded by:

Vinay Pangem



HOR. FORCES  $F_x - R_{x1} = 0$  (A)

VERT. FORCES  $-\frac{W}{2} + F_y + R_{y1} = 0$  (B)

MOMENT ABOUT PT D

$$F_x \cdot L \sin \theta + F_y \cdot L \cos \theta - \frac{W}{2} \cdot 2L \cos \theta = 0$$
 (C)

MOMENT ABOUT PT C

$$\frac{W}{2} \cdot 2L \cos \theta + F_y \cdot L \cos \theta - F_x \cdot L \sin \theta = 0$$
 (F)

$$\textcircled{C} F_x \cdot \frac{\sin \theta}{\cos \theta} + F_y - W = 0 \quad \textcircled{F} W + F_y - F_x \cdot \frac{\sin \theta}{\cos \theta} = 0$$

$$W = F_x \cdot \tan \theta + F_y$$

$$W = F_x \cdot \tan \theta - F_y$$

$$\therefore F_y = 0$$

$$W = F_x \cdot \tan \theta$$

$$F_x = \frac{W}{\tan \theta}$$

$$\textcircled{A} F_x = R_{x1} = \frac{W}{\tan \theta}$$

$$\textcircled{D} F_x = R_{x2} = \frac{W}{\tan \theta}$$

$$\textcircled{B} -\frac{W}{2} + R_{y1} = 0 \quad R_{y1} = \frac{W}{2}$$

$$\textcircled{E} -\frac{W}{2} + R_{y2} = 0 \quad R_{y2} = \frac{W}{2}$$



# Section Ef

## Component Design

Session # 5

Attendees: Saketh, Arnav, Alex

Location: ~~Arnav's~~ Black Frogs  
(Arnav's House) HQ

Date: ~~9-15-20~~ 9-21-2014

Plan for the day

Make a ~~non~~ functional Prototype for  
Scooping up the ball; And pushing rolling  
goal

Task	Reflections
Brainstorm Idea #1 (Box with Brushes)	Our first idea was a Box with Brushes, and a funnel to dispose of the balls. We <del>believed</del> <sup>realized</sup> that this would not work because the balls would be pushed <sup>up</sup> <del>at</del> if the brushes make <sup>us</sup> <del>any</del>
Brainstorm Idea 2.	<u>wrong contact</u> Our second idea was to have two flaps stick out to push rolling goals. We thought this was a good idea because we could...

Recorded by:

Arnav Talukder, Saketh Addanki

Session # 5

Date: 9.21.14

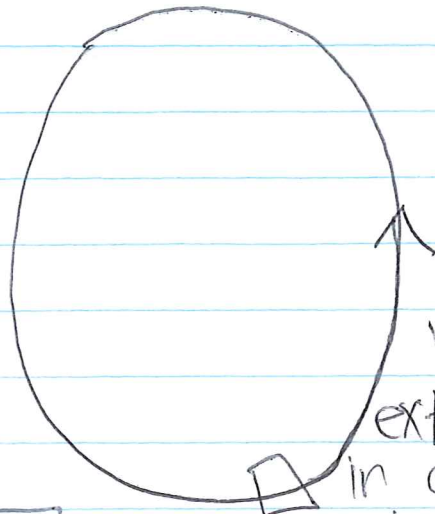
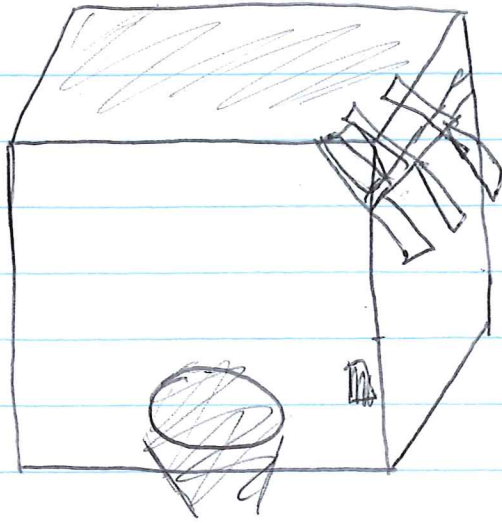
Task	Reflections
Brain Storm Idea 2 [cont.]	...come from either side and still Kick the kickstand
Brain Storm Idea 3	We decided to combine idea 1 & 2 to make a amazing idea witch would do all our needs. This later would be our mainidea
<del>Whorez</del> Choose Main Idea	We disregarded idea 1 because the fact that the balls may slip away. We disregarded idea 2 because it was added to idea 3. This is why we decided to use idea 3.

Recorded by:

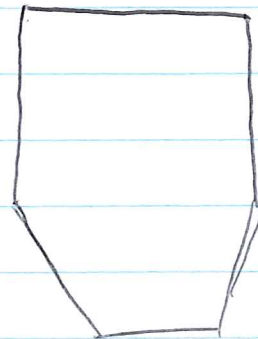
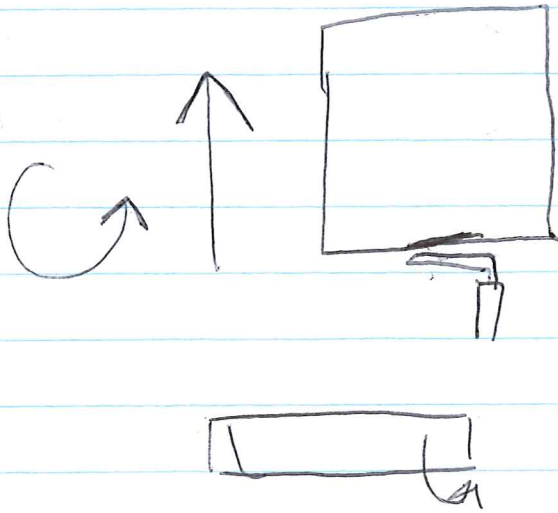
Saketh Addanki, Arnav Talukder



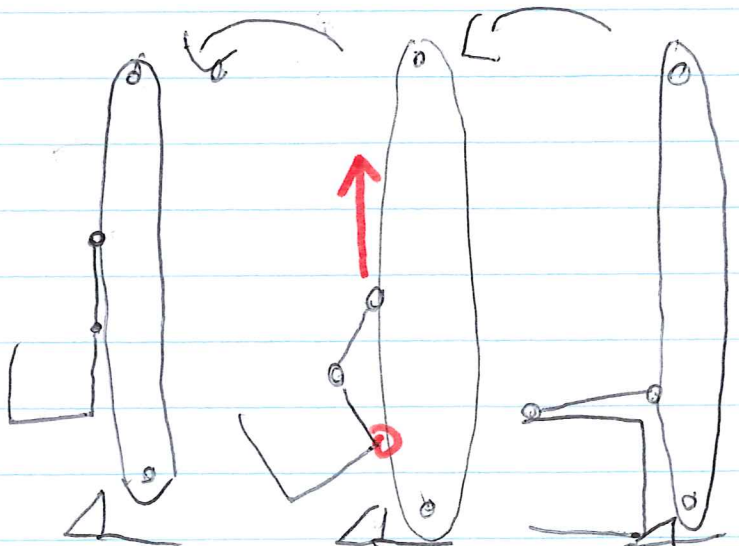
# Option 1



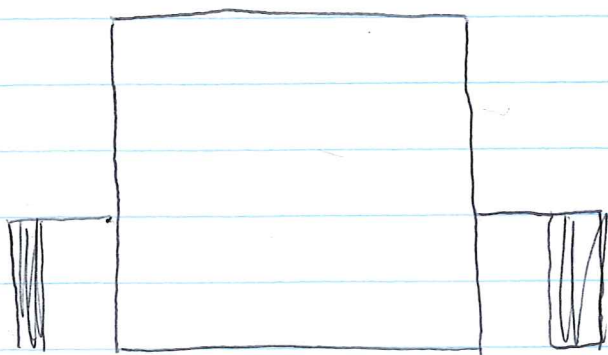
Verify if a  
extra ball comes  
in and you spit  
out is it a penalty



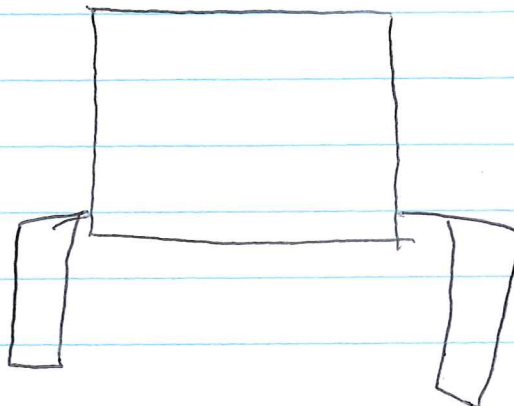
## How do we control the trapdoor



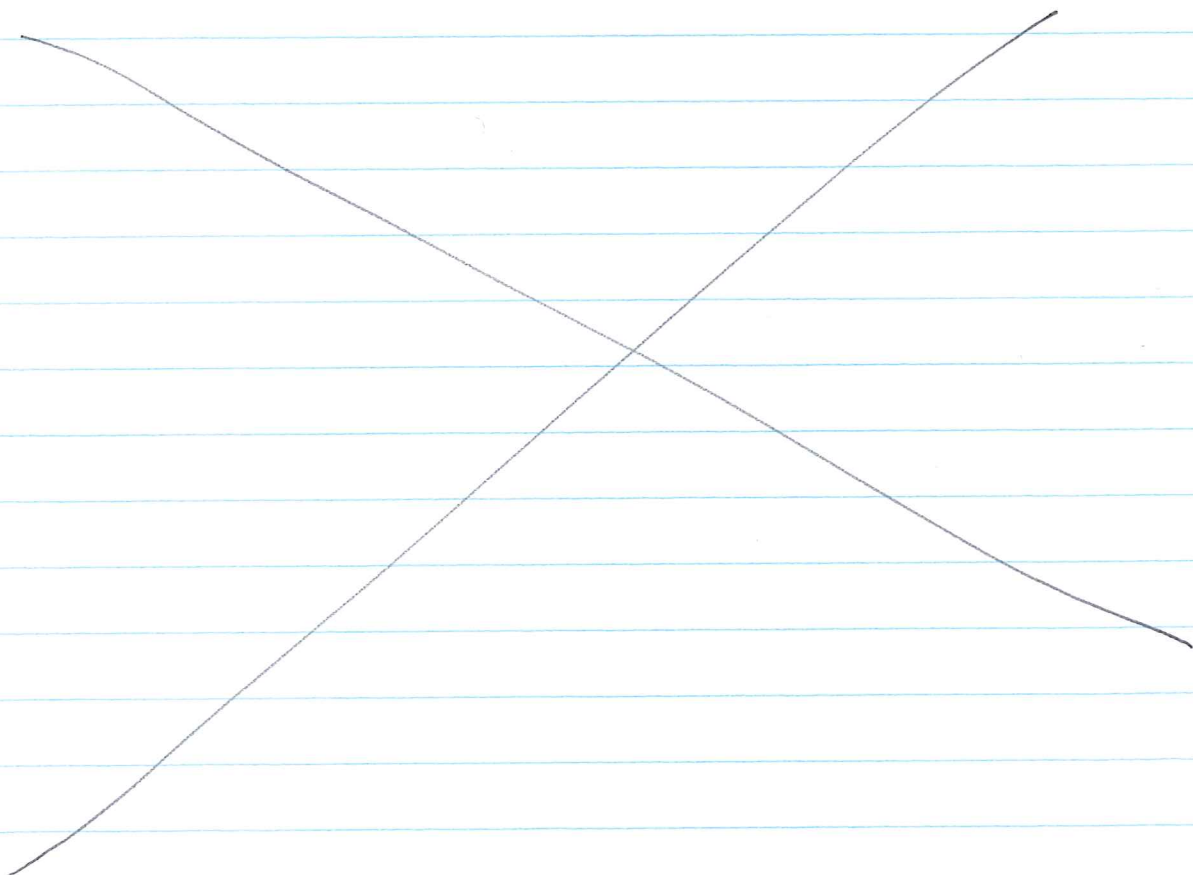
# Option 2



Front

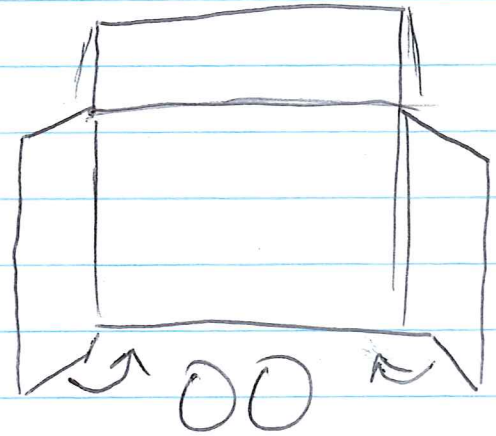
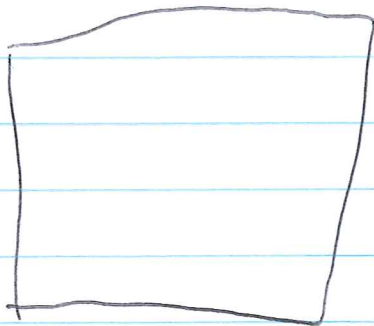


Top



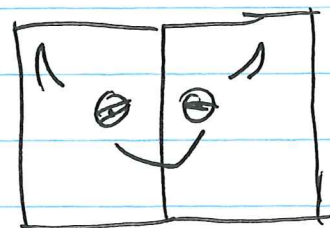
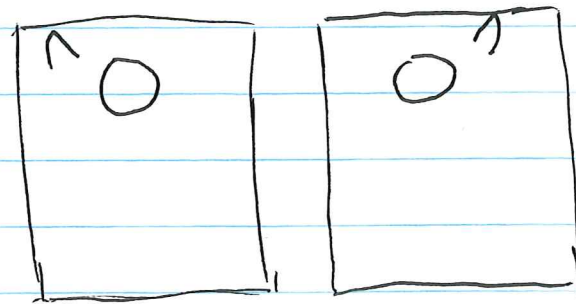
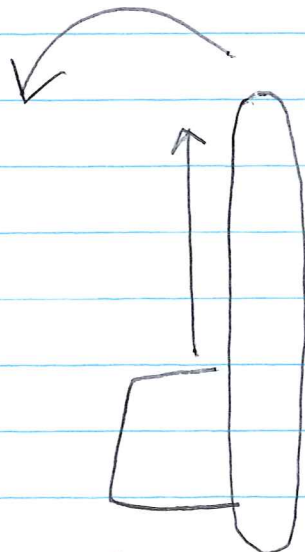
# Option 3

Combine the Bucket  
and the V holder.

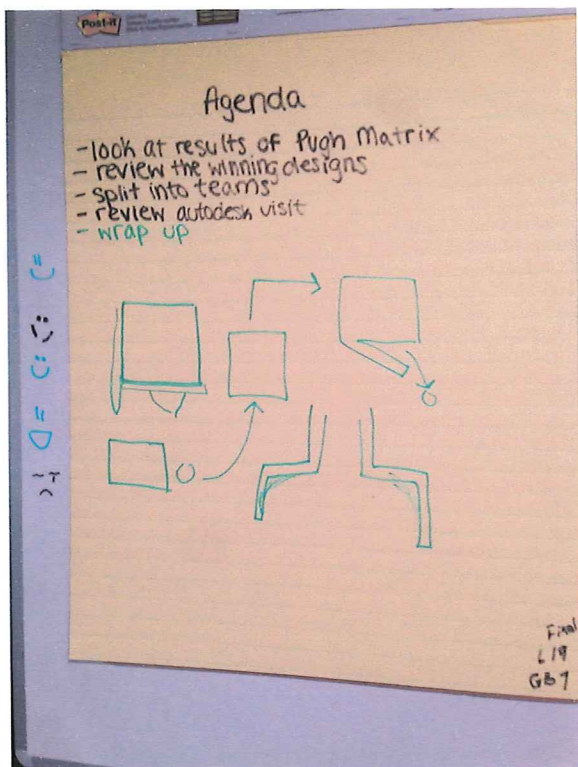


Door that  
scoop balls  
also function  
as funnel

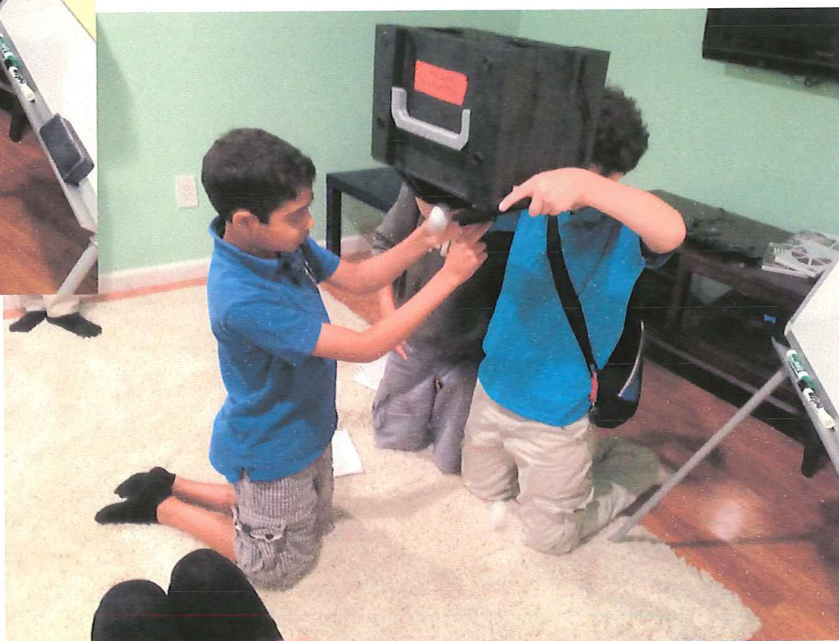
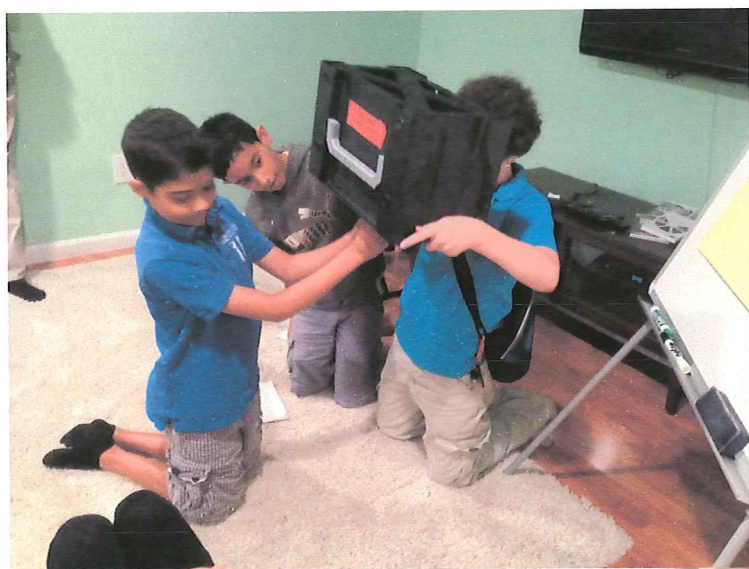
Bucket doors open up acting as a funnel







Explaining Option 3 to the Team.



Session # 6

Attendees: Everyone

Location: Anna's House

Date: 9/25/14

Plan for the day

Prototype the lift mechanisms.

Task	Reflections
<p>- Think of ideas for a lift mechanism.</p>	<p>- We thought of two ideas. The first one was a scissor mechanism. The second one was a "N" mechanism.</p>
<p>- See Ideas for Scissor mechanism.</p>	<p>- we thought of using a <del>pin</del> gear and pinions idea. The idea was to attach one side and push the other side toward the attached side. <u>See drawing #1</u></p>

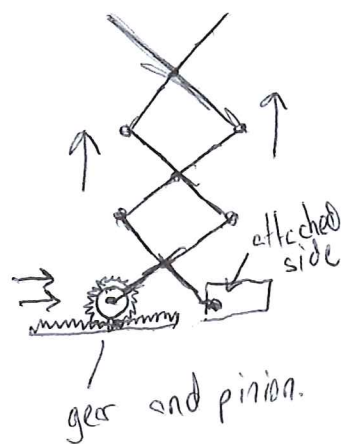
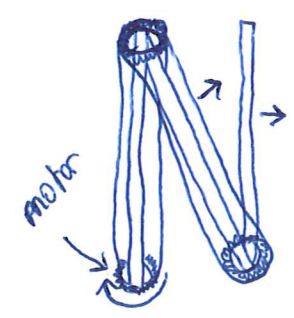
Recorded by:

Anne and Arun



Session # 6

Date: 9/25/14

Task	Reflections
<p>Scissors mechanism (Drawing # 1)</p>	
<p>The "N" mechanism.</p>	<p>- This mechanism looks like an "N". There's a motor at the base of the "N", and there's a sprocket attached to the motor. There's going to be a chain attached to the first bar. There is another sprocket and chain attached to the next bar</p> 

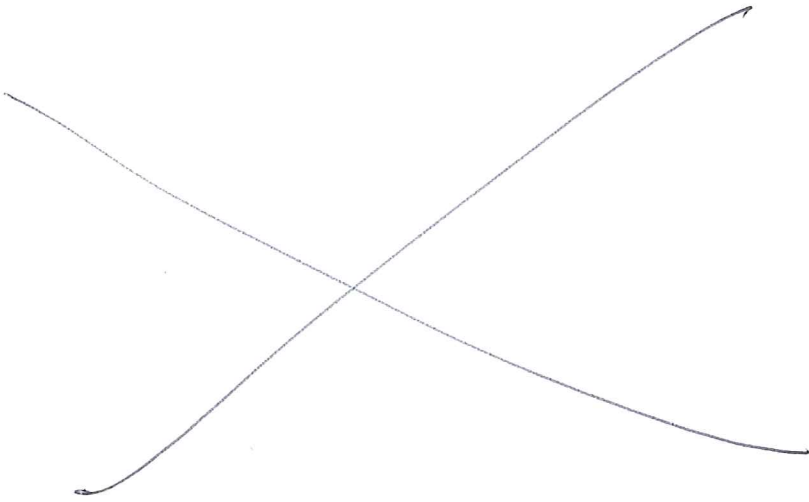
Recorded by:

Anna Kommandorit, Anae



Session # 6

Date: 9/25/14

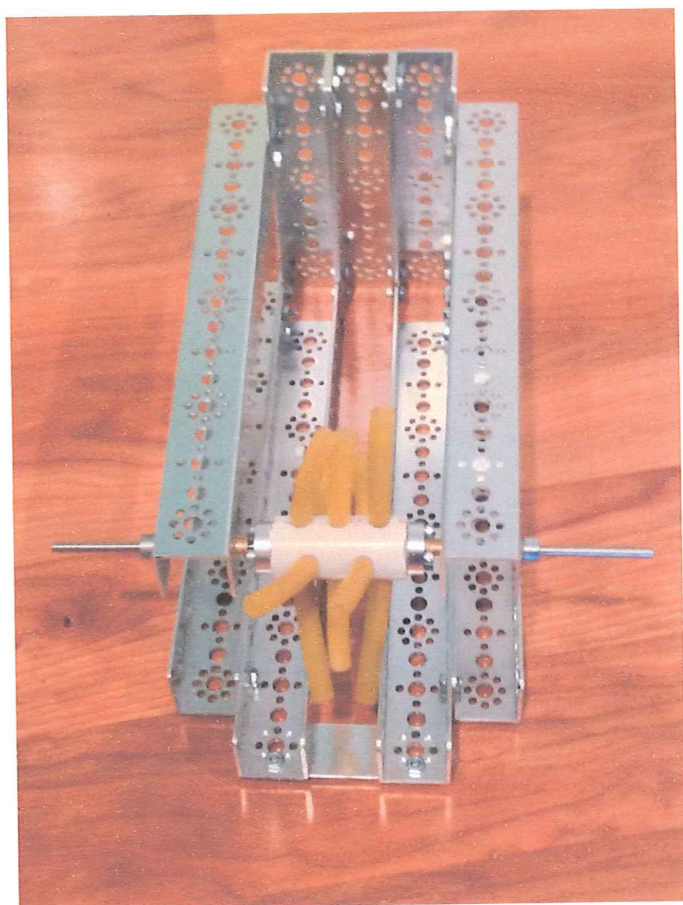
Task	Reflections	
<p>-Pros and Cons for Scissor mechanism.</p>	<p>Pros</p> <ul style="list-style-type: none"> <li>- looks cool</li> <li>- limited motors</li> <li>- simple</li> <li>- light weight</li> </ul>	<p>Cons</p> <ul style="list-style-type: none"> <li>- weight of bucket may push down</li> <li>- placement and attaching of box</li> <li>- multiple points of failure.</li> </ul>
<p>-Pros and Cons for "N" mechanism</p>	<p>Pros</p> <ul style="list-style-type: none"> <li>- easier to attach box</li> <li>- easier to pick up balls</li> </ul>	<p>Cons</p> <ul style="list-style-type: none"> <li>- many points of failure</li> <li>- weak?</li> </ul>
		

Recorded by:

Arun and Anne



Prototyping Idea 1.



# FTC #6134 Black Frogs

Session # 7

Attendees: Everyone

Location: Arnav's House

Date: 10-5-14

## Plan for the day

We had to prototype the box to pick up balls.

Task	Reflections
1) Ideas for the <del>Box</del> mechanism to pick up and drop the balls.	• One of the ideas was to pick the balls using brushers and drop them off the same way.
2) The other idea for the <del>mech</del> mechanism.	• The other idea was to pick up the balls <del>and</del> using the box, and dropping them using gravity.

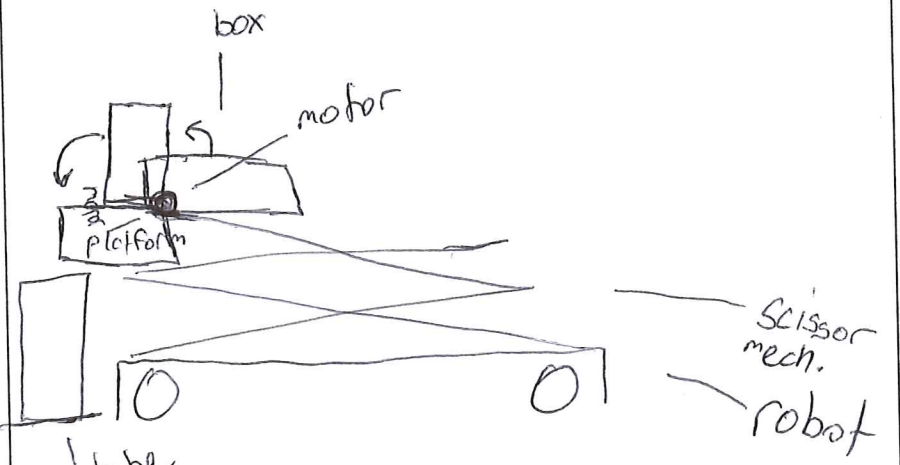
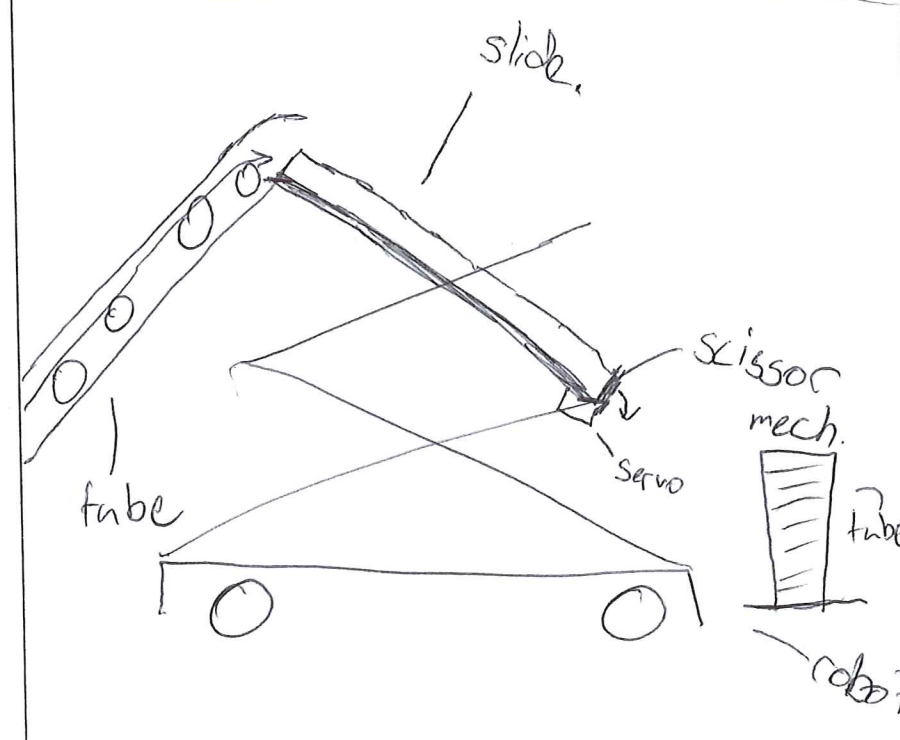
Recorded by:

Arav Kammandimithi, Vinay Panyam



Session # 7

Date: 10-5-14

Task	Reflections
<p>what the first mechanism looks like.</p>	 <p>box</p> <p>motor</p> <p>platform</p> <p>scissor mech.</p> <p>robot</p> <p>tube</p>
<p>what the second one looks like</p>	 <p>slide</p> <p>scissor mech.</p> <p>servo</p> <p>tube</p> <p>robot</p>

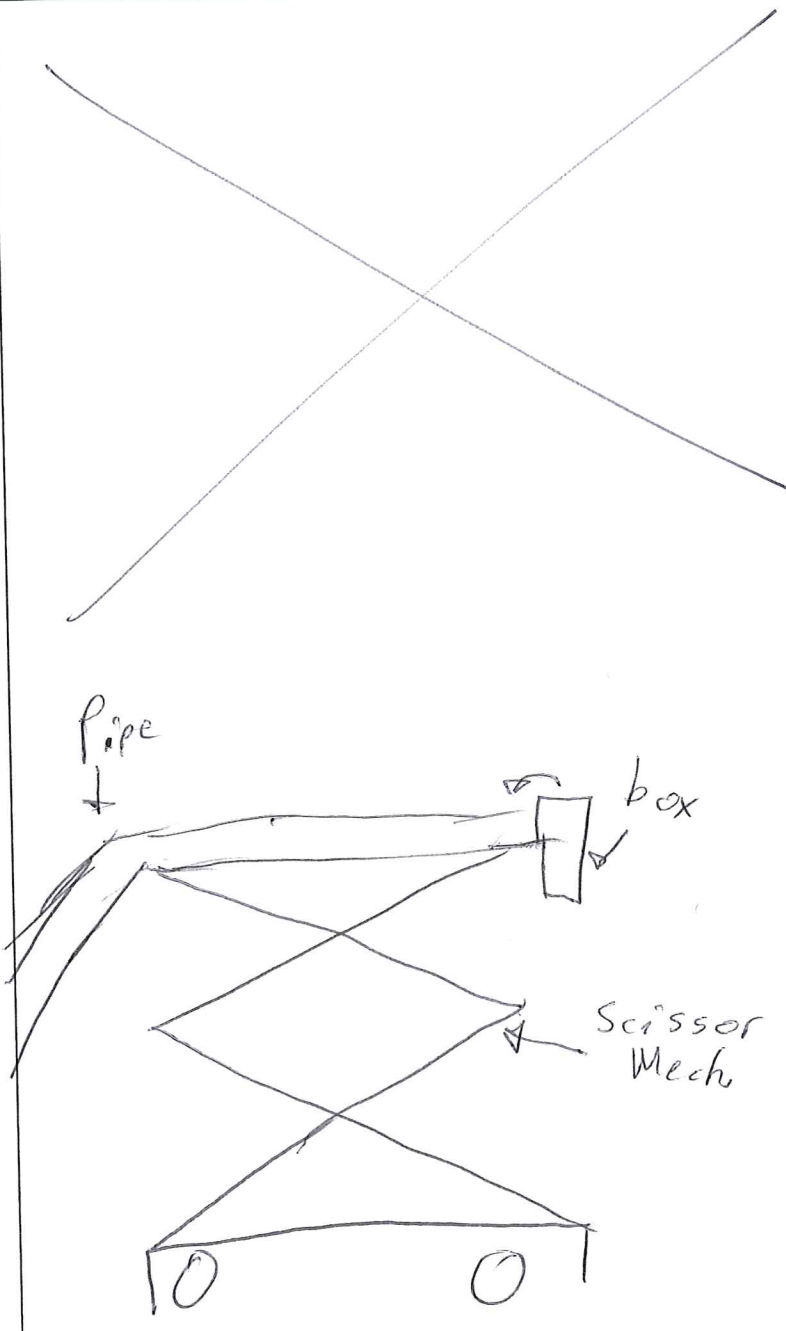
Recorded by:

Drawn by Arun Kammandimati, Vinay Panyam

10/5/14

Session # 7

Date: ~~10/16/14~~

Task	Reflections
<p>-A variant of the second idea</p>	

Recorded by:

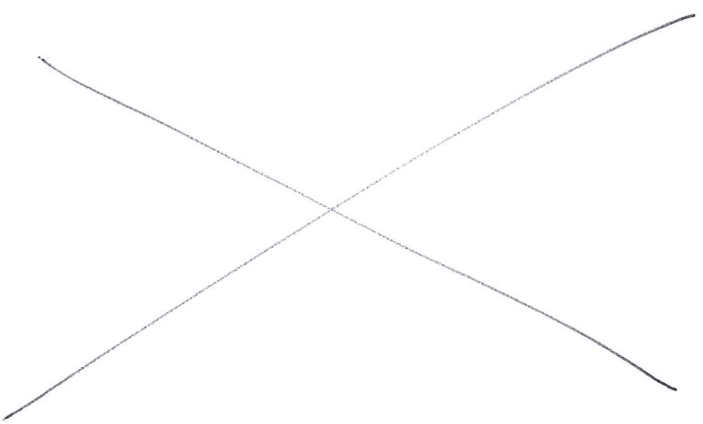
Vinay Pangam

Acu Karmnadimithi

FTC #6134 Black Frogs

Session # 7

Date: 10-5-14

Task	Reflections	
Pros and Cons of version ①	Pro's <ul style="list-style-type: none"> <li>• Easier to control.</li> <li>• Doesn't have to make balls move as far</li> <li>• Easier to put balls in smaller goals</li> <li>• Don't have to lift up as far to dump the balls in.</li> </ul>	Con's <ul style="list-style-type: none"> <li>• More motors</li> <li>• More moving parts</li> <li>• Uses more battery power</li> <li>• Have to lift it up and down more.</li> </ul>
Pros and Cons of Version 2	Pros <ul style="list-style-type: none"> <li>• Less motors</li> <li>• Less moving parts</li> <li>• Less battery power used</li> <li>• Doesn't have to lift it up and down as much</li> </ul>	Cons <ul style="list-style-type: none"> <li>• Can't control as much</li> <li>• Have to move balls further</li> <li>• Harder to put in the smaller goals</li> <li>• Have to lift it up further to drop balls in goals.</li> <li>• More Friction</li> </ul>
		

Recorded by:

Aron Kammundimhi, King Panyan



Session # 7

Attendees: Everyone

Location: Arnav's house

Date: 10/5/14

Plan for the day

Finish building a working scissor lift.

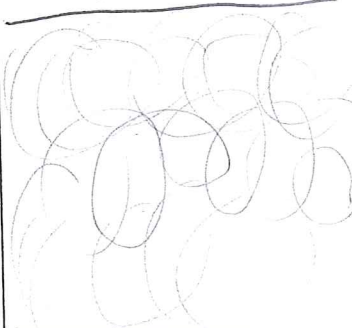
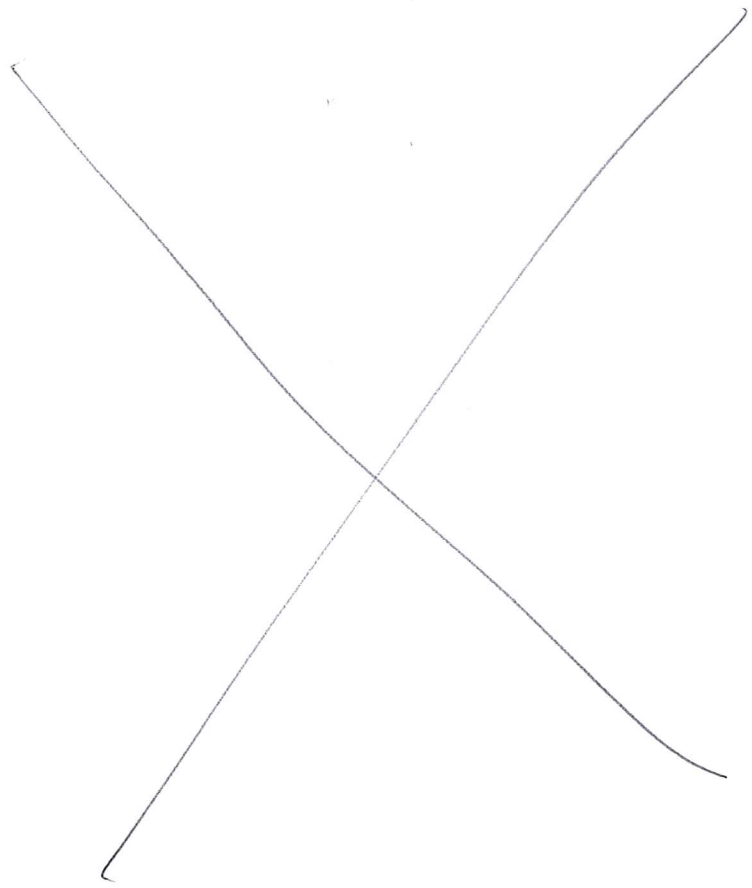
Task	Reflections
- pinning the scissor lift.	- When we were pinning the scissor lift, we <del>had</del> proportionally centered it. The first time we attached it, it was to the left. This caused issues with the sliders because there wasn't enough room on the side.
- putting wheels on the unpinning side.	- This <del>task</del> task made it easy for our scissor lift mechanism to <del>rotate</del> maneuver. We did this to lessen friction. Rolling friction is less than sliding friction.

Recorded by:

Anne, Saketh, Arnav, Sydney

Session # 7

Date: 10/9/14

Task	Reflections
<p>Putting drawer sliders</p> 	<p>This task would put less friction on our mechanism's wheels. This also locked the mechanism in place so that it would not tip over during movement.</p>
	

Recorded by:

Saketh, Arnav, Anne, SYDNEY ♥



The Scissor Lift





Session # 8

Date: 10-9-24

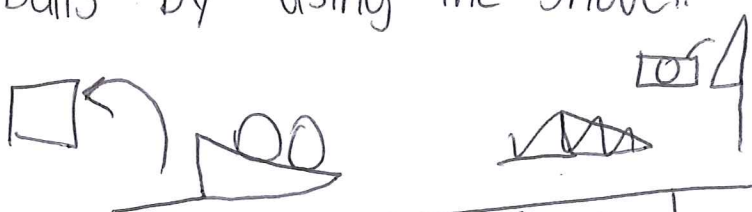
Task	Reflections				
Thinking of ideas for our loading mechanism	<p><u>Idea #1</u></p> <p>The robot would have a ramp that, at the start of the match, its vertical above the scissor lift. In autonomous we release the ramp and let it drop to the ground. The</p>				
	<p>ramp has roller made of PVC Pipe and surgical tubing that push the balls up the <del>ramp</del> ramp and into our lifting mechanisms.</p>				
Pros and Cons	<p><u>Idea #1</u></p> <table> <tr> <th>Pros</th><th>Cons</th></tr> <tr> <td> <ul style="list-style-type: none"> <li>* Can pick up balls quickly</li> <li>* Few moving parts</li> <li>* Few points of Error</li> <li>* Easy to pick up balls</li> </ul> </td><td> <ul style="list-style-type: none"> <li>* Weak</li> <li>* Heavy</li> <li>* Drags along mat</li> <li>* Made of Flexible material.</li> </ul> </td></tr> </table>	Pros	Cons	<ul style="list-style-type: none"> <li>* Can pick up balls quickly</li> <li>* Few moving parts</li> <li>* Few points of Error</li> <li>* Easy to pick up balls</li> </ul>	<ul style="list-style-type: none"> <li>* Weak</li> <li>* Heavy</li> <li>* Drags along mat</li> <li>* Made of Flexible material.</li> </ul>
Pros	Cons				
<ul style="list-style-type: none"> <li>* Can pick up balls quickly</li> <li>* Few moving parts</li> <li>* Few points of Error</li> <li>* Easy to pick up balls</li> </ul>	<ul style="list-style-type: none"> <li>* Weak</li> <li>* Heavy</li> <li>* Drags along mat</li> <li>* Made of Flexible material.</li> </ul>				

Recorded by:

Saketh, Vinay, An kith

Session # 8

Date: 10-9-2014

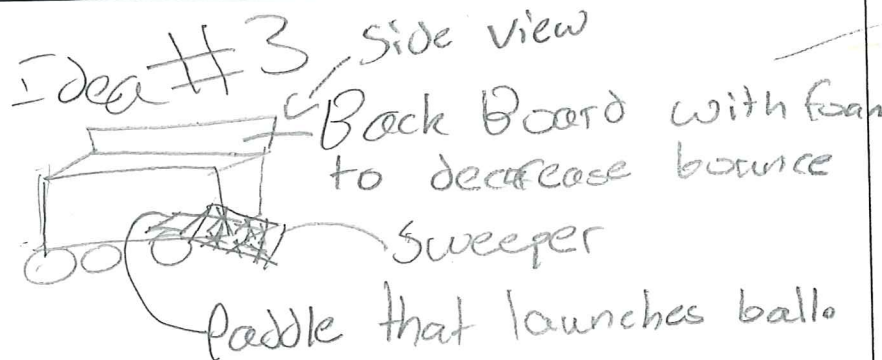
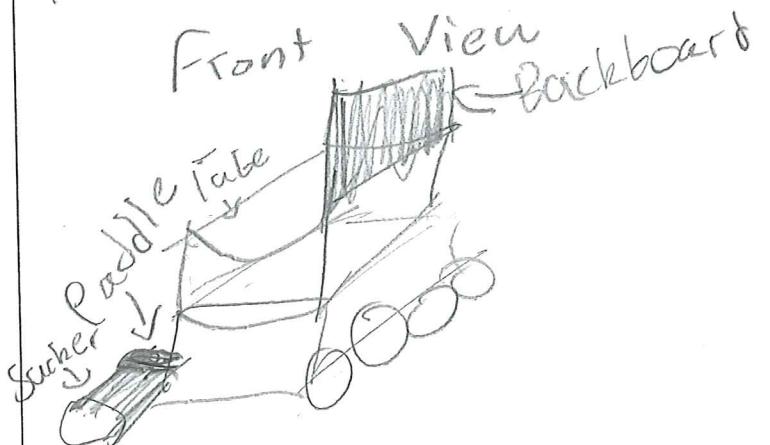
Task	Reflections				
Thinking About Ideas	<p><u>Idea #2</u></p> <p>The robot <del>would</del> would have an arm that would have a shovel at the end. In the beginning the shovel would be folded verticle. Then in autonomous it would come down. We would then use this mechanism to pick up balls by using the Shovel.</p> 				
Pros and Cons	<table border="1"> <thead> <tr> <th>Pros</th><th>Cons</th></tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>- Simple</li> <li>- One motor</li> <li>- 1 point of failure</li> <li>- Pick up balls fast</li> </ul> </td><td> <ul style="list-style-type: none"> <li>- Can be Hit (can be damaged)</li> <li>- Can foil with bad motor</li> </ul> </td></tr> </tbody> </table>	Pros	Cons	<ul style="list-style-type: none"> <li>- Simple</li> <li>- One motor</li> <li>- 1 point of failure</li> <li>- Pick up balls fast</li> </ul>	<ul style="list-style-type: none"> <li>- Can be Hit (can be damaged)</li> <li>- Can foil with bad motor</li> </ul>
Pros	Cons				
<ul style="list-style-type: none"> <li>- Simple</li> <li>- One motor</li> <li>- 1 point of failure</li> <li>- Pick up balls fast</li> </ul>	<ul style="list-style-type: none"> <li>- Can be Hit (can be damaged)</li> <li>- Can foil with bad motor</li> </ul>				

Recorded by:

Saketh, Vinay, Ankith

Session # 8

Date: 10/9/14

Task	Reflections
<p>Thinking about Ideas for Loading Mech #3</p>	<p>Idea #3, side view</p>  <p>The Robot would pick up the balls using Surgical tubing sucker then a paddle would launch it into the foam back board then would fall into tube</p> <p>Front View</p> 

Recorded by:

Ankith, Vinay, Saketh



Session # 8

Date: 10-9-2014

Task	Reflections	
<p>Pros and Cons for Mech #3</p>	<p>Pros</p> <ul style="list-style-type: none"> <li>• Simple</li> <li>• low amount of moving parts</li> <li>• Not much bounce</li> </ul>	<p>Cons</p> <ul style="list-style-type: none"> <li>• minimum collection space</li> <li>• slightly inaccurate</li> <li>• Big</li> <li>• Backboard might get in way of tube</li> <li>• hard to open and close</li> </ul>

Recorded by:

Ankith, Saketh, Vinay

# FTC #6134 Black Frogs

Session # 9

Attendees: Alex

Location: outside  
Arnav's House

Date: Oct 11

## Plan for the day

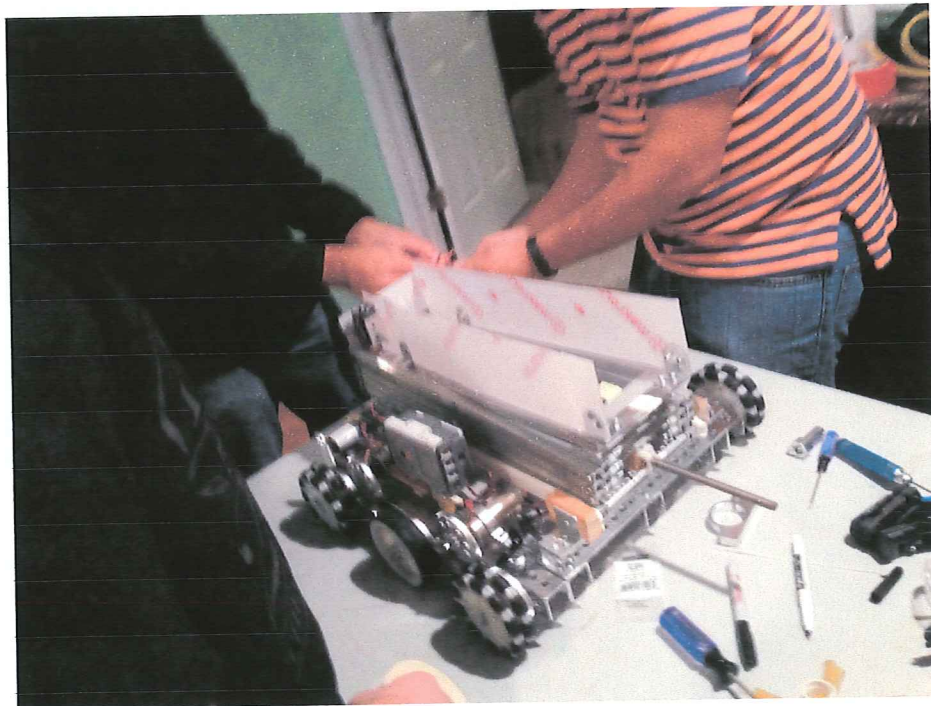
Build chute for ball placement

Task	Reflections
cut plastic for a box to go in between Swiss <del>man</del> lift	not hard just time consuming,
drill holes for screws, and then	difficult because some screws just <del>didn't</del> did not work because the holes were sometimes off center,

Recorded by:

Alex Moore

## Making Ball Chute





# FTC #6134 Black Frogs

Session # 10

Attendees: Alex

Location: Anna's House

Date: Oct 12

## Plan for the day

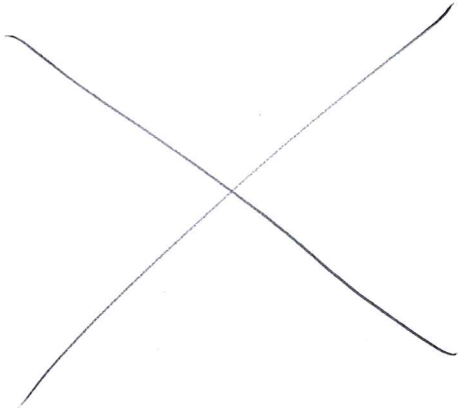
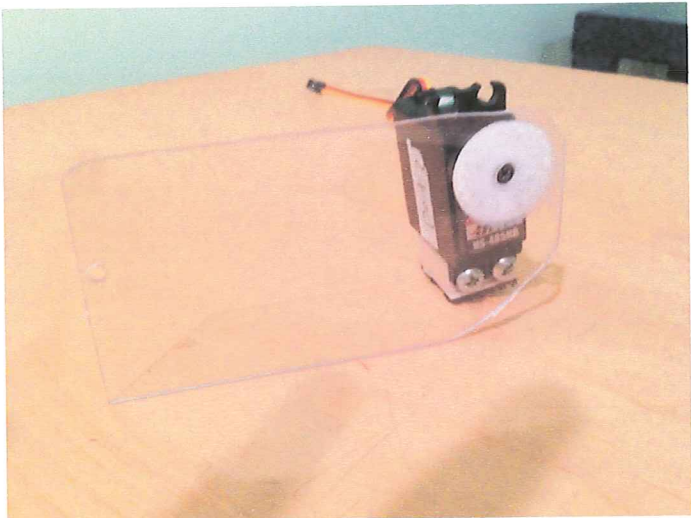
Attach a servo and a door to chute

Task	Reflections
attach servo holster to <del>door</del> chute end	annoying because of the same thing that happened yesterday when the holes <del>were</del> were sometimes off-center
create loop <del>pin</del> to attach to servo	difficult because screws kept blocking other screws and plastic

Recorded by:

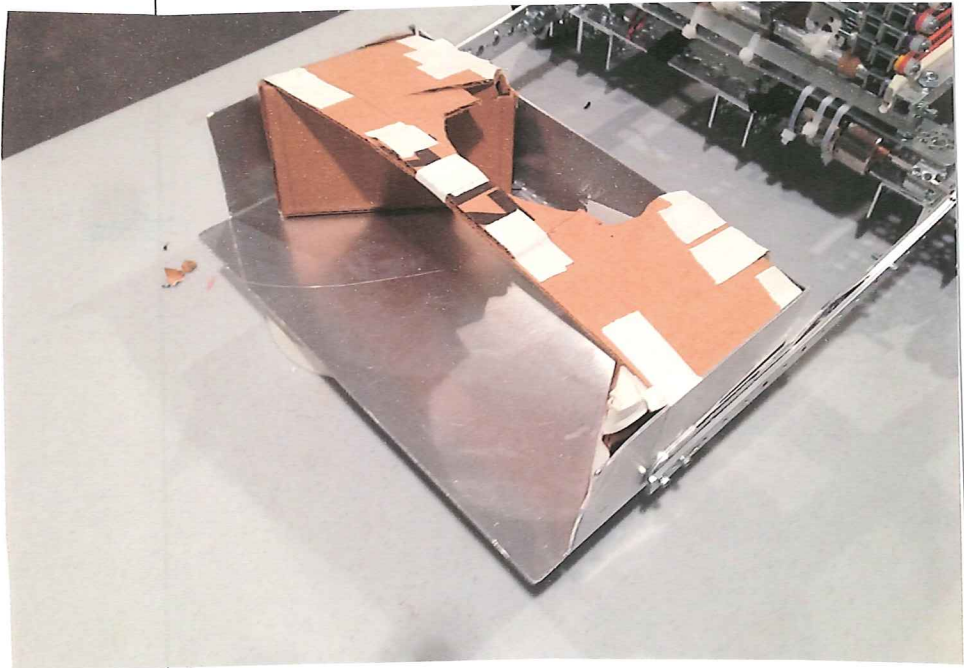
Alex Moore

Adding door and servo to ball chute.



Session # 10

Date: Oct. 12

Task	Reflections
<p>Find a new way to pick up the balls</p>	<p>- We thought about an easier, less complicated way to pick up the balls. We thought of <del>the</del> a shovel idea that can scoop up the balls and dump them into the shoot. We decided this idea because <del>when</del> when we tested the balls releasing and they all went to the sides, we realized this may not happen every time but we could push the balls against the wall. So we decided to make a "scooper" mechanism. This made it possible to push the balls <del>to</del> to the wall then lift the scooper mechanism to pick up balls.</p>
	

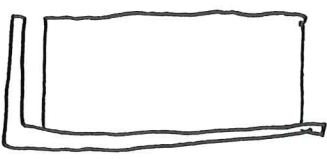
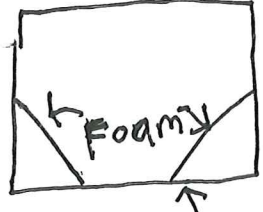
Recorded by:

Sydney Grassmyer, Arnav Talakder



Session # 10

Date: 10.12.14

Task	Reflections
<p>Building Scooper</p>	<p><del>Wn</del> <del>Eliza</del> Since last meeting we <del>have</del> proved that the Scooper mechanism concept would work we decided to follow through and build it. First we used sheet metal as the base. We then <del>we</del> bent the metal to make the walls of the scooper. To funnel the balls we used styrophone and cut it to meet our needs.</p> <p>Bucket side view</p>  <p>Top view</p> 

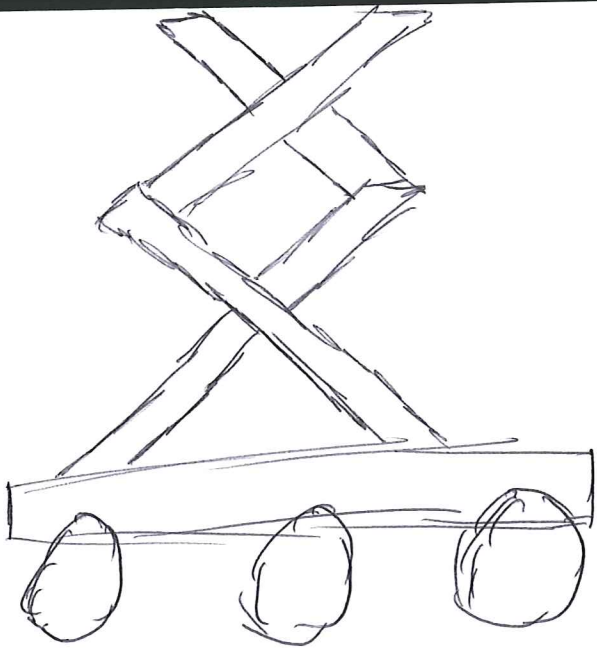
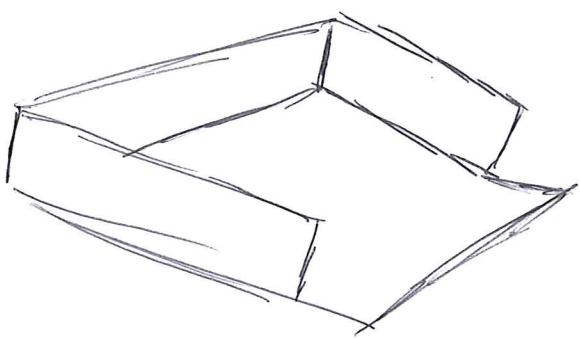
Recorded by:

Saketh, Arnav, Anne

# FTC #6134 Black Frogs

Session # 13

Date: 10-19-14

Task	Reflections
<p>Scissor Mechanism Design.</p>	
<p>Pick-up Mechanism.</p>	

Recorded by:

Arun Kammanadiminti

# FTC #6134 Black Frogs

Session # 13

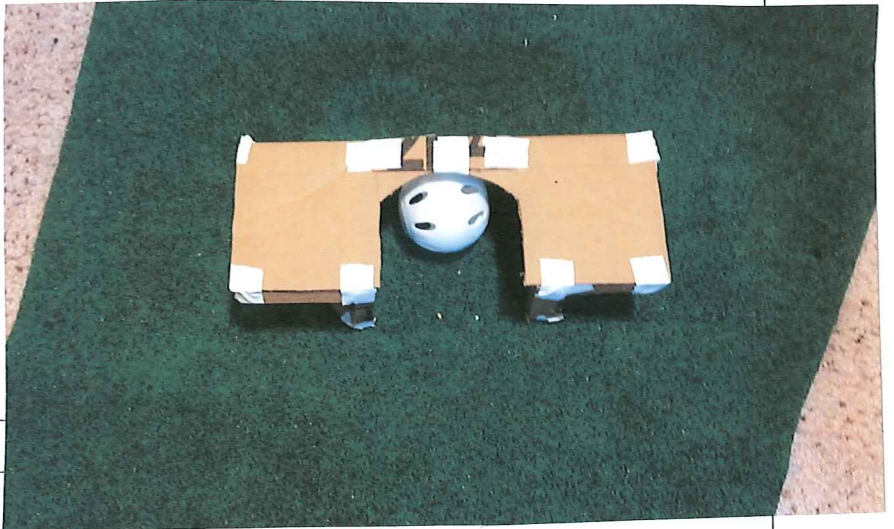
Attendees: Everyone

Location: Arnav's house

Date: 10-19-14

## Plan for the day

Improve the pickup mechanism

Task	Reflections
Building Cardboard Sides	On the pickup mechanism with the team, the balls fell out all over the place, so we built the foam funnel walls out of cardboard, and then added a roof to hold the balls in, and so that they can only exit from the center.
	

Recorded by:

Vinay



FTC #6134 Black Frogs

Session # 13

Attendees: Sydney, Saketh, Arnav

Location: Arnav's House

Date: 10-19-14

Plan for the day

Add another layer on to the scissor lift mechanism because it is too short,

Task	Reflections
Getting the necessary supplies	We had to look for 4 hollow square rods.
Making the layer of scissors	First, we cut a long plate into 2 smaller plates, using the rods we made the mechanisms scissors. We then placed the plates.

Recorded by:

Sydney Grassmyer, Arnav Talukder,  
Saketh Addanki

FTC #6134 Black Frogs

Session # 17

Attendees: Saketh

Location: Arnav's House

Date: 10/29/14

Plan for the day

Put holes in the robots 'scoop

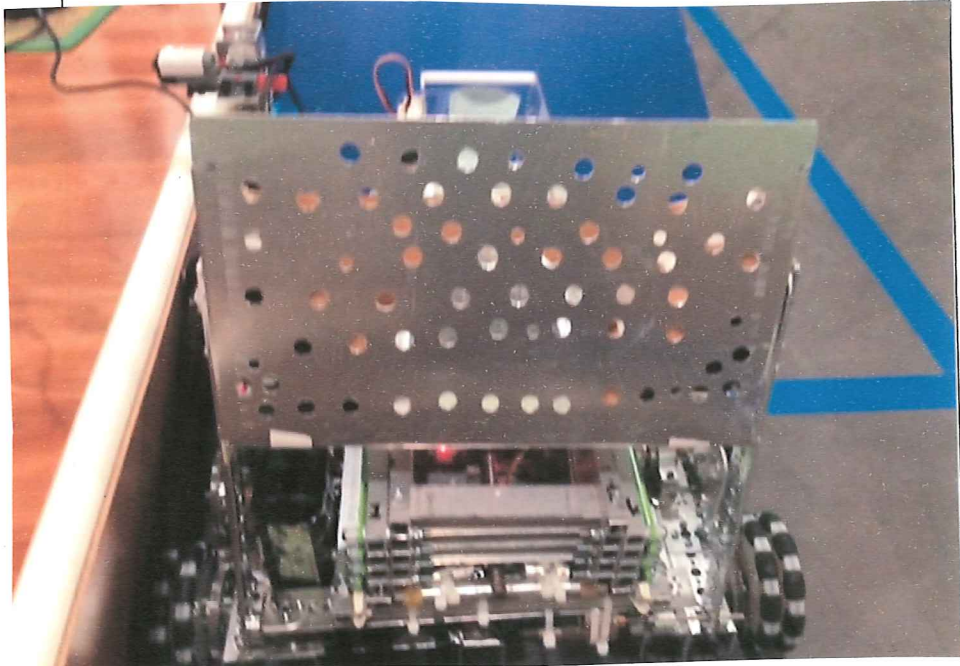
Task	Reflections
Why are we putting Holes?	To reduce weight of the bucket to ease the motor and keep the dropping mechanism from getting destroyed
Putting Holes	We strategically placed 63 holes in the bucket. These holes vary in size

Recorded by:

Saketh

Session # 17

Date: 10/29/14

Task	Reflections
	<p>from <math>\frac{1}{4}</math> in to <math>\frac{3}{8}</math> inches.</p> <p>This task reduced the weight of the bucket and helped of the preservation of the bucket.</p> 

Recorded by:

Saketh



# FTC #6134 Black Frogs

Session # 19

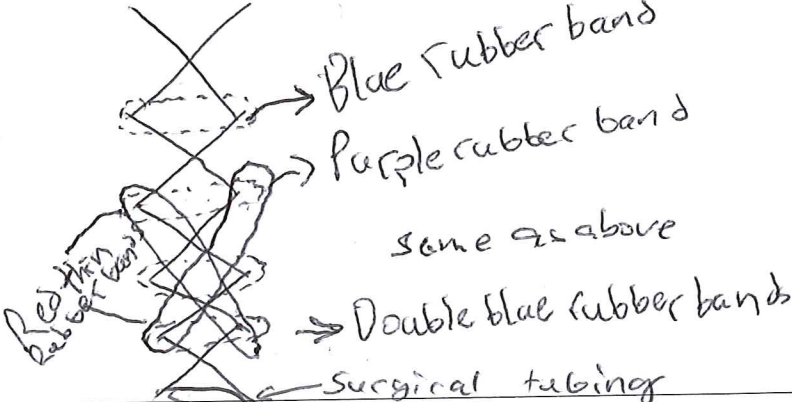
Attendees: Alex, Ankith, Arnav

Location: Arnav's house

Date: 11-1-14

## Plan for the day

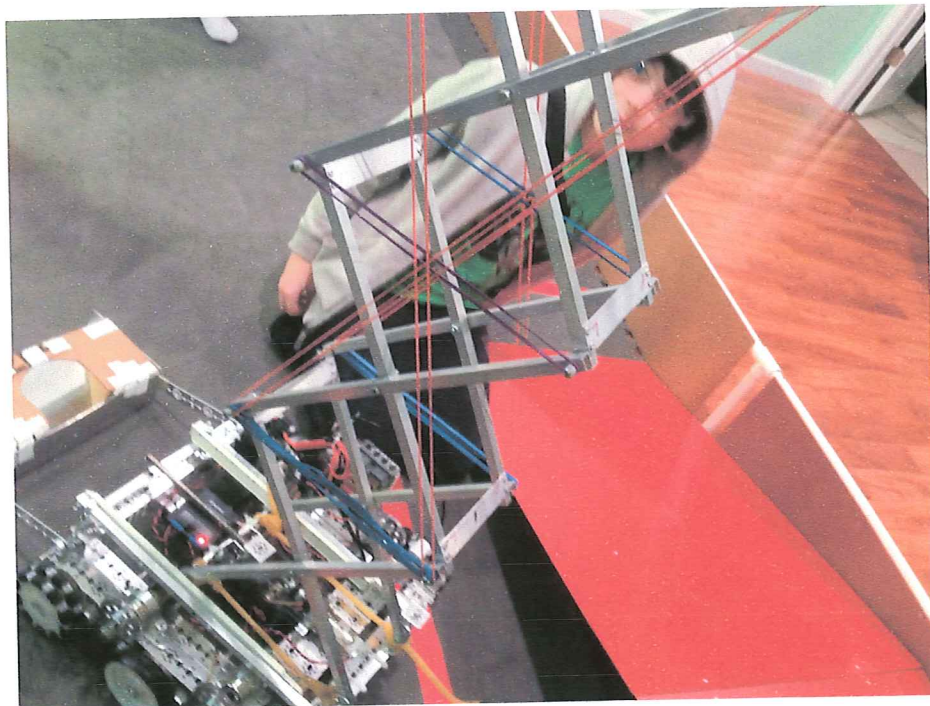
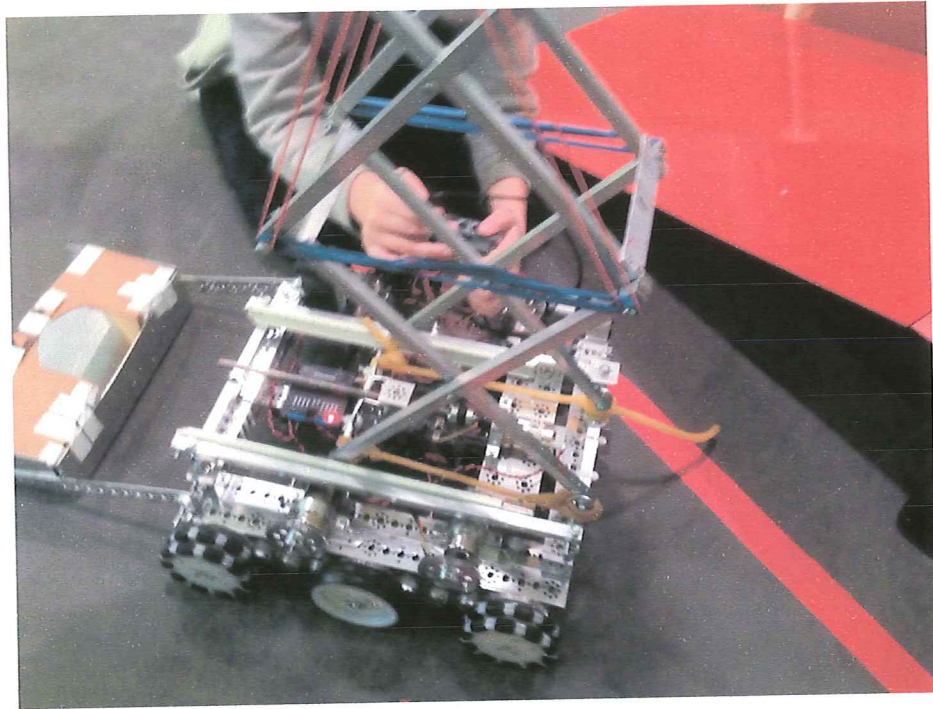
Stabilize scissor lift

Task	Reflections
place rubber bands to stabilize scissors	 <p>Blue rubber band</p> <p>Purple rubber band</p> <p>same as above</p> <p>Double blue rubber bands</p> <p>Surgical tubing</p>
	<p>The two cross rubber bands helped stabilize the scissor and all the straight bands helped increase tension. Surgical tubing at the bottom helped to assist with lifting.</p>

Recorded by:

Ankith udga

## Stabilizing Scissor Lift



# FTC #6134 Black Frogs

Session # 20

Attendees: Alex

Location: Alex's house

Date: 11.24.14

## Plan for the day

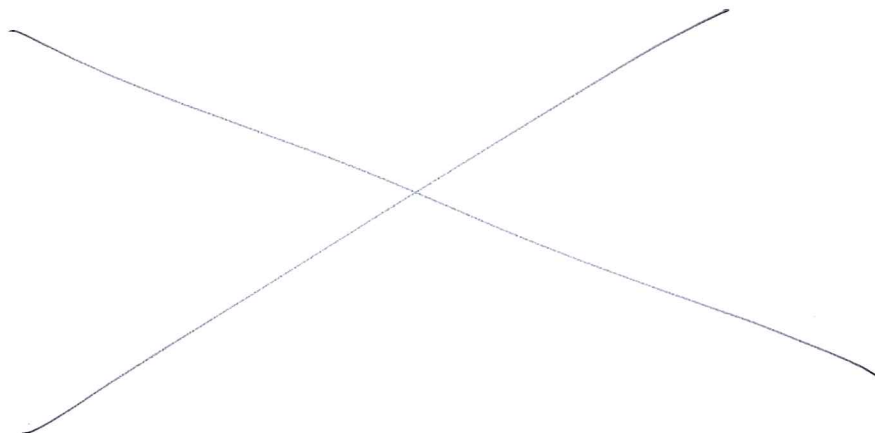
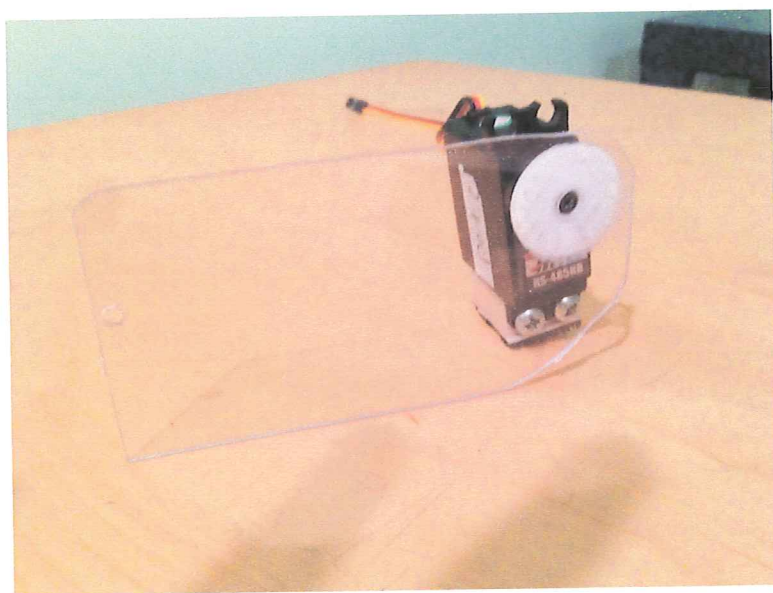
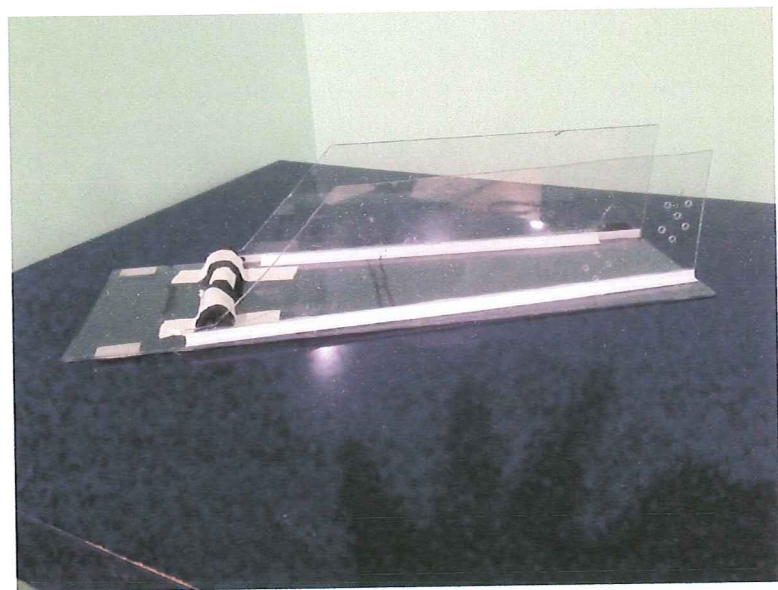
lighten the weight of the ball chute  
so the scissor lift has less weight to move.

Task	Reflections
Replace the metal brackets	We used super glue and L-brackets to lighten the ball chute. The glue and brackets made a strong fit able to withstand pressure during competition.
Replace metal parts on the servo.	Same with the chute, we needed to lighten the weight. We did this by replacing metal parts on the servo with plastic parts to lighten the weight. We used glue to put the parts on.

Recorded by:

Alex Moore





FTC #6134 Black Frogs

Session # 26

Attendees: Whole team

Location: Annav's House

Date: 11/20/14

Plan for the day

A Visit from Mr. Ellison from  
MSC Software

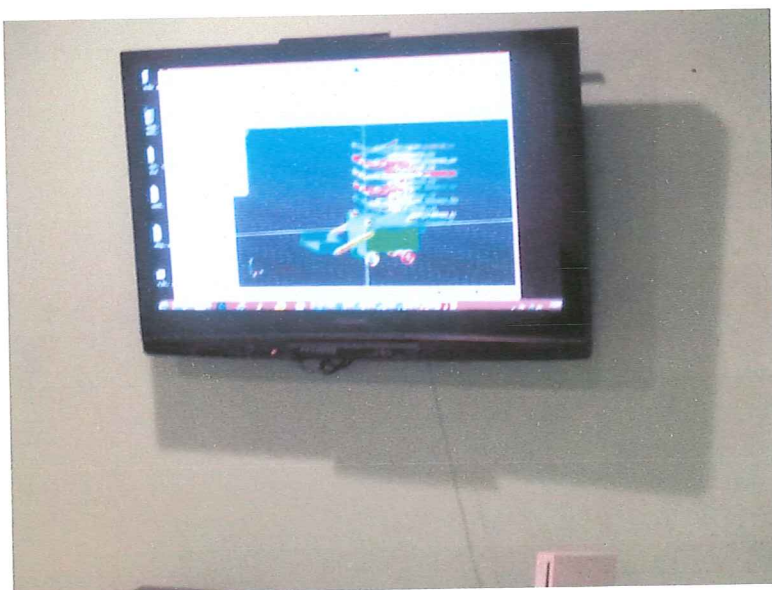
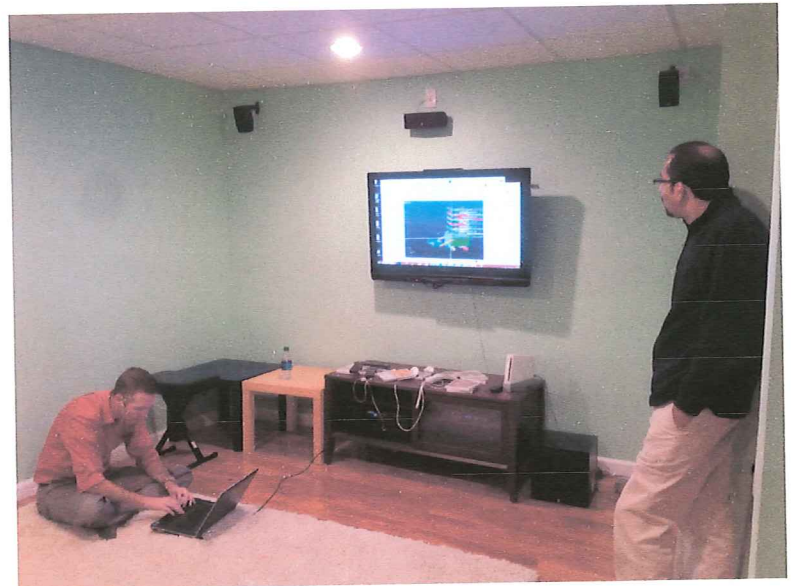
Task	Reflections
A.D.A.M.S software presentation	Showed us how to apply design measurements in to software such as stress and <del>torque</del> torque. Also showed implementing gravity and other factors into design software
Pack up field and prepare for Frog Force Frenzy	Packed up field and put into our car.

Recorded by: Leon Chen, ~~Mark~~ Nishtha Kakkar

Jarketh Day



How to use  
ADAMS to  
test components.





Session # 33

Location: Arnav House

Attendees: Anne, Arnav, Vinay

Date: 12-11-14

Plan for the day

- Make kickstand mechanism

Task	Reflections
Make Kickstand mechanism	We decided to make a mechanism to kick down the kickstand in autonomous. We wanted a mechanism to be able to kick down the kickstand with less precision than before. We decided to make a mechanism
	that used a servo to make a bar stick out and hit the kickstand. The bar was a piece of metal with a right angle. The stick would rotate outwards and then when the right angle caught against the kickstand it would pull the kickstand out.

Recorded by:

Arnav Talukder

FTC #6134 Black Frogs

Session # 34

Attendees: Anne, Arnav, Vinay

Location: Arnav House

Date: 12-13-14

Plan for the day

- Fix Kickstand
- Add hooks to robot

Task	Reflections
Fix Kickstand	We realized that our kickstand <del>mechanism</del> mechanism was too weak and would snap off the servo when hitting the kickstand. To fix this we decided to brace it better so that the servo would have less force put on it <del>when</del> it hit the kickstand.
Add hooks to robot	We added our new rolling gear puller mechanism to our robot. Since the holes didn't line up we drilled new ones. We then attached the two mechanisms to the bottom of the robot.

Recorded by:

Arnav Talukder

FTC #6134 Black Frogs

Session # 35

Attendees: Arnav and Anne.

Location: Arnav's House

Date: 12-14-14

Plan for the day

- to finish attaching the kickstand and add crossbraces.

Task	Reflections
- add cross brace.	- we added <del>two</del> a diagonal cross brace to secure the two towers. we wanted to secure it because it held our NXT, Schmeuntha, and our kickstand arm.
- add kick-stand mechanism back on.	- we changed the position of the tower many times so it would fit our needs. we also added a hub on our servo to make sure the kick stand mechanism doesn't wobble.

Recorded by:

Anne and Arnav.



Session # 35

Attendees: Saketh, Sydney, Alex

Location: Arnau's House

Date: December 14, 2014

Plan for the day

To ~~start and finish~~ start and finish  
rack & pinion and build a  
new ~~scissor lift~~ scissor lift.

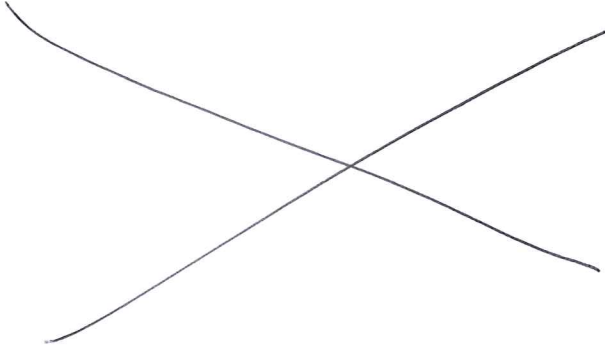
Task	Reflections
Build motor mount so we can move along the pinion	The motor mount was a simple <del>easy</del> easy design it was a motor on a c-channel. The motor then drove a gear which fit on the rack then completing the rack & pinion. We then made 2 copies of these so we can drive the scissor lift with 2 motors.
Build a new smaller scissor	<del>Building</del> Building a new scissor lift was challenging but fun! We used the design from the old scissor lift but changed it porportionly.

Recorded by:

Saketh Addanki, Sydney Grassmyer

Session # 35

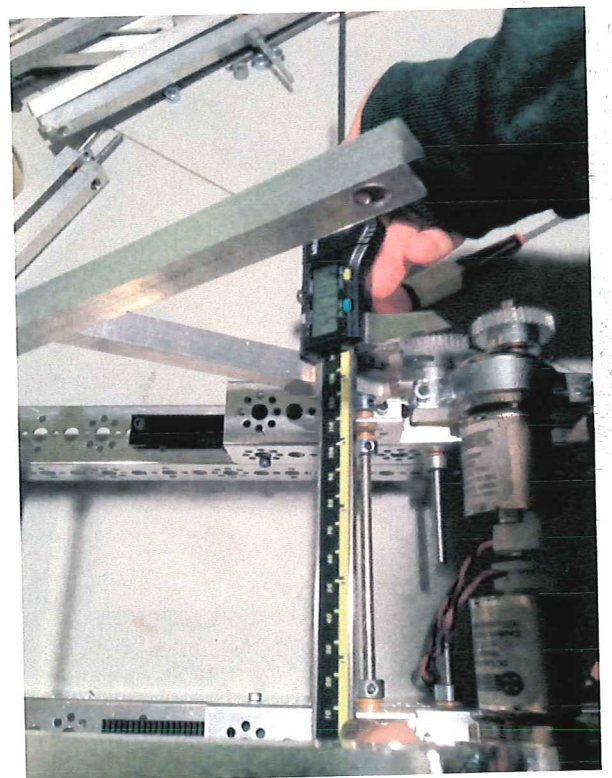
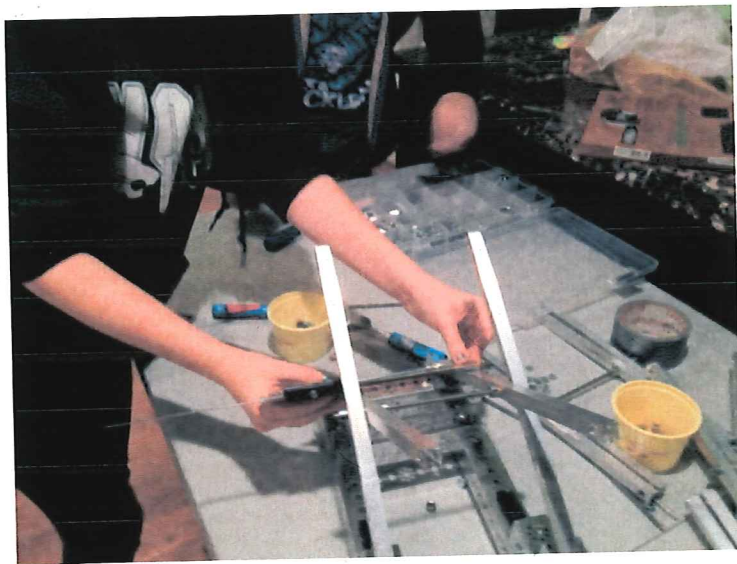
Date: December 14, 2014

Task	Reflections
	We also added new components such as rods & bushings, and collars on every intersection.
Challenges	<p>Some challenges we faced were finding enough materials to make the scissor lift. We also had the problem of making the links perfect.</p> 

Recorded by:

Sareth Addanki, Sydney Grassmeyer ♡







FTC #6134 Black Frogs

Session # 36

Attendees: Team

Location: Arnan's Team

Date: December 16, 2014

Plan for the day

To finish and  
test rack and pinion

Task	Reflections
Replace the longer rods	Some of the rods we had put on were longer then needed, some of them were also interfering with motors. The new ones were not interfering with the motors.
Test rack and pinion	After we finished the rack and pinion, we attached it to the robot so we could practice and ensure it would go up straight and quickly. While testing, we found a <b>noise factor</b> , <del>the</del> since we have 2 motors, one was pulling <del>the</del> the other and making it fall to one side which could break our scissor lift.

Recorded by:

Sydney Grassmyer

FTC #6134 Black Frogs

Session # 39

Attendees: Sydney, Anne, Saketh

Location: Arnau's House

Date: December 20, 2014

Plan for the day

Finish refining scissor lift  
and Test scissor lift

Task	Reflections
Finish scissor lift	* We put whitespacers between the the pieces of the scissor lift to reduce friction and make it smooth.
	* We also put a convolute to hold our wires for the servo. This made sure that the wires do not get jammed and don't break.

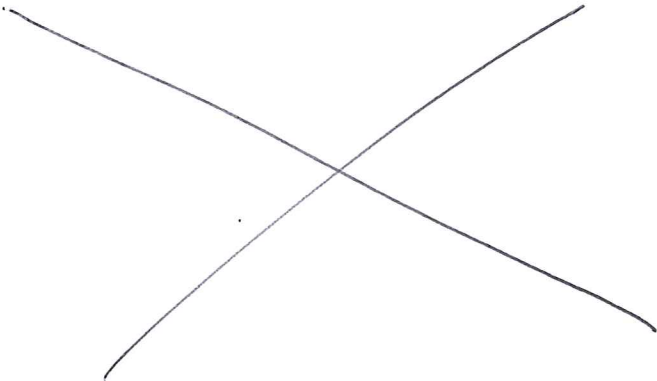
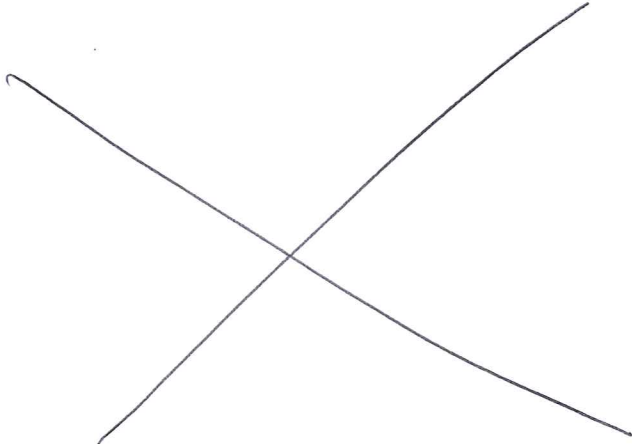
Recorded by:

~~Sydney~~ Sydney Grassmyer, Anne George, Saketh

FTC #6134 Black Frogs

Session # 39

Date: December 29, 2014

Task	Reflections
- Test the Scissor lift.	When we lifted the scissor lift we noticed that it tilted to the left. It only did that when it was above the center goal. To try and fix this we add counterweights, and we added rubberbands to make it more stable
	
	

Recorded by:

Sydney Grassmyer, Anne George, Sanketh Addanki.



## FTC #6134 Black Frogs

Session # 41

Attendees: Alex

Location: Alex's basement

Date: 12-31-14

### Plan for the day

Fix the rack and ~~pinion~~ pinion scissor lift

Task	Reflections
Grease moving parts	By greasing the bushings, the scissor lift will be able to move more freely. We <del>greased</del> greased the lift with white lithium grease and applied the grease using a-tips
Stabilizing tracks	using <del>thick</del> aluminium bars we were able to connect both of pinion racks so the motors can move in unison. We also used aluminium L-bars to connect the frame together so that it is square

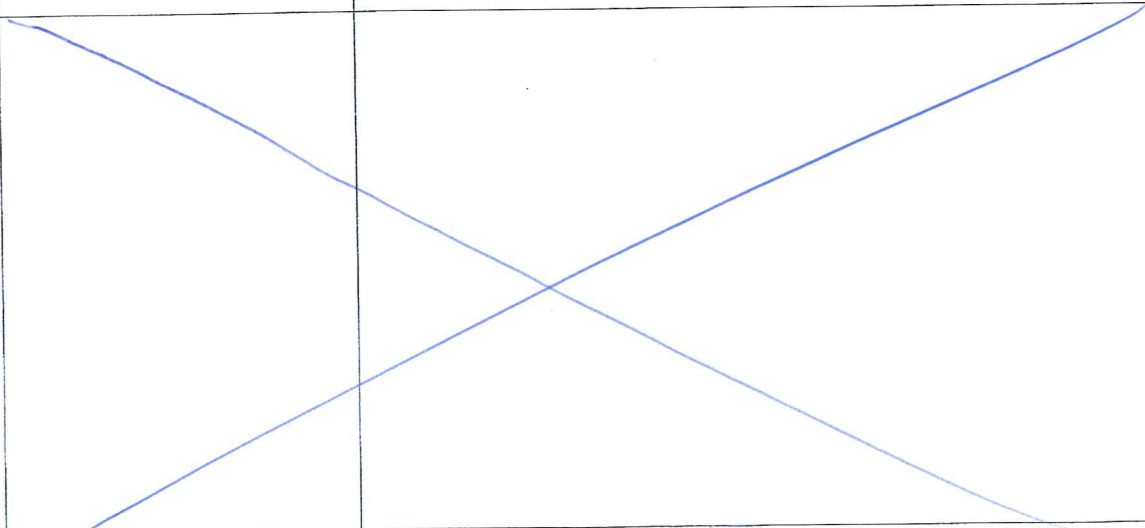
Recorded by:

Alex

# FTC #6134 Black Frogs

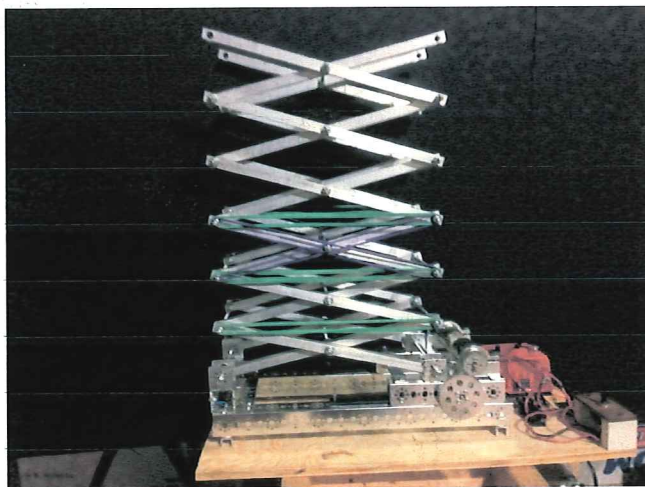
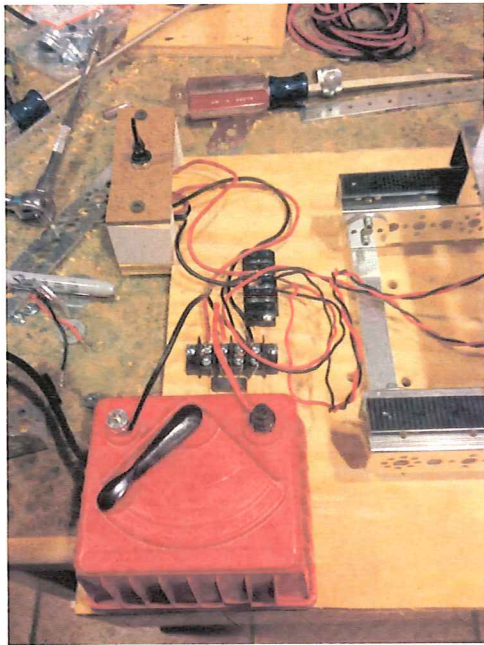
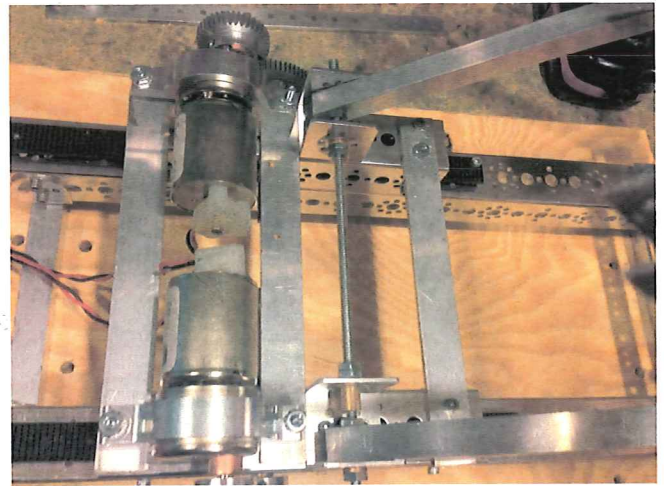
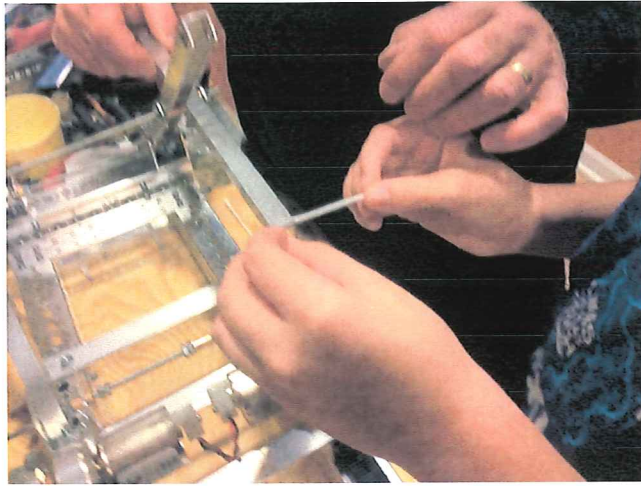
Session # 41

Date: 12-31-14

Task	Reflections
Hooking scissor lift up to a power source	Using a model train transformer we were able to power the rack and pinion motors for testing. It allowed freedom, because we could test the scissor lift without the robot.
replace the smooth <del>rods</del> rods and axle collers	We replaced the smooth rods and axle collers with threaded rods and nuts. We did this because it allowed us a tighter grip on the rods.
	

Recorded by:

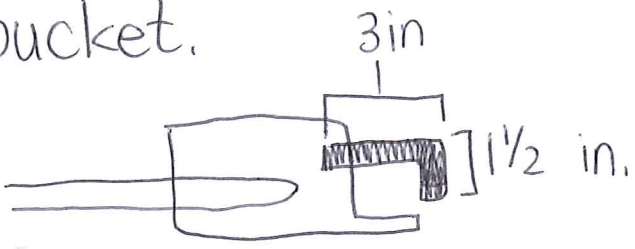
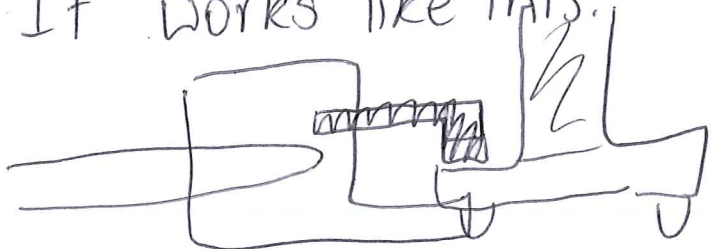
Alex





Session # 44

Date: 1-15-15

Task	Reflections
New Hook Mechanism	<p>What it is   The new hook mechanism is a <del>sym</del> simple <del>&amp;</del> design with no motor element. It <del>is</del> is shaped like a hatchet and is attached to the bucket.</p> 
	<p>It works like this.</p> 

Recorded by:

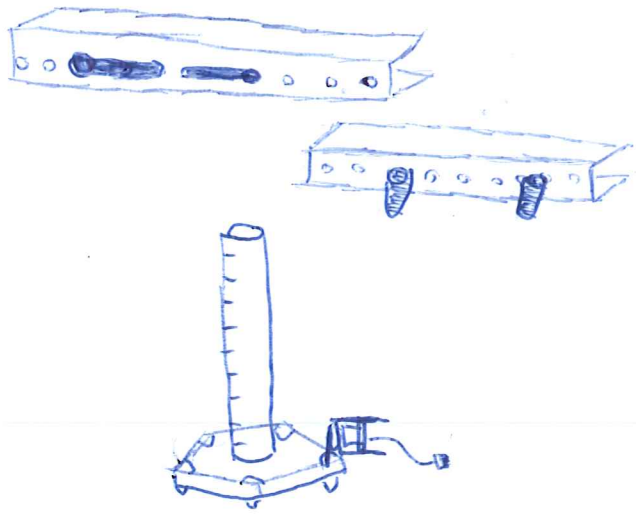
Saket h Addanki

# Hooks 2

FTC #6134 Black Frogs

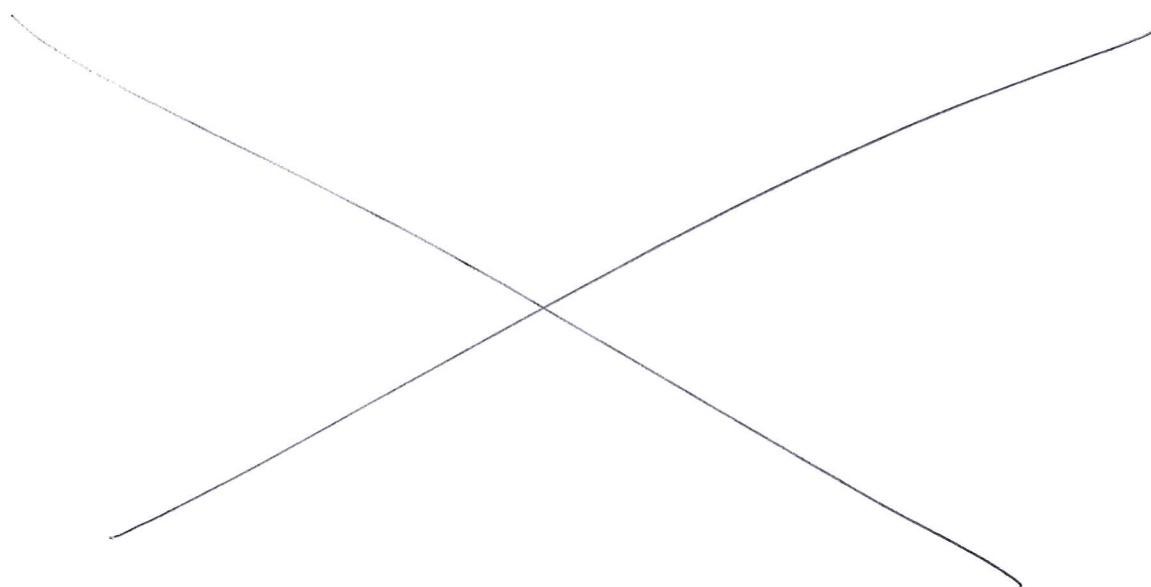
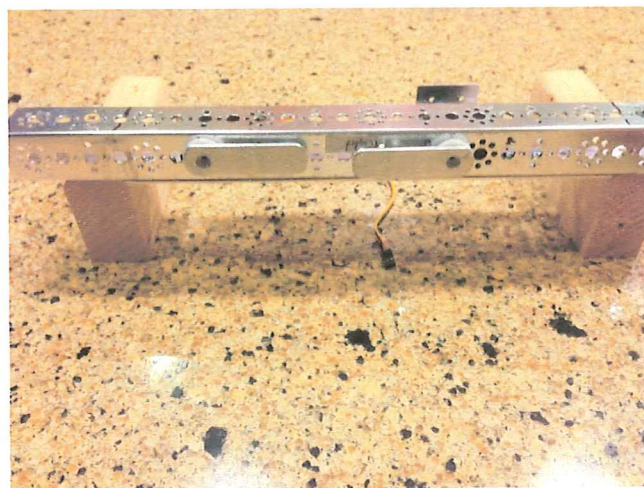
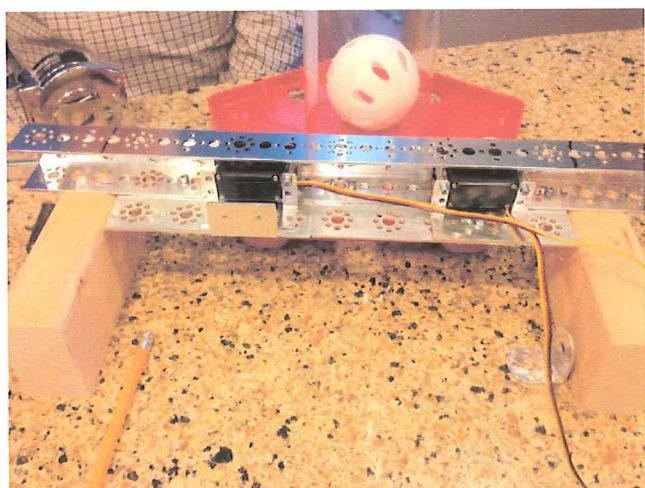
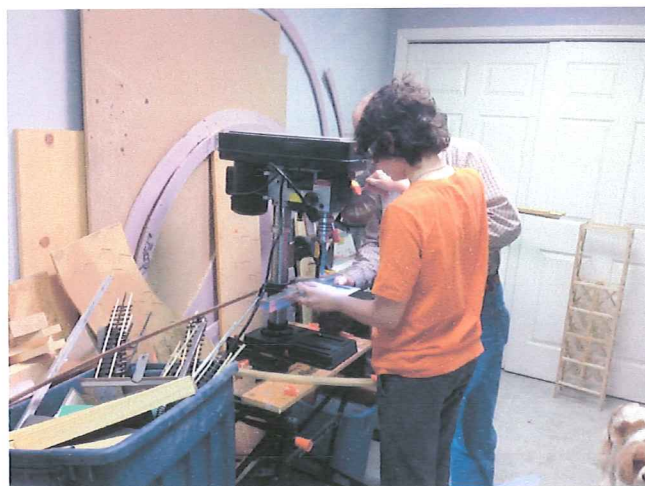
Session # 44

Date: 1-15-15

Task	Reflections
C-channel modification	Since we have limited space outside of the robots chassis, we will need to put the servos inside a C-channel. Using a drill press holes in the C-channel were widened to fit the servos
fabricate hooks	<p>Now the the servo ends come out of the robot we need hooks. Normal tech-trix peices could be to weak and break. Using scrap aluminium we custom fabricated hooks to use for the robot.</p>  <p>The sketches show two views of a C-channel with holes. The top view shows a long channel with several holes, some of which are widened. The bottom view shows a similar channel with two holes widened into larger rectangular openings. Below these is a sketch of a custom hook assembly, which consists of a vertical rod with a base and a hook-like structure at the top.</p>

Recorded by:

Alex ~~Moore~~ Moore





# FTC #6134 Black Frogs

Session # 45

Attendees: Everybody

Location: Arnar's house

Date: 1/18/15

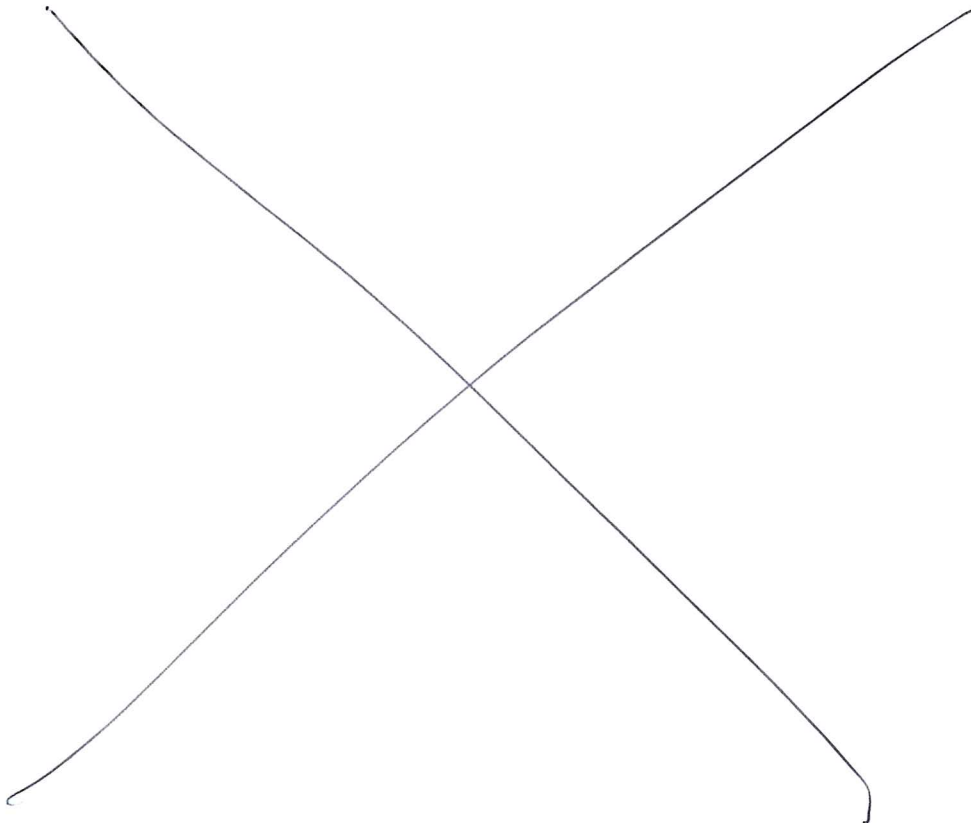
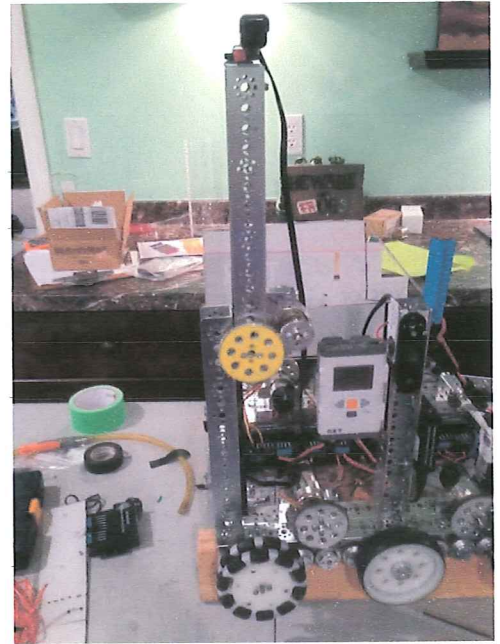
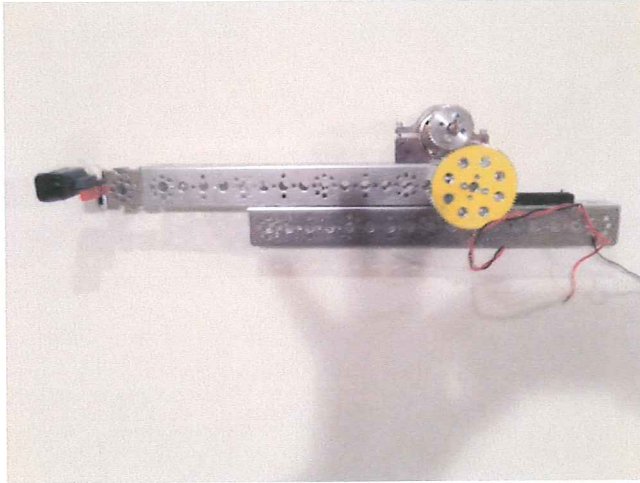
## Plan for the day

Build rack and pinion for IR sensor.

Task	Reflections
Assemble Rack and Pinion.	In autonomous, our IR sensor was inaccurate because the IR sensor and the IR beacon were at different heights. We decided to use a <del>rack</del> Rack and Pinion to lift the IR sensor. The Rack and Pinion is built so that the <del>rack</del> side with the pinion
Use for the lift.	<u>Lifts up.</u> The lift made the IR sensor more accurate, and allowed us to score in the center goal in autonomous.



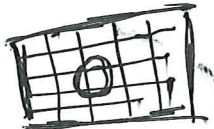
Recorded by:

Vinay Panyam



Session # 49

Date: 2/5/15

Task	Reflections
<p>Prototyping a new bucket design</p>	<p>- We had 3 ideas for a new bucket design. The first design is the bucket with an axis on it. The axis will be powered by a wheel on the floor. On the axis there would be a scooper that will turn with the wheel. Here is a drawing of it.</p>  <p>The second idea we had was basically the first idea, but instead of the scooper we used zip-ties.</p>  <p>The last idea we had was a frame with rubberbands across it. So when you pushed it down the balls would push through it.</p> 

Recorded by:


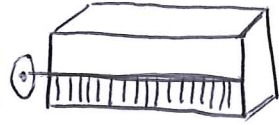
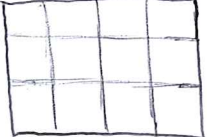
Anne George ✓



FTC #6134 Black Frogs

Session # 401

Date: 2/8<sup>5</sup>/15

Task	Reflections	
<p>Bucket with axle</p> 	<p><del>PRO's</del> PRO's</p> <ul style="list-style-type: none"> <li>• Balls would be "scooped" in</li> <li>• wheel can easily turn it</li> <li>• continuous turn</li> <li>• uses same bucket</li> </ul>	<p>Con's</p> <ul style="list-style-type: none"> <li>• only uses <math>\frac{1}{3}</math> of length of <del>the</del> bucket</li> <li>• wheel could get run over + destroyed</li> <li>• can't get balls from edges</li> </ul>
<p>Bucket with zipties</p> 	<ul style="list-style-type: none"> <li>• Balls will be pushed in</li> <li>• wheel goes contin.</li> <li>• zipties keep them in</li> <li>• uses <del>the</del> same bucket</li> <li>• uses whole length</li> </ul>	<ul style="list-style-type: none"> <li>• zipties may not be strong enough</li> <li>• wheel could get run over</li> <li>• can't get balls from walls</li> </ul>
<p>Frame with rubber bands</p> 	<ul style="list-style-type: none"> <li>• balls will not fall back out</li> <li>• balls will easily go through the rubber bands</li> <li>• can get many balls at once</li> <li>• rubber bands are easily replaceable between rubber</li> <li>• can get big &amp; small balls</li> </ul>	<ul style="list-style-type: none"> <li>• can't get balls from walls</li> <li>• <del>the</del> rubber bands could break during match</li> <li>• rubber bands can move</li> <li>• balls get stuck between bands.</li> </ul>

Recorded by:

Sydney Grassmeyer & Anne George ♥

FTC #6134 Black Frogs

Session # 52

Attendees: Sydney, Anne, Nishtha

Location: Arnow's House

Date: 2/18/15

Plan for the day

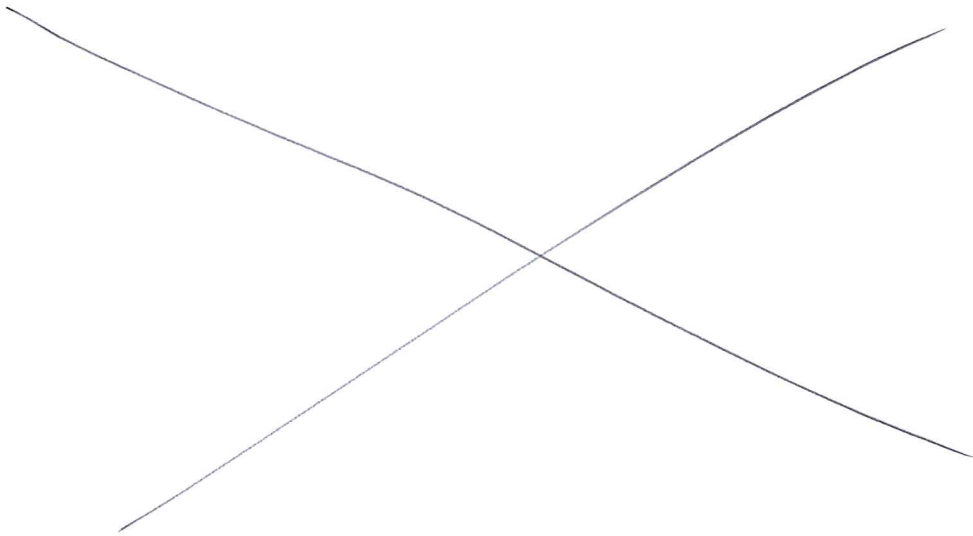
Prototype our best new mechanism

Task	Reflections
choose our best idea.	We looked at our pros + cons chart and we decided that our tennis ball hopper / frame with rubber bands <del>was</del> was the best. <del>Our</del> Our tennis ball hopper had cons that could easily be fixed and the best pros so we decided to prototype it.
Prototype	We used 41 pieces of aluminum and connected them temporarily by duct taping them together and adding rubber bands. We measured out the appropriate distance between each rubber band and put notches in there so they wouldn't move.

Recorded by:

Sydney Grassmeyer







FTC #6134 Black Frogs

Session # 58

Attendees: Everyone

Location: Arnav's house

Date: 3-5-15

Plan for the day

Protect the gears from balls getting stuck in them.

Task	Reflections
What was the problem?	There were balls that got stuck in the gears and pulled them out, and they also were preventing the gears from turning forward, which made driving much more difficult
How did we solve the problem?	We put a small covering over the exposed areas of the gears, so now any balls that go into those areas just roll off the chassis.

Recorded by:

Vinay Panyam

Session # 60

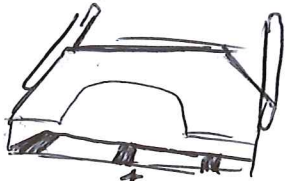
Attendees: whole team

Location: Arnav's House

Date: March 8

Plan for the day

- make a ledge so the balls can get ~~into~~ into the bucket easier.

Task	Reflections
- make a ledge.	<p>- we took a piece of wood and we shaved it down so it would be thinner. We made the center parts of the two pieces thinner than the edges. That way we can limit the amount of balls that come in. We used a filer to make it thinner, and used tape to connect the two pieces on the bucket.</p>
	 <p>wood pieces.</p> <p>This piece allows us to pick up many balls. Including the ones against the wall! This will help greatly and solves the problems of getting balls against the wall.</p>

Recorded by:

Anne George

# Section Eg

## Electrical System



# FTC #6134 Black Frogs

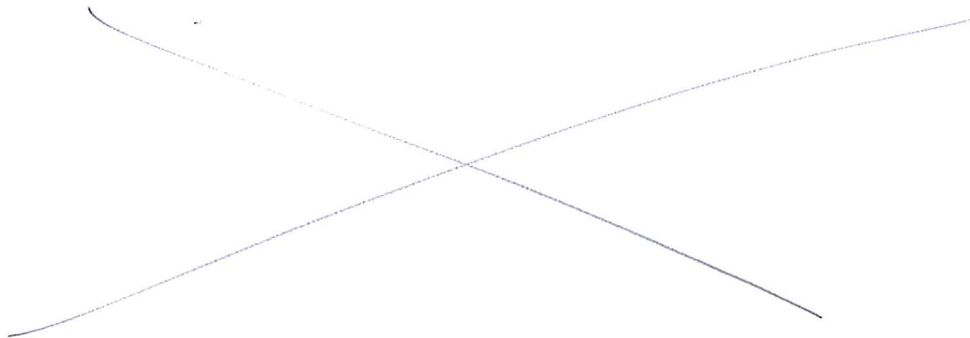
Session # 21

Attendees: Everyone

Location: Annar's house

Date: 11-7-14

## Plan for the day



Task	Reflections
Develop Electrical Schematic for our robot	

Recorded by:

~~Arnav Talukder~~ Arnav Talukder

FTC #6134 Black Frogs

Session # 48

Attendees: Black Frogs

Location: Arnav's House

Date: Jan. 25, 2015

Plan for the day

Electrical. We put a groundstrip for our controllers so sparks won't damage our robot.

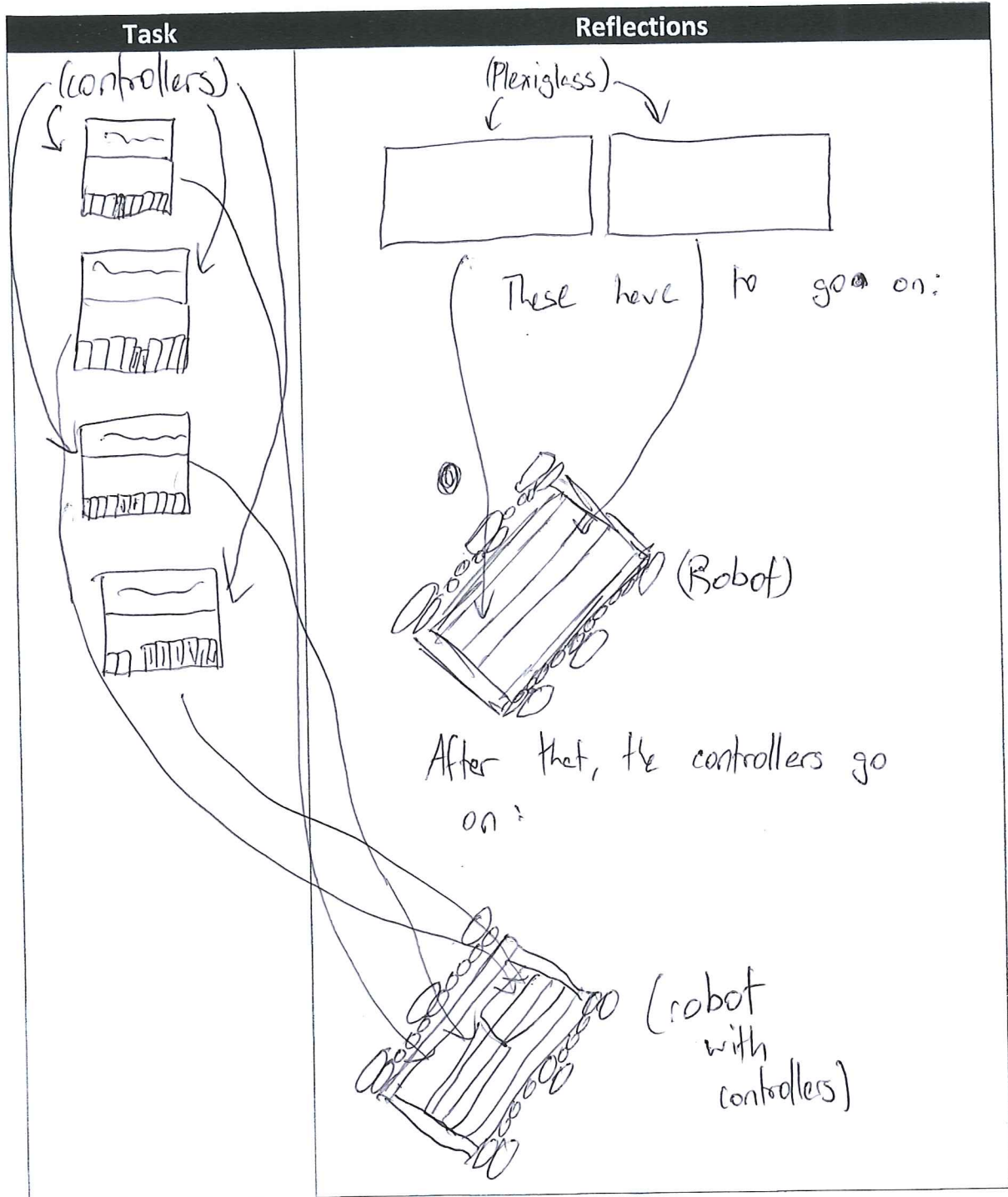
Task	Reflections
<del>we</del> cut the parts to make the groundstrips.	With plexiglass, we made 2 rectangles to put 4 controllers on it. After we cut out the pieces, and covered it in electrical tape
We put the four controllers on and put them on the robot.	There were some sizing and packing issues so we overlapped the controllers a bit. In the end it fit and we wired everything up.

Recorded by:

Arav Hammanadiminti

Session # 48

Date: Jan. 25, 2015



Recorded by:

Aron Hammond



# Section Eh

## CAD

# FTC #6134 Black Frogs

Session # 12

Attendees: Everyone

Location: Aaron's house

Date: 10-18-14

## Plan for the day

Work on fixing our arm mechanism  
on CAD. (scissor)  
Make our picking up mechanism on CAD.

Task	Reflections
Scissor mechanism: Finishing it up.	We had managed to finish some of the scissor mechanism before but didn't finish it. I had to copy a few more parts. I did that and <del>con</del> constrained the parts so that they <del>can</del> could only move in a certain direction.
Make our picking up mechanism	Starting from a 2-D sketch, I had to make a rectangle and extrude 4 <del>diff</del> different parts and constrain them to make a bucket.

Recorded by:

Aaron Kommandiant

# FTC #6134 Black Frogs

Session # 13

Attendees: Anne and Nishtha

Location: Arnav's house

Date: 10/19/14

## Plan for the day

-CAD the details of the bucket arm

Task	Reflections
change lengths of arm	counted the amount of holes needed for model. Original model had 9 holes and we made it into 17 holes.
first hole	measured center point of 1st hole to center point of 2nd large hole. Measured edge of arm to 1st hole and put a point at the other end of the arm. To find the diameter we clicked inspect and found the diameter. We clicked line and from the point we went up 180° and then down 180°. We then drilled the hole on the arm.

Recorded by:

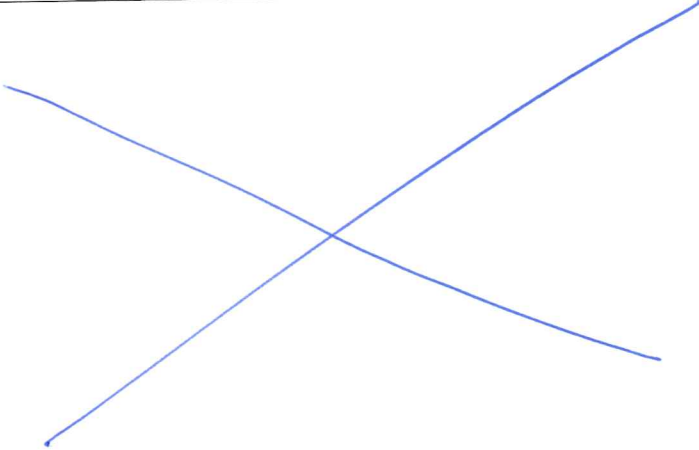
Anne and Nishtha

Eh-



Session # 13

Date: 10/19/14

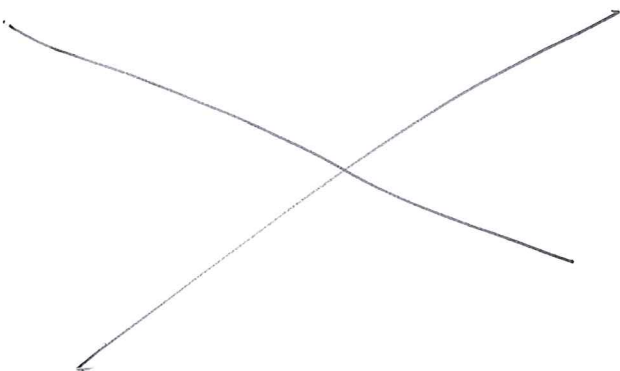
Task	Reflections
Create a hole (circular) pattern	We used the same method to find the small hole as we did to find the big hole. The diameter of the small hole was 3.7 mm. We found the distance between two small holes, and it was 16.125 mm. We inserted those two factors and made an 8-hole circular pattern.
Create a rectangular pattern of a circular pattern	First, we selected to do a rectangular pattern. We selected the existing circular pattern for the rectangular pattern. We told the program to make more big circles. Instead of 8 holes we made it four. The only thing we had to find was the distance between each hole.
	

Recorded by:

Anne and Nishtha

Session # 16

Date: 10/26/14

Task	Reflections
We tried to finish up the robot on CAD.	We tried to finish up the CAD but our computer doesn't have much virtual memory and the CAD program kept crashing.
We managed to get some of the bucket down.	We got some pieces and all that constraints up. We got something done but the CAD kept crashing.
	

Recorded by:

Arun Kammanadiminti

Eh.

Session # 40

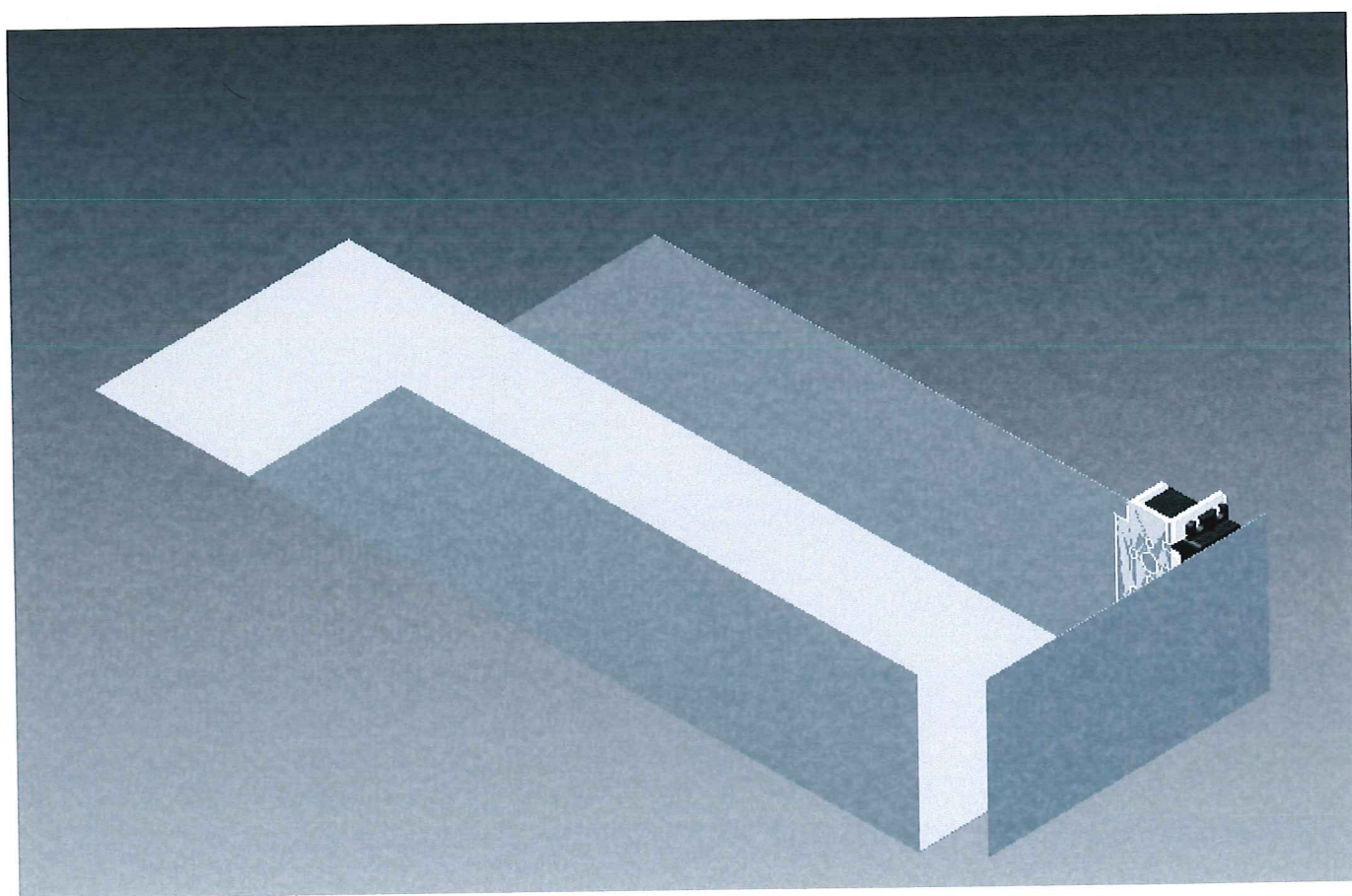
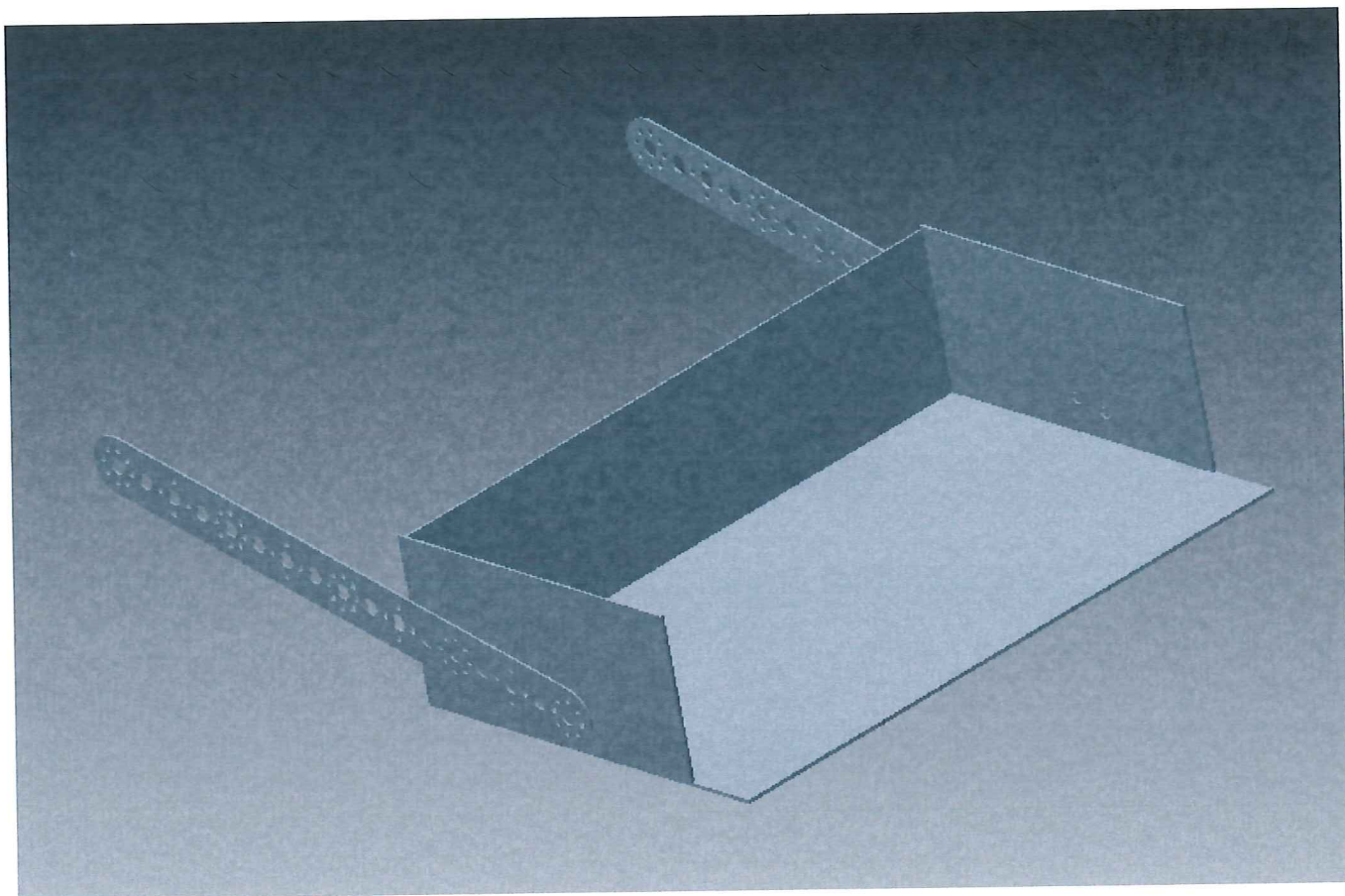
Date: 12-24-14.

Task	Reflections
<p>PLAN:</p>	<p>The people working on CAD finished the video they were making.</p>
<p><del>Start and</del> Finish the CAD video.</p>	<p>First, I constrained the components I wanted to animate in a way so that <sup>there was</sup> only one degree of freedom. I opened the environment called Inventor Studio. Going into constraints, I selected the components I wanted and made movement constraints. I also selected the time it</p>
	<p>was to the task. In this instance, the video was 1 minute. When I was rendering the video, I put 15 frames per seconds. It took 12 hours to render.</p>

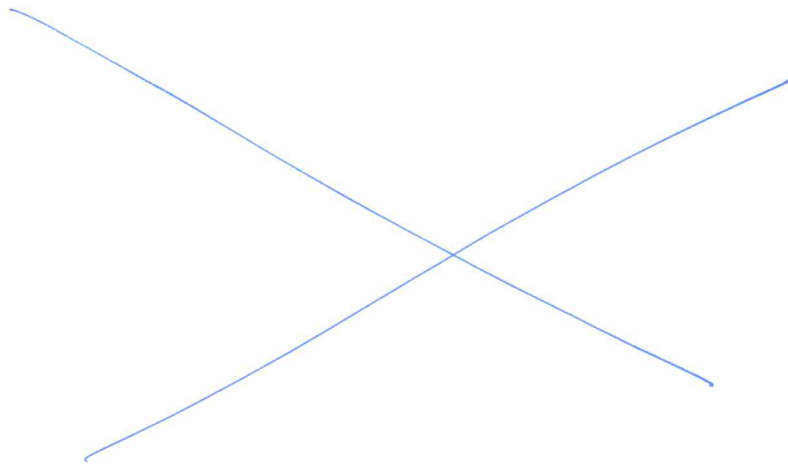
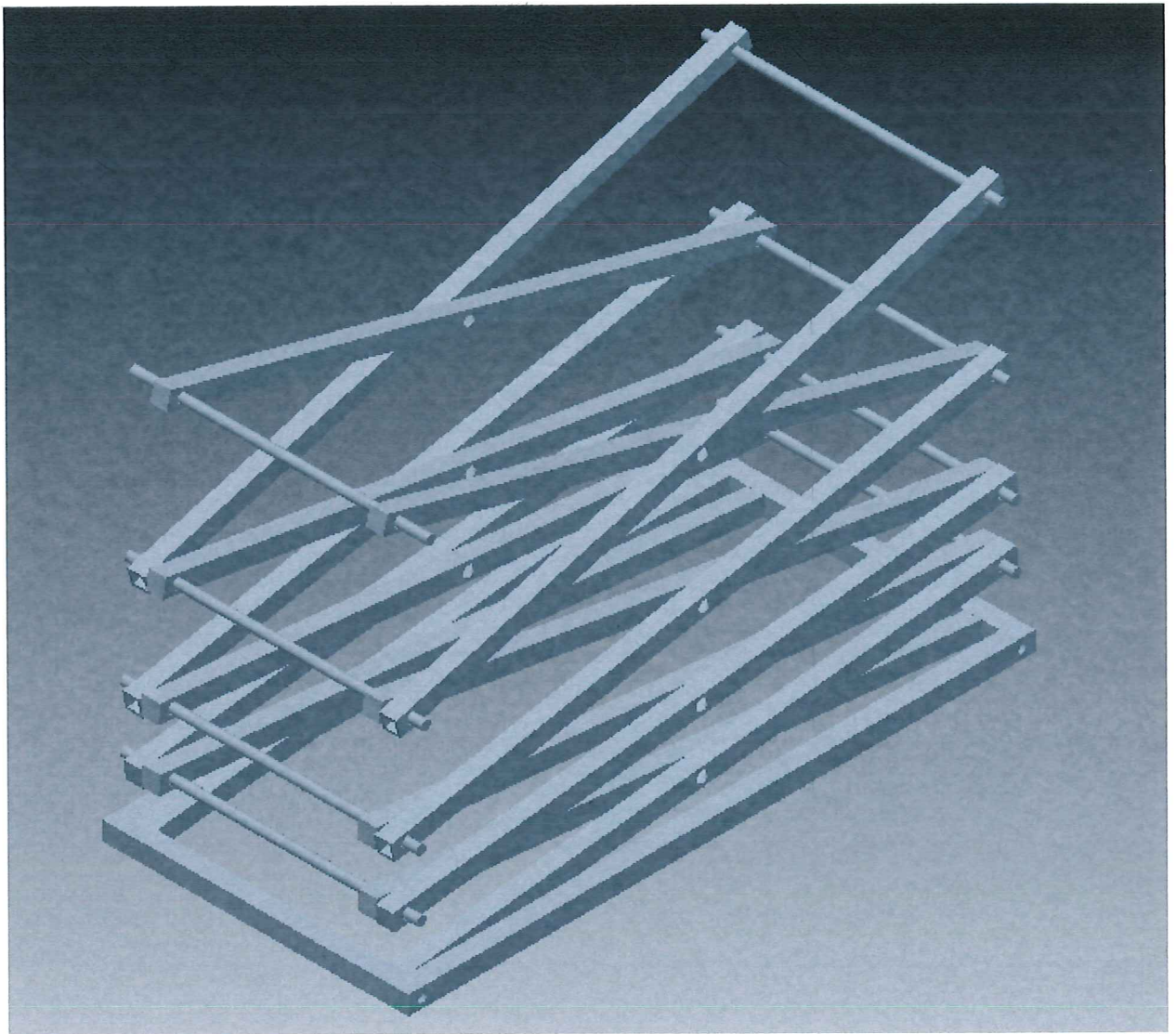
Recorded by:

Arun Kammanadiminti

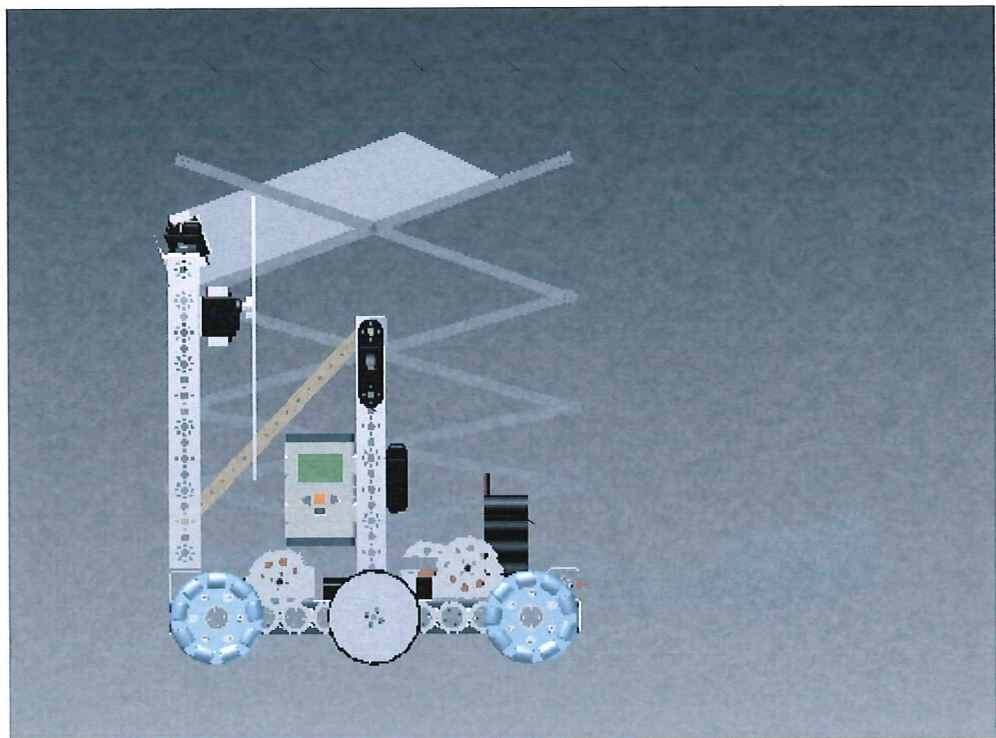
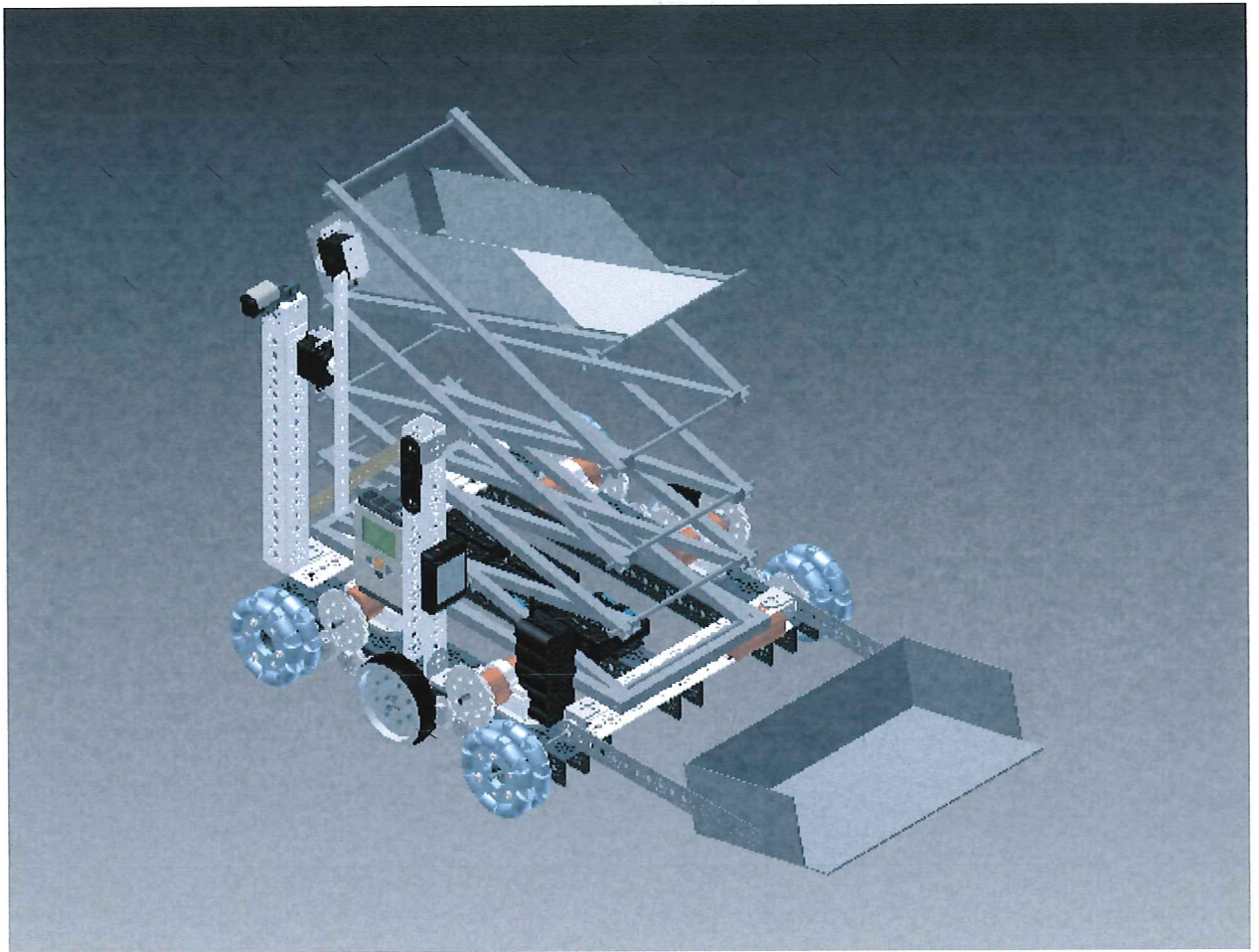




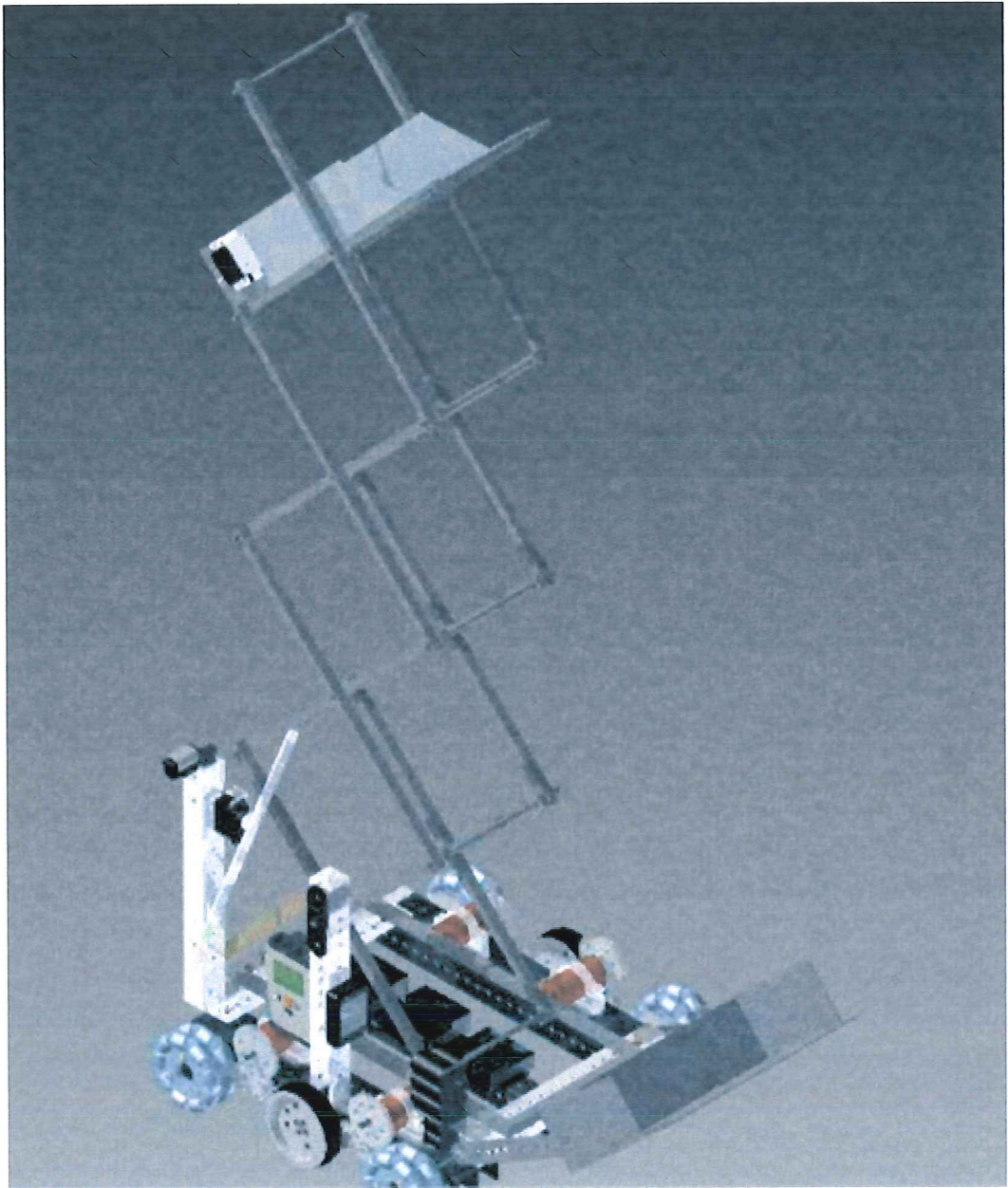
Eh-6

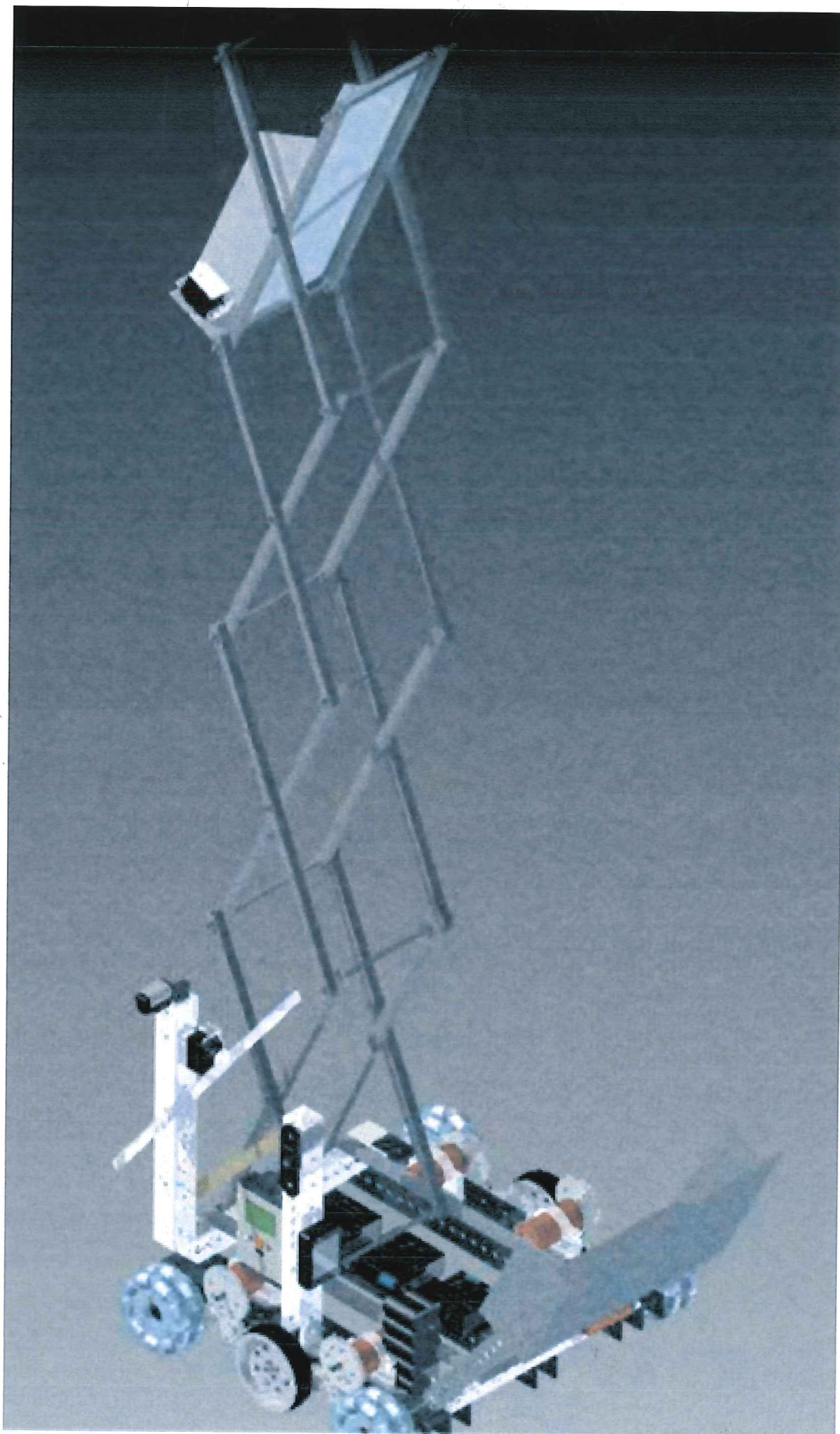






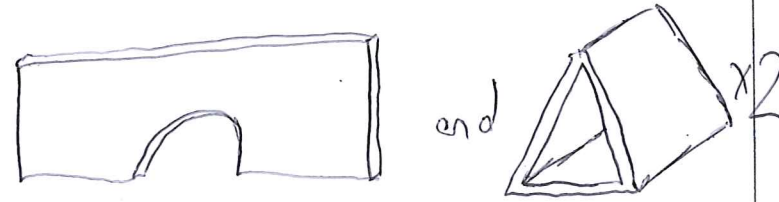






Session # 44

Date: Jan. 15, 2015

Task	Reflections
<p>Plan for the day</p>	<p><u>CAD.</u></p>
<p><del>Wrote</del></p> <p>We started making the ball guider for the bracket.</p>	<p>We made the main part, and the 2 triangles.</p>  <p>We started w/ 2-d sketches and then extruded them. For the triangles, we sketched the inside so it would be hollow. We plan to 3-d print these objects and then put it on our robot.</p>

Recorded by:

Ann Kammanediminh



Session # 56



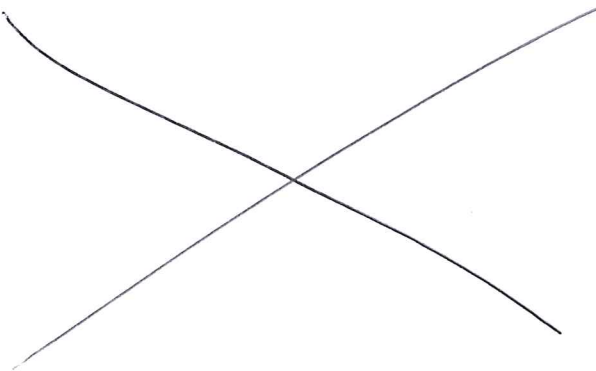
Attendees: Arun, Alex, Sydney

Location: Arnav's House

Date: 2-22-15

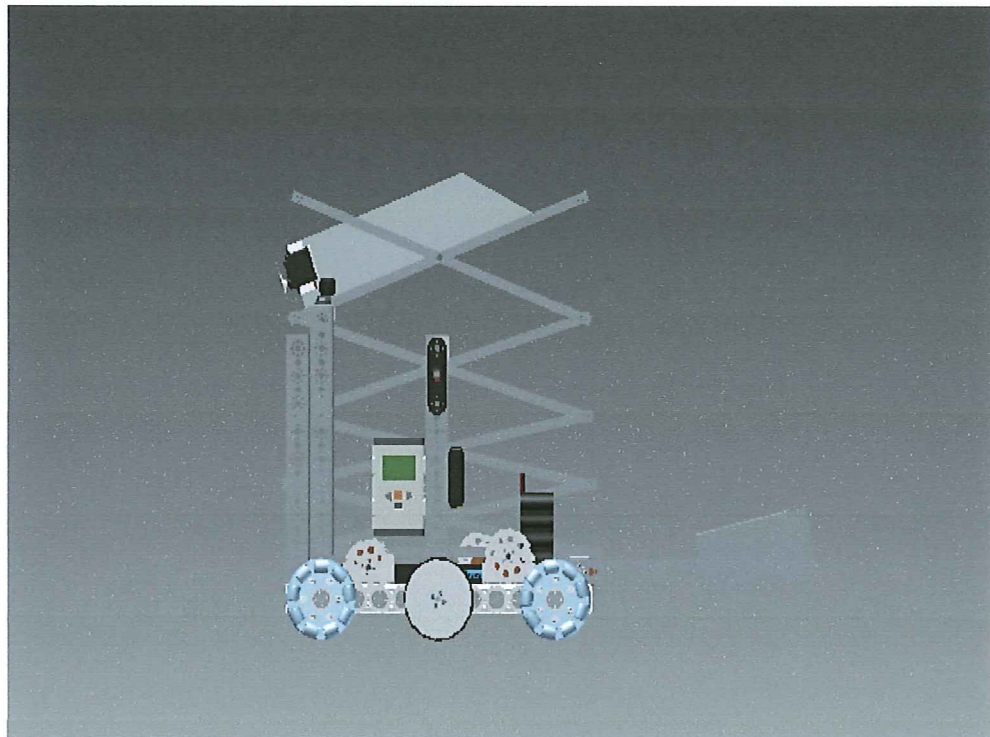
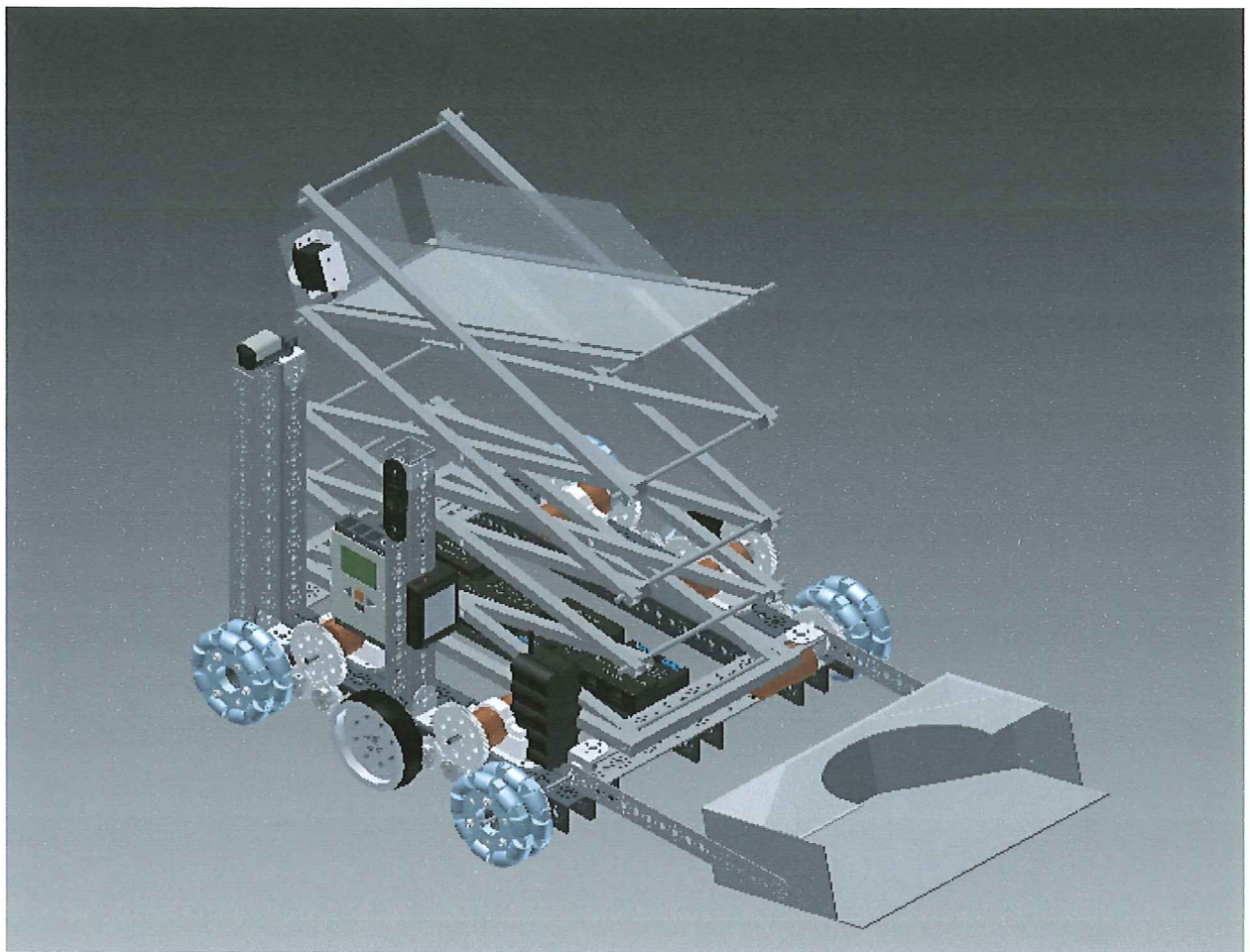
Plan for the day

3-d print the triangles for the bucket.

Task	Reflections
3-d print the triangles.	<p>In our ball guider in the bucket, we have finished the top part:</p>  <p>There are 2 triangles supporting it and so we 3-d printed them</p> 
	

Recorded by:

Arun Kammanadiminti



# FTC #6134 Black Frogs

Session #

Attendees: Whole team.

Location: Arnav's House

Date: 4-12-15

## Plan for the day

Make and CAD more stuff to 3-D print at World's at our pit.

Task	Reflections
We made the initials BFR.	To do this we had to draw the basic B, F, and R. The B consists of 2 ellipses and a line. The F was simply 3 lines and The R was 1 ellipse and 2 lines.
Next, we had to bubble the letters.	To bubble the B, we added 2 D's inside the B. The F was just making it more thicker. The R had a D and thicker lines.

Recorded by:

Arin Kammagadimin fi



# Section Ei

## Robot Assembly Strategy

# FTC #6134 Black Frogs

Session # 22

Attendees: Everyone

Location: Arnav's house  
~~Arnav's house~~

Date: 11-10-14.

## Plan for the day

# Robot (Rough) Design

Task	Reflections
Chassis	6 wheels attached to a main frame. 4 omni-wheels and 2 solid wheels.
Game Spec.	<p>Bucket to pick-up balls.</p> <p>Scissor mechanism to lift up <del>balls</del> balls.</p> <p>Dropper mechanism to drop <del>the</del> the balls.</p>

Recorded by:

Arun Kammanadimithi

# Section Ej

## Programming Strategy



Session # 2

Date: 9-10-14

Task	Reflections
Come up with a CPI	CPI is counts per inch So we ran the motor for some time and divided the counts by the number of inches travelled we got 444 counts (ave.) in 2 inches so $CPI = \frac{444}{2} = 222$
Come up with a CPD	CPD is counts per degree So we ran a turn for some time and divided the counts by the degrees we got 56 counts when we turned 4 degrees so $CPD = \frac{56}{4} = 14$
Use CPI and CPD to make subprograms to Drive Forward and backwards and Turn	for forward and backwards we created a sub program with parameters of inches, and power, we multiplied inches and CPI to make Target counts and made it drive forward until the encoder reaches target counts. <hr/> for turning we had parameters of Degrees, and Direction and did the same thing as above except turn until target counts

Recorded by:

Ankith usapa

Session # 9

Attendees: Serdar, Leon, Ankith,  
Arun, Nishta, Alex

Location: Arnav's house

Date: 10/11/14

Plan for the day

- Program the robot to be able to find the IR Beacon, and make the NXT brick display the zone and strength.

Task	Reflections
- Attach the IR sensor to the robot, and assure that it does not put out.	- While experimenting with the sensor, we found that placing the sensor facing the beacon gives better strength results instead of placing it facing forward with the robot.
- Program the robot to display the zone and strength of the IR Beacon	- After we have this, we will be able to have a good idea on we must add to the program and continue with the autonomous session.

Recorded by:

Leon Chen

# FTC #6134 Black Frogs

Session # 10

Location: Arnav's House

Attendees: Serdar, Leon, Ankith, Arnav, Anun, Alex, Anne, Saketh, Vinay, Nishita,  
Date: Sydney  
10/12/14

## Plan for the day

We wanted to drive straight off of the ramp during Autonomous and find the IR Beacon zone and strength every time we drove off the ramp. We did it for every position of the center goal.

Task	Reflections
To drive off the ramp straight	We used the encoders for input on how each motor was working and based on the input from the encoders we either added or subtracted from the power of the motors on the right side. We later found out that we configured the motors wrong so it was all useless.
To test the IR beacon zone and strength after driving off the ramp	We made code to show the IR Beacon zone and strength related to the IR sensor on the NXT <del>ss</del> screen. We measured the values for every position for the center goal.

Recorded by:

Serdar



Session # 11

Date: 10/16/14

Task	Reflections
Plan for the day.	Decided different autonomous combinations.
Decide Combos	We made six combination 3 for starting on ramp and 3 for starting on 2 parking zones we tried to map out the 3 combos in the fastest most efficient way possible we are going to get off the ramp knock
↓ (cont.)	the kickstand then go back to zone.

Recorded by:

Ankith Vdapa

# FTC #6134 Black Frogs

Session # 11

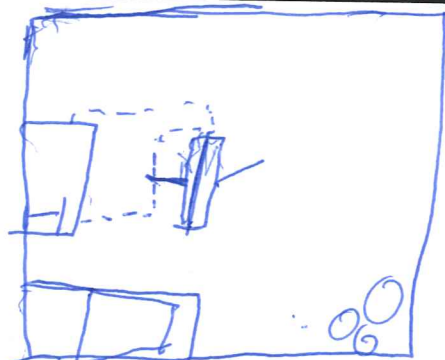
Attendees: Everyone

Location: Arnav's House

Date: October 16<sup>th</sup>, 2014

## Plan for the day

To decide different autonomous combinations.

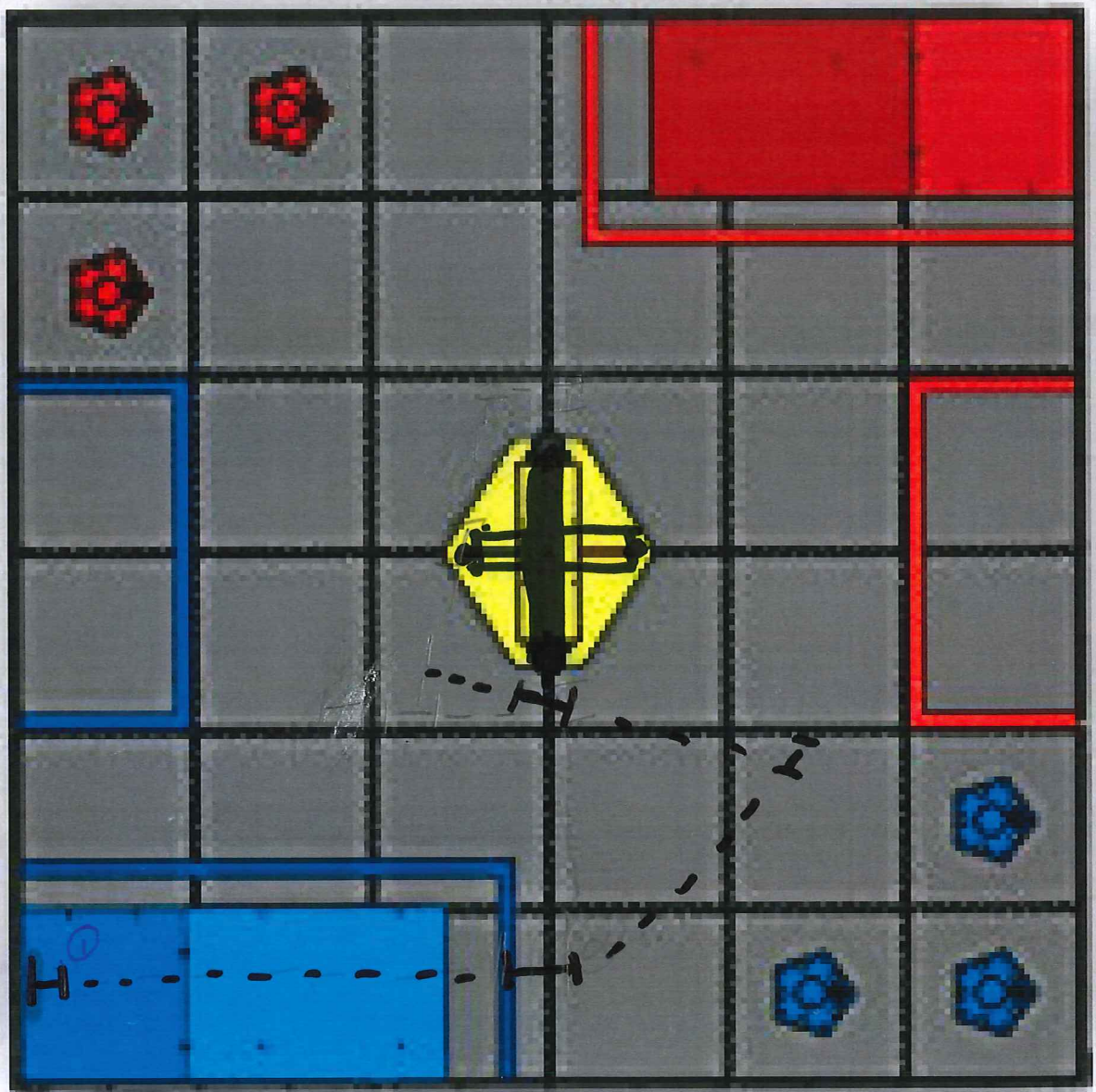
Task	Reflections
decide different Combos Start from ground position 3 doing Kickstart and Centergoal	
Other Combos	On Maps

Recorded by:

Sydney, Leon, Ankith, Serdar

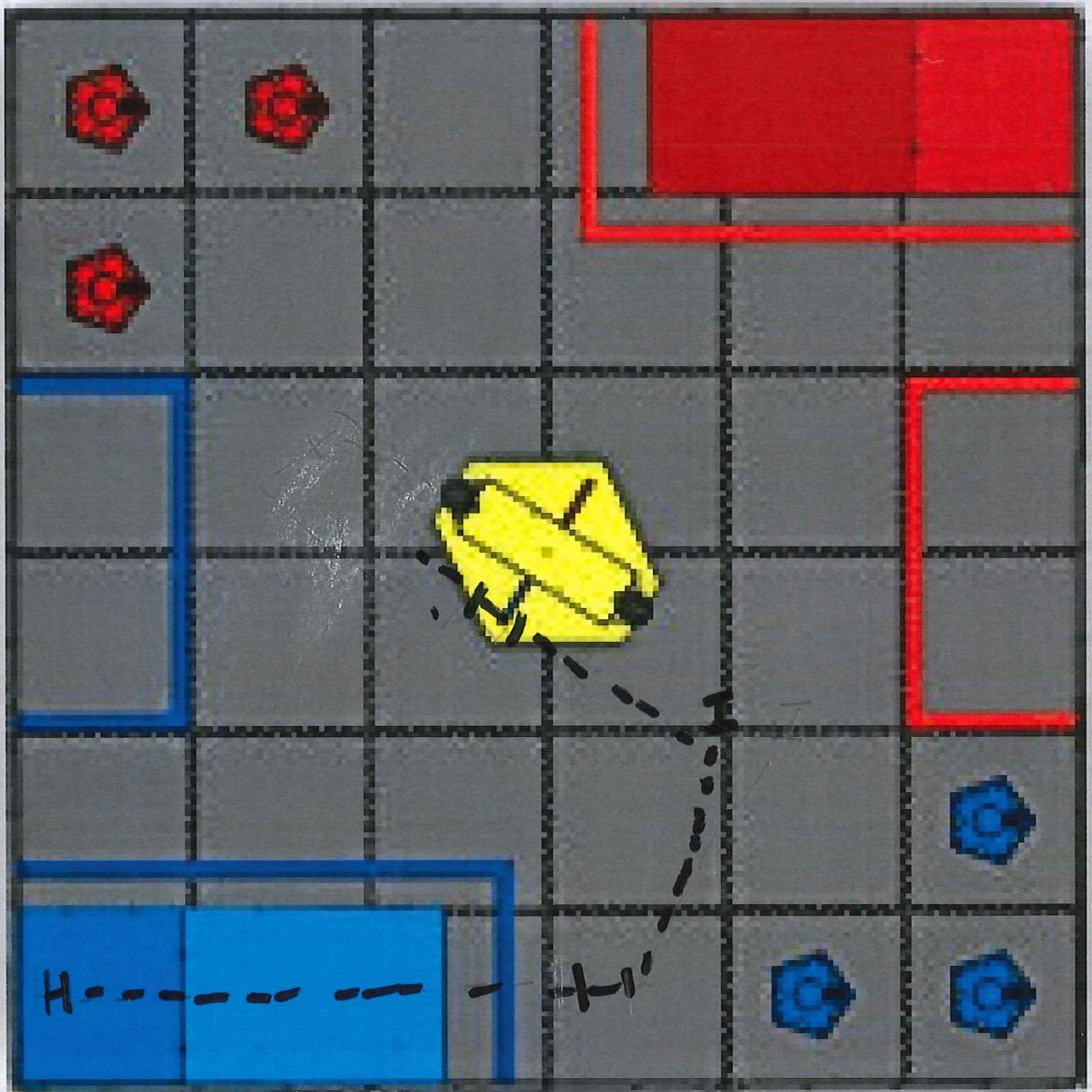
Eg-5

1

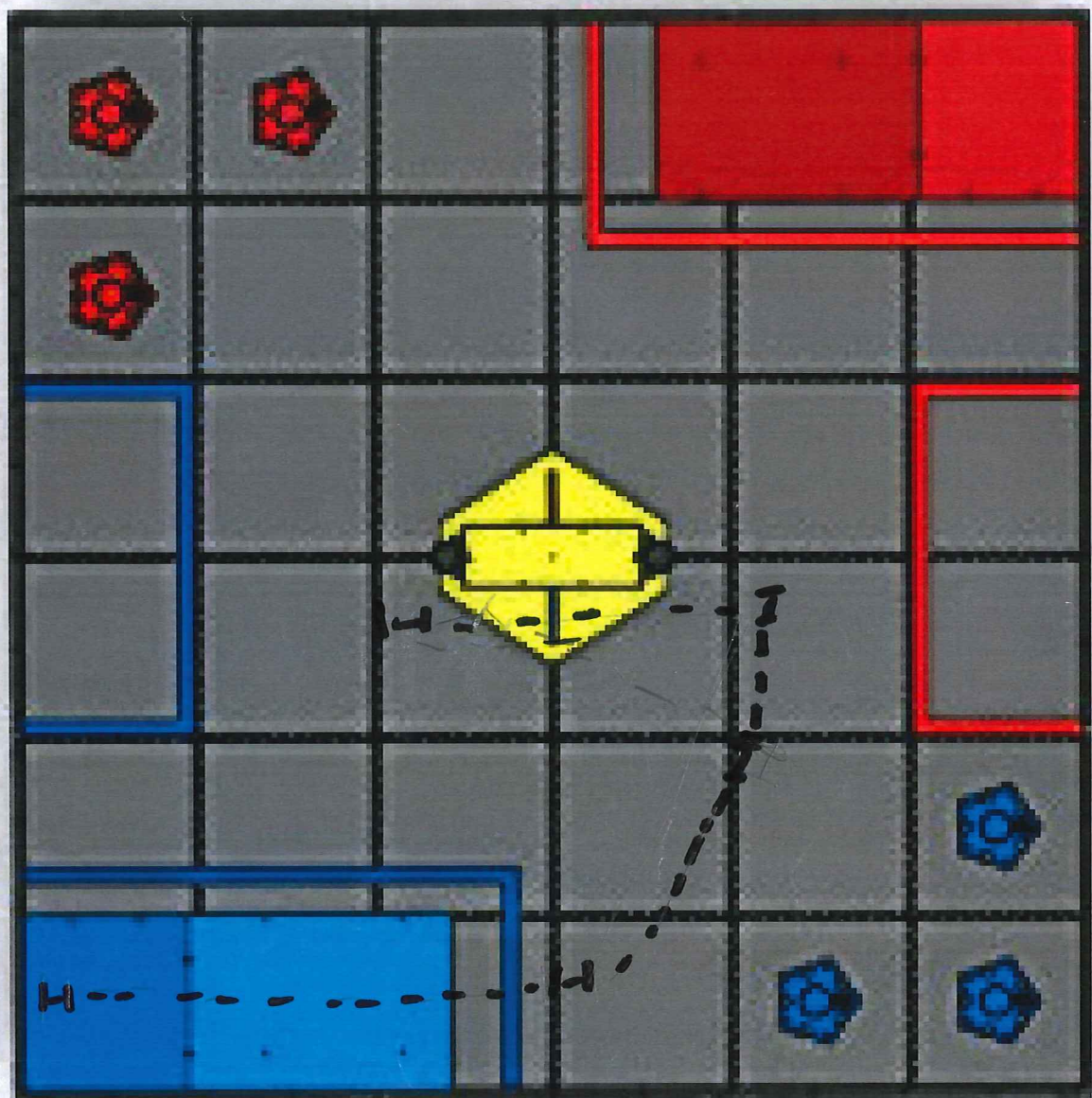




2



3





Session # 12

Date: 10/18/14

Task	Reflections
<ul style="list-style-type: none"> <li>- Write a test program to test all the motors and servos</li> <li>- Assign button/joystick controls for the <del>robot</del> robot in order to carry out teleop tasks.</li> </ul>	<ul style="list-style-type: none"> <li>- A successful program was completed and tested the components of the robot including the wheels, scissor lift, bucket, hooks, and door.</li> <li>- Buttons/joysticks were successfully programmed to perform tasks. This includes the movement of the robot, door, scissor lift, bucket, and hooks.</li> </ul>

Recorded by:

Leon Chen



FTC #6134 Black Frogs

Session # 13

Attendees: Leon, Serdar, Ankrith

Location: Arnav's house

Date: 10/19/14

Plan for the day

We ran our motor/servo test program and changed it based on required power and time running. We took a look at "gentleTurn" and looked at ways to implement it into our program. We also made programs to isolate each of the game spec element to test each motor/servo.

Task	Reflections
Run each motor/servo on the robot.	We made a program that runs each motor/servo and individual programs for each motor/servo. We tinkered with the motor/servo power and time.
Learn how to use "gentleTurn"	Coach brang a flash drive with programs containing gentleTurn and we looked at how to use it in our program.

Recorded by:

Serdar ~~Masahan~~

28-

Session # 14

Date: 10-20

Task	Reflections
Make a program that makes the robot go straight	We used the encoder count for this. If the difference between left and right encoders is positive then we increase the power of the right motor. If it is negative then we decrease the power.

Recorded by:

Anketh Uduza

# FTC #6134 Black Frogs

Session # 15

Attendees: Ankith Udaya, Leon Chen, Srdar K. K. K.

Location: Arnav's house

Date: 10-23-14

## Plan for the day

Get autonomous going.

Task	Reflections
fix wheel problem	The back wheels were not spinning as fast as the front wheels. In order to fix it we had to rewire the robot and connect the left motors to each other and connect the right motors so we only need one controller.
make robot go straight	When we put the same amount of power on both motors it doesn't go straight so we made a program that finds the difference in encoder counts then increases or decreases power on the right motor depending on which is moving faster.

Recorded by:

Ankith



# FTC #6134 Black Frogs

Session # 16

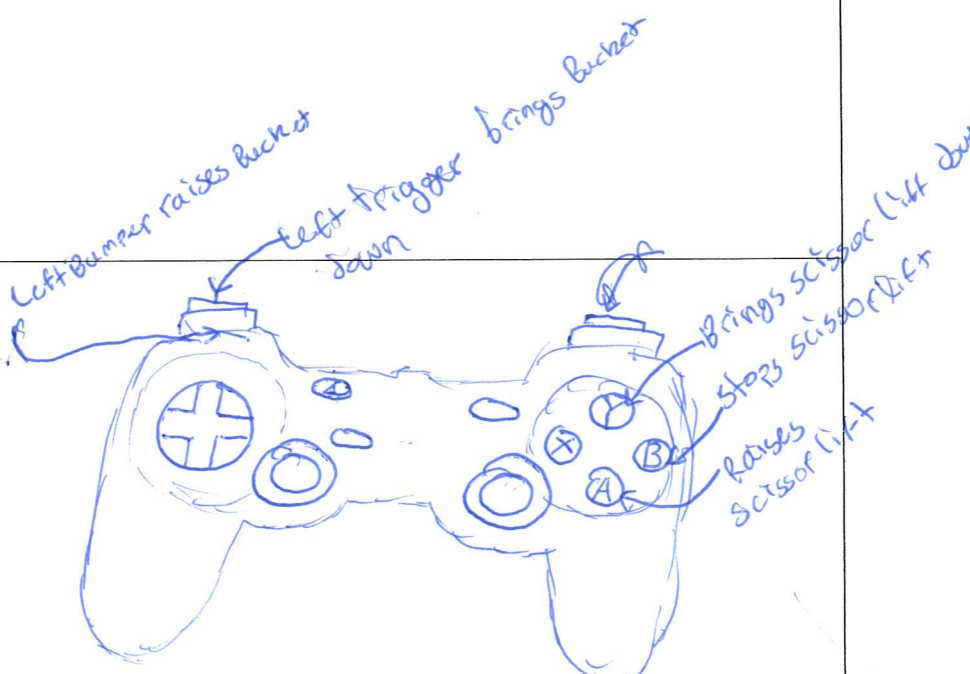
Attendees: Anirudh Nalaya

Location: Arnav's house

Date: 12-26-14

## Plan for the day

- Get autonomous going
- Work on Teleop

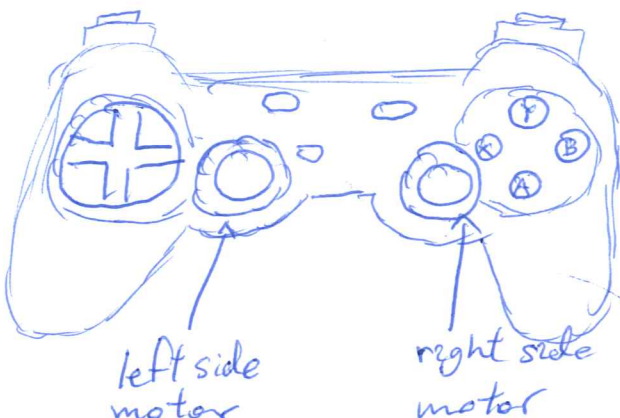
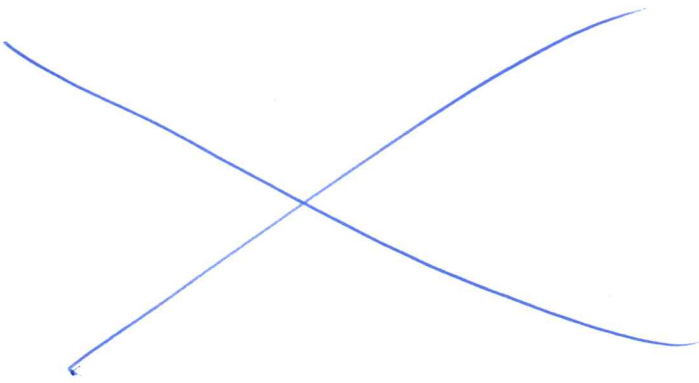
Task	Reflections
fix configuration	the configuration was wrong so we went back and fixed it.
Map teleop buttons for gamepad	

Recorded by:

Anirudh Nalaya

Session # 16

Date: 10-26-14

Task	Reflections
<p>map buttons for chassis controller</p>	 <p>left side motor</p> <p>right side motor</p>
<p>Calibrate <del>the</del> encoders for scissor left &amp; robot's turning</p>	<p>After doing some testing during autonomous, we found that encoders when the robot was turning and on the scissor left were off, so we had to recalibrate them.</p>
	

Recorded by:

*Calvin*

# FTC #6134 Black Frogs

Session #

16

Attendees:

Leon, Ankith, Vinay, Aru  
Arnav, Alex, Anne, Sydney

Location:

Arnav's House

Date:

10/26/14

## Plan for the day

- Continue with programming and prepare the robot for teleop.

Task	Reflections
- Calibrate the motor for the scissor lift and encoder.	- The motor was not consistent in the CPI. The lead screw was also constantly getting stuck at one point. We ended up abandoning the idea.
- Test the buttons on the teleop program.	- The scissor lift was tested and our configuration was altered. If we pressed a button, the lift would rise and pressing another button would stop the motor.

Recorded by:

Leon Chen, Vinay Pangam, Ankith Udupa



# FTC #6134 Black Frogs

Session # 18

Attendees: Programmers

Location: Arnav's house

Date: 10/30/14

## Plan for the day

- Finish recalibrating the robot's turning for autonomous

Task	Reflections
- Test the amount of degrees the robot is actually turning and its encoder count	- Measuring the lengths of the sides of a right triangle formed by the robot's turning, we were able to find the actual turn degree of the robot by using tangent, and approximate a good count per degree
- Correct the program and test the turning of the robot	- While we corrected the program, the robot seemed to be turning the correct amount of degrees in our autonomous program.

Recorded by:

Leon Chen

Ej-16

Task	Reflections
Test IR values for various positions of the center goal	We <del>notes</del> found the zone values that we measured before are inaccurate so we <del>redo</del> the measurements and got the right values.
Make case statement for starting in the parking zone.	Using the IR values in a case statement we had different movements for each position if the IR is not working then it will run an emergency program that puts the robot in a corner.
Make a wait button	We made a wait button so that if the other team has a collision course with us we can press the orange button and it will delay the actions by 8 seconds.

Recorded by:

Amith, Sidar, Leon.

FTC #6134 Black Frogs

Session # 28

Attendees: Leon, Ankit, Serdar

Location: Arnav's House

Date: 11/26/14

Plan for the day

Test the new IR Beacons and program a new autonomous session starting from the ramp

Task	Reflections
-Test the new IR beacons	As we collected the zone, and strength from the IR Beacon, we realized we must have the sensor close to the beacon to get an accurate reading
-Use the readings from IR beacons in 3 different positions to program autonomous	Some of the data from different center goal positions were very similar, so we had to base some of the robot's movements on the beacon's strength instead of zone.

Recorded by:

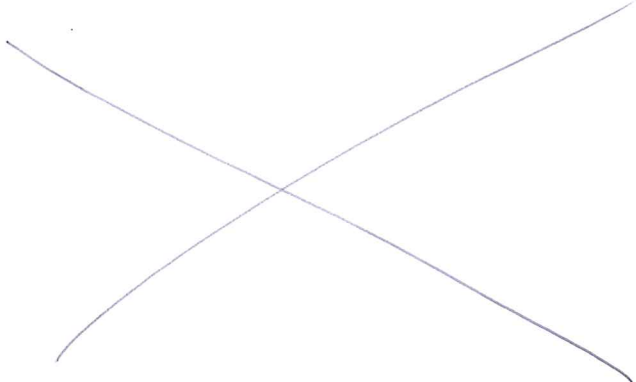
Leon Chen



FTC #6134 Black Frogs

Session # 30

Date: 11/29/14

Task	Reflections
Run autonomous on parking zone	We created a base set of movements that <del>auto</del> would start every time autonomous started. We got the zone and strength values from there and we were able to find the position of the center goal from the values
Put the ball in the center goal in autonomous	We found the CPI of the scissorlift to get it at the height needed to drop the ball in. We found the CPI to be 2450 and since we had to go up 50 inches to drop the ball we move the scissor up until counts is equal to 12,900
	

Recorded by:

# FTC #6134 Black Frogs

Session # 38

Attendees: Leon Chen, Serdar Karahann,  
Ankith Udupa

Location: Arnav's House

Date: 12/18/14

## Plan for the day

- Reassure IR Beacon values of Autonomous session.
- Try to apply movements that supports the robot's new kickstand kicker function.

Task	Reflections
- Find new zones and strength in different positions.	While the centergeal is at position 2 or 3, we got identical values. We are thinking of doing only one set of movements <del>to do</del> to complete these positions.
- Program new set of autonomous movement in order to apply kickstand kickers.	To program this, we were supposed to have the robot drive a few inches away from the kickstand. The extended kickstand kicker would knock it down.

Recorded by:

Leon Chen & Serdar Karahann

Task	Reflections
PLAN	<ul style="list-style-type: none"> <li>- Try the kickstand kicker</li> <li>- Attempt to combine position 2 &amp; 3 into one set of movements</li> </ul>
Task Combine two movements	<p>we had to make the program go in a set of movements that we thought would hit it in both positions</p>
Task it wasn't consistent	<p>At the end of the program we had the robot turn and try again at a different angle</p>

More on bench

Recorded by:

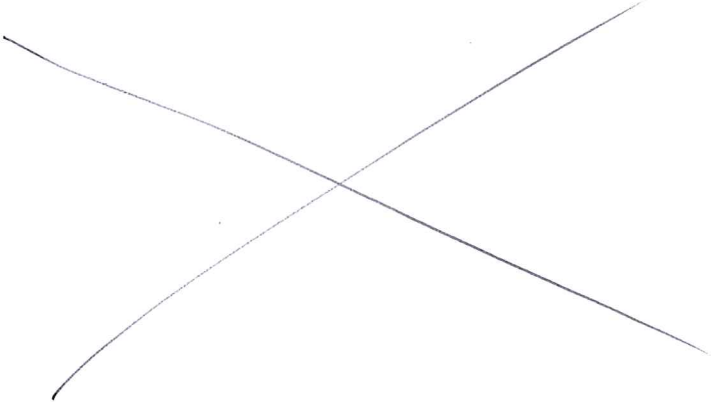
Ankith Udupa, Leonchen

Serdar Karahacann



Session # 44

Date: 1-15-15

Task	Reflections
<ul style="list-style-type: none"> <li>• Program automatic ball picker-upper</li> </ul>	<ul style="list-style-type: none"> <li>• Driver presses Right Trigger to run</li> <li>• <del>Drive forward</del>, puts bucket down, on ball, drives backward, picks bucket up simultaneously</li> <li>• Saves time b/c. you don't need 2 people to pick up balls &amp; it does everything in one motion</li> <li>• One of the limitations of our pick-up program is it can't be near any platforms.</li> </ul> 

Recorded by:

Serder Karahann, Leon Chen, Ankith Udupa

Session # 49

Attendees: Serdar, Leon, Ankith

Location: Arnav's house

Date: February 5th, 2014

Plan for the day

Program the hooks to move rolling goals in Teleop

Task	Reflections
Diagnose problems with hooks	<ul style="list-style-type: none"> <li>• The wiring was incorrect, so we isolated the motors on multiple programs to fix it</li> <li>• The 2 servos were models that were different, so we replaced them with identical model servos</li> </ul>
Program hooks	<ul style="list-style-type: none"> <li>• The A button brings both hooks down</li> <li>• The Y button brings both hooks up</li> <li>• The driver operates these because the driver positions the robot</li> </ul>

Recorded by:

Serdar Karachann

Ej-2

FTC #6134 Black Frogs

Session # 50

Attendees: Serdar, Leon, Ankith

Location: Arnav's House

Date: 2-6-15.

Plan for the day

Score in the center goal during autonomous

Task	Reflections
Find common point to start from during autonomous	<ul style="list-style-type: none"> <li>• The initial movements the robot goes through are different for each position to get to the common point</li> <li>• Getting to the common point made programming a lot easier from then on</li> <li>• CPI right next to IR beacon</li> </ul>
• Program from common point	<ul style="list-style-type: none"> <li>• Case statement based on IR readings</li> <li>• Program pretty much the same from then on, with a few variables that vary based on position</li> </ul>

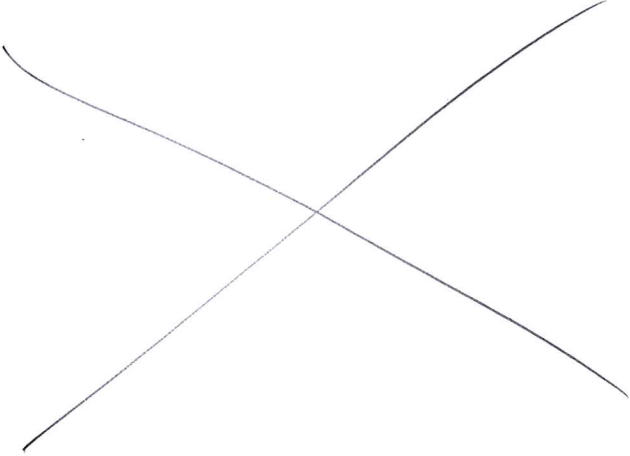
Recorded by:

Serdar Karahann, Leon



Session # 51

Date: 2/7/14

Task	Reflections
Plan. - Start working on center goal for autonomous	
Work on center goal for position 1.	<p>We made a case statement which held the movements for each of the positions of the kickstand. For position 1 we had to create a do while statement so we would move backwards until the zone is <del>6</del> or equal to <del>two</del> four. Then we programmed the movements to score in the center goal</p> 

Recorded by:

Ankith Udapa

Session #52

Date: 2/8/15

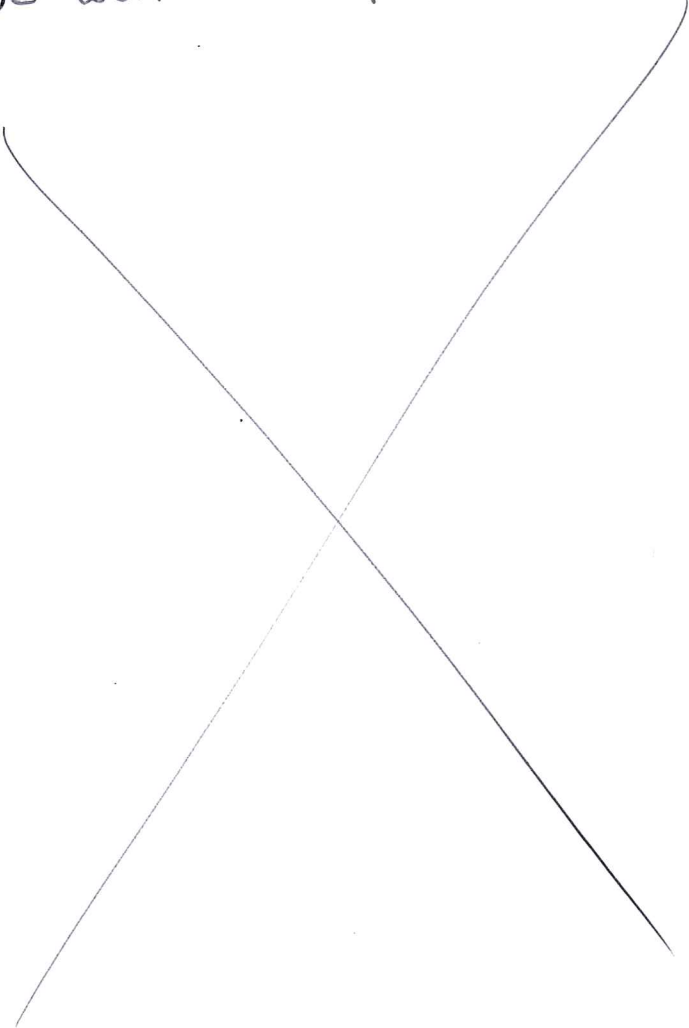
Task	Reflections
Plan: Finish programming autonomous from parking zone	
- Determine movements for positions 2 and 3	The zone and strength were acquired. They will be able to work separately because there is a noticeable difference
- Make score center sub-routine	<del>After realizing that after</del> the robot gets in position to score in the center goal. We realized that this set of movements was common in all three <del>positions</del> center goal positions. Therefore, we made a subroutine.

Recorded by:

Leon Chen

Session # 53

Date: 2/11/14

Task	Reflections
<ul style="list-style-type: none"> <li>• Work on 4 AutoRamp</li> </ul>	<ul style="list-style-type: none"> <li>• We added variables "adjustment" and "adjustDegrees"</li> <li>• We made waits compile so we didn't have as many</li> <li>• We worked on positions 1 + 3</li> </ul> 

Recorded by:

Ankith Udapa



Session # 56

Date: 2/22/15

Task	Reflections
<p>- Determine robot movements from the ramp during autonomous</p>	<p>- After the robot gets the data from the IR beacon, we realized that the movements from then on would be the same as the autonomous from the parking zone.</p>
<p>Position</p> <p>1</p>	

Recorded by:

Leon Chen

Session #56

Date: 2/22/15

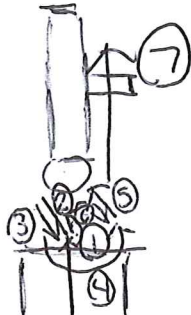
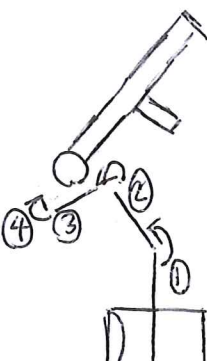
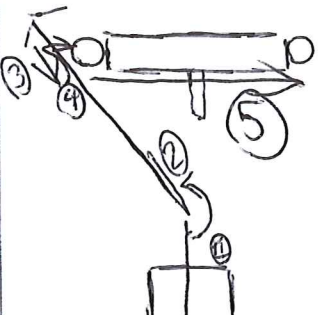
Task	Reflections
<p>Position</p> <p>2</p>	
<p>Position</p> <p>3</p>	

Recorded by:

Leon Chen

Session # 56

Date: 2/22/15

Task	Reflections
<p>Movements from parking zone during autonomous - Position 1</p>	
<p>Position 2</p>	
<p>Position 3</p>	

Recorded by:

Serdar Karahann



```

4Auto-Park.c
#pragma config(Hubs, S1, HTServo, HTMotor, HTMotor)
#pragma config(Sensor, S2, IR, sensorI2CCustom)
#pragma config(Motor, motorA, MotorA, tmotorNXT, openLoop, encoder)
#pragma config(Motor, motorB, , tmotorNXT, openLoop, encoder)
#pragma config(Motor, motorC, , tmotorNXT, openLoop, encoder)
#pragma config(Motor, mtr_S1_C2_1, motorD, tmotorTetrix, openLoop)
#pragma config(Motor, mtr_S1_C2_2, IR_lift, tmotorTetrix, openLoop)
#pragma config(Motor, mtr_S1_C3_1, leftMotors, tmotorTetrix, PIDControl, encoder)
#pragma config(Motor, mtr_S1_C3_2, rightMotors, tmotorTetrix, PIDControl, reversed, encoder)
#pragma config(Motor, mtr_S1_C4_1, bucket_lift, tmotorTetrix, openLoop)
#pragma config(Motor, mtr_S1_C4_2, scissor_lift, tmotorTetrix, openLoop)
#pragma config(Servo, srvo_S1_C1_1, sci_trapdoor, tServoStandard)
#pragma config(Servo, srvo_S1_C1_2, servo2, tServoNone)
#pragma config(Servo, srvo_S1_C1_3, servo3, tServoNone)
#pragma config(Servo, srvo_S1_C1_4, Right_hook, tServoStandard)
#pragma config(Servo, srvo_S1_C1_5, servo5, tServoNone)
#pragma config(Servo, srvo_S1_C1_6, Left_hook, tServoStandard)
/*!!Code automatically generated by 'ROBOTC' configuration wizard
!!*/

#include "hitechnic-irseeker-v2.h"
#include "JoystickDriver.c"

#define gearRatio -2
#define TOTALDISTANCE 16000 //distance from Ramp to floor in encoder counts
#define REMAININGRAMP 000 // distance left to travel on the ramp
#define CPD 12 // encoder counts per degree
#define diameter 6.6 // diameter of wheel
#define pi 3.14159 // pi
#define maxPower 40 // max power for driving the robot
#define backCounter 720
#define center 7
#define CPI 222 //encoder counts per inch
#define RIGHT -1
#define LEFT 1
#define WAIT 250

long runTimer;
int runTimeHandle;
bool scoreCenterflag= false;
bool kickflag = false;

void scoreCenter(int scoreadjust, int adjustDegrees, int kickadjust, int kickDegrees); //different positions for scorecenter subprogram
void driveForward(int power, int targetDistance); // drive forward
subprogram
void gentleTurn(int turnDegrees, int turnDirection); // turn subprogram
int findKickstand();
void kickTheStand(int kickstandLoc); // kickstand subprogram
void kickstandOnly();

task main(){ // start of actual program

    // the following block intializes the variables
    int kickstandLoc = 0;
    int waitingTime = 0;

    eraseDisplay();
    clearTimer(runTimeHandle);
    runTimer = time1(runTimeHandle);
    //////////////////////////////////////

```

## 4Auto-Park.c

```
// the following block waits for you to press the orange btn if you want to wait at the start of the match
```

```
while (runTimer < 10000){
nxtDisplayTextLine(1, "Right to only score center");
nxtDisplayTextLine(2, "Left arrow to only kick stand :D");
nxtDisplayTextLine(3, "Orange to wait");

if (nNxtButtonPressed == 3){
    waitingTime = 8000;
    break;
}
if (nNxtButtonPressed == 1){
    scoreCenterflag = true;
    break;
}
if (nNxtButtonPressed == 2){
    kickflag = true;
    break;
}
runTimer = time1(runtimeHandle);
}
```

*(The page contains diagonal hatching marks.)*

```
//when the following block is uncommented it waits for start and waits for 8
seconds if orange btnn is preesed
```

```
waitForStart();
wait1Msec(waitingTime);
```

////////////////////////////////////

```
//The following block holds the intail common movements of the robot
motor[bucket_lift] = 15;
motor[IR_lift] = 30;
driveForward(-60, 30);
wait1Msec(WAIT);
gentleTurn(45, RIGHT);
wait1Msec(WAIT);
motor[IR_lift] = 0;
driveForward(-60, 24);
wait1Msec(WAIT);
```

```
kickstandLoc = findKickstand();
```

```
kickTheStand(kickstandLoc);
```

}

```
//Finds the zone and strength of IR beacon
int findkickstand (){
```

```

int zone, strength, position;
position = 0;
if (HTIRS2readEnhanced(IR, zone, strength)) {
    eraseDisplay();
    nxtDisplayCenteredTextLine(0, "%d %d", zone, strength);
    wait1Msec(WAIT);
}

```

#### 4Auto-Park.c

```

    if (zone == 0){
        position = 3;
    }
    else if (zone >= 6){
        position = 1;
    }
    else {
        position = 2;
    }
    return position;
}

void kickTheStand(int kickstandLoc) {
    //////////////////////////////////////
    bool IRflag;
    int zone, strength, scoreadjust, adjustDegrees, kickadjust, kickDegrees;

    //the following block uses a switch statements to knock the kickstand in any
    of the three positons
    switch (kickstandLoc) {
        case 1: {
            //movements for positon 1
            do {
                IRflag = HTIRS2readEnhanced(IR, zone, strength);
                motor[leftMotors] = motor[rightMotors] = 40;
            } while (zone > 4);
            motor[leftMotors] = motor[rightMotors] = 0;
            driveForward(60, 9);
            wait1Msec(WAIT);
            gentleTurn(135, RIGHT);
            wait1Msec(WAIT);
            scoreadjust = 5;
            kickadjust = 4;
            adjustDegrees = 50;
            kickDegrees = 45;
            scoreCenter(scoreadjust, adjustDegrees, kickadjust,
kickDegrees);
            break;
        }
        case 2: {
            //movements for position 2
            do {
                IRflag = HTIRS2readEnhanced(IR, zone, strength);
                motor[leftMotors] = motor[rightMotors] = -40;
            } while (zone < 5);
            motor[leftMotors] = motor[rightMotors] = 0;
            gentleTurn(30, LEFT);
            wait1Msec(WAIT);
            driveForward(60, 7);
            wait1Msec(WAIT);
            gentleTurn(135, RIGHT);
            wait1Msec(WAIT);
            scoreadjust = 6;
            kickadjust = 3;
            adjustDegrees = 50;
            kickDegrees = 75;
            scoreCenter(scoreadjust, adjustDegrees, kickadjust,
kickDegrees);
            break;
        }
        case 3: {
            //movements for position 3
            motor[IR_lift] = -50;

```



```

4Auto-Park.c
motor[bucket_lift] = 10;
driveForward(65, 5);
wait1Msec(WAIT);
gentleTurn(60, RIGHT);
wait1Msec(WAIT);
driveForward(100, 36);
motor[IR_lift] = 0;
wait1Msec(1300);
gentleTurn(45, RIGHT);
wait1Msec(WAIT);
driveForward(60, 12);
motor[bucket_lift] = 0;

break;

}

default: { //movements for emergency situation
    motor[IR_lift] = -30;
    wait1Msec(2500);
    motor[IR_lift] = 0;
    gentleTurn(360, LEFT);
    wait1Msec(WAIT);
    break;
}

}
return;
}
/////////////////////////////////////////////////////////////////
// the following block holds the turn sub-program
void gentleTurn(int turnDegrees, int turnDirection){
    int countsToTravel;

    countsToTravel = turnDegrees * CPD;
    nMotorEncoder[leftMotors] = nMotorEncoder[rightMotors] = 0;
    while (abs(nMotorEncoder[leftMotors]) < countsToTravel){
        if (turnDirection == RIGHT){
            motor[leftMotors] = -100;
            motor[rightMotors] = 100;
        }
        else {
            motor[leftMotors] = 100;
            motor[rightMotors] = -100;
        }
    }
    motor[leftMotors] = motor[rightMotors] = 0;
    eraseDisplay();
    nxtDisplayCenteredTextLine(0, "%d", abs(nMotorEncoder[leftMotors]));
}
/////////////////////////////////////////////////////////////////
// the following block holds the drive sub program
void driveForward(int power, int targetDistance){
    long totalEncoders, speedAdjust;
    long targetCounts;
    int encoderDiff;
    int distanceTraveled, robotspeed, stallTimeHandle;
    long stallTime, d1, d2, runTime;

```

```

                                4Auto-Park.c
targetCounts = (targetDistance * CPI);
totalEncoders = speedAdjust = 0;
nMotorEncoder[leftMotors] = nMotorEncoder[rightMotors] = 0;
motor[leftMotors] =      motor[rightMotors] = power;

clearTimer(runTimeHandle);
while(totalEncoders < targetCounts){
    runTimer = time1[runTimeHandle];
    if (runTimer >= 1000) {
        encoderDiff = (nMotorEncoder[leftMotors]) -
(nMotorEncoder[rightMotors]);
        if (encoderDiff > 0){
            speedAdjust = speedAdjust + 1;
        }
        else {
            speedAdjust = speedAdjust - 1;
        }
        motor[rightMotors] = power + speedAdjust;
        clearTimer(runTimeHandle);
        runTimer = 0;
    }
    totalEncoders = abs(nMotorEncoder[leftMotors])+
abs(nMotorEncoder[rightMotors]);
}
// the following block sets the motors to 0
motor[leftMotors] =      motor[rightMotors] = 0;
}

//Scores in center goal and kicks stanc
void scoreCenter(int scoreadjust, int adjustDegrees, int kickadjust, int
kickDegrees){
    if (kickflag){
        kickstandOnly();
        return;
    }
    motor[IR_lift] = -50;
    motor[bucket_lift] = -40;
    wait1Msec(200);
    motor[scissor_lift] = -100;
    wait1Msec(2500);
    motor[IR_lift] = 0;
    wait1Msec(3500);
    motor[scissor_lift] = 0;
    driveForward(60, scoreadjust);
    wait1Msec(WAIT);
    servo[sci_trapdoor] = 180;
    wait1Msec(1000);
    servo[sci_trapdoor] = 0;
    driveForward(-60, kickadjust);
    motor[scissor_lift] = 80;
    wait1Msec(3500);
    gentleTurn(adjustDegrees, LEFT);
    wait1Msec(WAIT);
    driveForward(60, 20);
    wait1Msec(WAIT);
    motor[scissor_lift] = 0;
    motor[bucket_lift] = 70;
    wait1Msec(200);
    if (scoreCenterflag) {
        return;
    }
}

```

```
gentleTurn(kickDegrees, RIGHT);  
wait1Msec(WAIT);  
driveForward(100, 30);  
wait1Msec(WAIT);  
gentleTurn(360, RIGHT);  
wait1Msec(WAIT);
```

```
return;
```

```
}
```

```
void kickstandOnly(){  
    motor[IR_lift] = -50;  
    driveForward(-60,3);  
    wait1Msec(WAIT);  
    gentleTurn(45, LEFT);  
    wait1Msec(WAIT);  
    driveForward(60, 15);  
    wait1Msec(WAIT);  
    motor[IR_lift] = 0;  
    gentleTurn(30, RIGHT);  
    wait1Msec(WAIT);  
    driveForward(60, 48);  
    return;  
}
```

```
////////////////////////////////////
```



```

4Auto-Ramp.c
#pragma config(Hubs, S1, HTServo, HTMotor, HTMotor)
#pragma config(Sensor, S2, IR, sensorI2CCustom)
#pragma config(Motor, motorA, MotorA, tmotorNXT, openLoop, encoder)
#pragma config(Motor, motorB, , tmotorNXT, openLoop, encoder)
#pragma config(Motor, motorC, , tmotorNXT, openLoop, encoder)
#pragma config(Motor, mtr_S1_C2_1, motorD, tmotorTetrix, openLoop)
#pragma config(Motor, mtr_S1_C2_2, IR_lift, tmotorTetrix, openLoop)
#pragma config(Motor, mtr_S1_C3_1, leftMotors, tmotorTetrix, PIDControl, encoder)
#pragma config(Motor, mtr_S1_C3_2, rightMotors, tmotorTetrix, PIDControl, reversed, encoder)
#pragma config(Motor, mtr_S1_C4_1, bucket_lift, tmotorTetrix, openLoop)
#pragma config(Motor, mtr_S1_C4_2, scissor_lift, tmotorTetrix, openLoop)
#pragma config(Servo, srvo_S1_C1_1, sci_trapdoor, tServoStandard)
#pragma config(Servo, srvo_S1_C1_2, servo2, tServoNone)
#pragma config(Servo, srvo_S1_C1_3, servo3, tServoNone)
#pragma config(Servo, srvo_S1_C1_4, Right_hook, tServoStandard)
#pragma config(Servo, srvo_S1_C1_5, servo5, tServoNone)
#pragma config(Servo, srvo_S1_C1_6, Left_hook, tServoStandard)
/*!!Code automatically generated by 'ROBOTC' configuration wizard
!!*/

```

```

#include "hitechnic-irseeker-v2.h"
#include "JoystickDriver.c"

```

```

#define gearRatio -2
#define TOTALDISTANCE 16000 //distance from Ramp to floor in encoder counts
#define REMAININGRAMP 000 // distance left to travel on the ramp
#define CPD 12 // encoder counts per degree
#define diameter 6.6 // diameter of wheel
#define pi 3.14159 // pi
#define maxPower 40 // max power for driving the robot
#define backCounter 720
#define center 7
#define CPI 222 //encoder counts per inch
#define RIGHT -1
#define LEFT 1
#define WAIT 250

```

```

long runTimer;
int runTimeHandle;
bool kickflag = false;
bool scoreCenterflag = false;

```

```

void scoreCenter(int scoreadjust, int adjustDegrees, int kickadjust, int
kickDegrees); //different positions for scorecenter subprogram
void driveForward(int power, int targetDistance); // drive forward
subprogram
void gentleTurn(int turnDegrees, int turnDirection); // turn subprogram
int findkickstand();
void kickTheStand(int kickstandLoc); // kickstand subprogram
void kickstandOnly();

```

```

task main(){ // start of actual program

```

```

// the following block intializes the variables
int kickstandLoc = 0;
int waitingTime = 0;

```

```

eraseDisplay();
clearTimer(runTimeHandle);
runTimer = time1(runTimeHandle);

```

```

////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

```

// the following block waits for you to press the orange btn if you want to wait at the start of the match

```
while (runTimer < 10000){
    nxtDisplayTextLine(1, "Right kick only");
    nxtDisplayTextLine(2, "Left center only");
    nxtDisplayTextLine(3, "Orange to wait");

    if (nNxtButtonPressed == 3){
        waitingTime = 8000;
        break;
    }
    if (nNxtButtonPressed == 2){
        scoreCenterflag = true;
        break;
    }
    if (nNxtButtonPressed == 1){
        kickflag = true;
        break;
    }
    runTimer = time1(runTimeHandle);
}
```

////////////////////////////////////

//when the following block is uncommented it waits for start and waits for 8 seconds if orange btn is preesed

```
waitForStart();
wait1Msec(waitingTime);
```

////////////////////////////////////

//The following block holds the intail common movements of the robot

```
motor[bucket_lift] = 15;
driveForward(-60, 60);
wait1Msec(WAIT);
motor[IR_lift] = 30;
gentleTurn(90, RIGHT);
wait1Msec(WAIT);
driveForward(-60, 24);
wait1Msec(WAIT);
gentleTurn(45, RIGHT);
motor[IR_lift] = 0;
wait1Msec(WAIT);
driveForward(-60, 45);
wait1Msec(WAIT);
gentleTurn(85, LEFT);
wait1Msec(WAIT);
driveForward(-60, 41);
wait1Msec(WAIT);
```

```
kickstandLoc = findKickstand();
```

```
kickTheStand(kickstandLoc);
```

```
}
```

//Finds the zone and strength of IR beacon

```

int findkickstand (){
    int zone, strength, position;
    position = 0;
    if (HTIRS2readEnhanced(IR, zone, strength)) {
        eraseDisplay();
        nxtDisplayCenteredTextLine(0, "%d %d", zone, strength);
        wait1Msec(WAIT);
    }

    if (zone == 0){
        position = 3;
    }
    else if (zone >= 6){
        position = 1;
    }
    else {
        position = 2;
    }
    return position;
}

void kickTheStand(int kickstandLoc) {
    //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
    bool IRflag;
    int zone, strength, scoreadjust, adjustDegrees, kickadjust, kickDegrees;

    //the following block uses a switch statements to knock the kickstand in any
    of the three positons
    switch (kickstandLoc) {
        case 1: {
            //movements for positon 1
            do {
                IRflag = HTIRS2readEnhanced(IR, zone, strength);
                motor[leftMotors] = motor[rightMotors] = 40;
            } while (zone > 4);
            motor[leftMotors] = motor[rightMotors] = 0;
            driveForward(60, 9);
            wait1Msec(WAIT);
            gentleTurn(135, RIGHT);
            wait1Msec(WAIT);
            scoreadjust = 4;
            kickadjust = 5;
            adjustDegrees = 50;
            kickDegrees = 45;
            scoreCenter(scoreadjust, adjustDegrees, kickadjust,
kickDegrees);
            break;
        }
        case 2: {
            //movements for position 2
            do {
                IRflag = HTIRS2readEnhanced(IR, zone, strength);
                motor[leftMotors] = motor[rightMotors] = -40;
            } while (zone < 5);
            motor[leftMotors] = motor[rightMotors] = 0;
            gentleTurn(30, LEFT);
            wait1Msec(WAIT);
            driveForward(60, 7);
            wait1Msec(WAIT);
            gentleTurn(135, RIGHT);
            wait1Msec(WAIT);
            scoreadjust = 6;
            kickadjust = 3;
            adjustDegrees = 50;
            Page 3

```



```

                                4Auto-Ramp.c
kickDegrees = 75;
scoreCenter(scoreadjust, adjustDegrees, kickadjust,
kickDegrees);
                                break;
                                }
case 3: {                                //movements for position 3
    motor[IR_lift] = -50;
    motor[bucket_lift] = 10;
    driveForward(65, 5);
    wait1Msec(WAIT);
    gentleTurn(45, RIGHT);
    wait1Msec(WAIT);
    driveForward(100, 36);
    motor[IR_lift] = 0;
    wait1Msec(1300);
    gentleTurn(45, RIGHT);
    wait1Msec(WAIT);
    driveForward(60, 12);
    motor[bucket_lift] = 0;

    break;

                                }
default: {                                //movements for emergency situation
    motor[IR_lift] = -30;
    wait1Msec(2500);
    motor[IR_lift] = 0;
    gentleTurn(360, LEFT);
    wait1Msec(WAIT);
    break;
                                }
}
return;
}
////////////////////////////////////
// the following block holds the turn sub-program
void gentleTurn(int turnDegrees, int turnDirection){
    int countsToTravel;

    countsToTravel = turnDegrees * CPD;
    nMotorEncoder[leftMotors] = nMotorEncoder[rightMotors] = 0;
    while (abs(nMotorEncoder[leftMotors]) < countsToTravel){
        if (turnDirection == RIGHT){
            motor[leftMotors] = -100;
            motor[rightMotors] = 100;
        }
        else {
            motor[leftMotors] = 100;
            motor[rightMotors] = -100;
        }
    }
    motor[leftMotors] = motor[rightMotors] = 0;
    eraseDisplay();
    nxtDisplayCenteredTextLine(0, "%d", abs(nMotorEncoder[leftMotors]));
}
////////////////////////////////////
// the following block holds the drive sub program

```

```

                                4Auto-Ramp.c
void driveForward(int power, int targetDistance){
    long totalEncoders, speedAdjust;
    long targetCounts;
    int encoderDiff;
    int distanceTraveled, robotsSpeed, stallTimeHandle;
    long stallTime, d1, d2, runTime;

    targetCounts = (targetDistance * CPI);
    totalEncoders = speedAdjust = 0;
    nMotorEncoder[leftMotors] = nMotorEncoder[rightMotors] = 0;
    motor[leftMotors] = motor[rightMotors] = power;

    clearTimer(runTimeHandle);
    while(totalEncoders < targetCounts){
        runTimer = time1[runTimeHandle];
        if (runTimer >= 1000) {
            encoderDiff = (nMotorEncoder[leftMotors]) -
(nMotorEncoder[rightMotors]);
            if (encoderDiff > 0){
                speedAdjust = speedAdjust + 1;
            }
            else {
                speedAdjust = speedAdjust - 1;
            }
            motor[rightMotors] = power + speedAdjust;
            clearTimer(runTimeHandle);
            runTimer = 0;
        }
        totalEncoders = abs(nMotorEncoder[leftMotors])+
abs(nMotorEncoder[rightMotors]);
    }
    // the following block sets the motors to 0
    motor[leftMotors] = motor[rightMotors] = 0;
}

//Scores in center goal and kicks stanc
void scoreCenter(int scoreadjust, int adjustDegrees, int kickadjust, int
kickDegrees){
    if (kickflag){
        kickstandonly();
        return;
    }
    motor[IR_lift] = -50;
    motor[bucket_lift] = -40;
    wait1Msec(200);
    motor[scissor_lift] = -100;
    wait1Msec(2500);
    motor[IR_lift] = 0;
    wait1Msec(3500);
    motor[scissor_lift] = 0;
    driveForward(60, scoreadjust);
    wait1Msec(WAIT);
    servo[sci_trapdoor] = 180;
    wait1Msec(1000);
    servo[sci_trapdoor] = 0;
    driveForward(-60, kickadjust);
    motor[scissor_lift] = 80;
    wait1Msec(3500);
    gentleTurn(adjustDegrees, LEFT);
    wait1Msec(WAIT);
    driveForward(60, 20);

```

#### 4Auto-Ramp.c

```
wait1Msec(WAIT);
motor[scissor_lift] = 0;
motor[bucket_lift] = 70;
wait1Msec(200);
if (scoreCenterflag) {
    return;
}
gentleTurn(kickDegrees, RIGHT);
wait1Msec(WAIT);
driveForward(100, 30);
wait1Msec(WAIT);
gentleTurn(360, RIGHT);
wait1Msec(WAIT);
return;
}
```

```
void kickstandOnly(){
    motor[IR_lift] = -50;
    gentleTurn(45, LEFT);
    wait1Msec(WAIT);
    driveForward(60, 15);
    wait1Msec(WAIT);
    motor[IR_lift] = 0;
    gentleTurn(30, RIGHT);
    wait1Msec(WAIT);
    driveForward(60, 48);
    return;
}
```

//ayy lmao

////////////////////////////////////



Session # 65

Attendees: Ankith, Serdar

Location: Arnav's House

Date: 4/10/15

Plan for the day

Address problem of extra IR rays (DC) interfering with rays the IR beacon emits (AC)

Task	Reflections
• We went to the root program of the IR sensor	• We found a function that only calls AC values and changed the program so we only call AC values. AC values use only <del>high</del> IR from <del>sensor</del> beacon an DC
•	values use only Ambient light. When we use the normal function call it uses the one w/ the highest strenght. So when Flood lights are on or it is sunny it uses DC values.

Recorded by:

Serdar, Ankith

FTC #6134 Black Frogs

Session # 66

Attendees: Ankit, Serdar

Location: Ance's House

Date: 4/11/15

Plan for the day

Fix problem of getting  
not accurate enough  
readings 2

Task	Reflections
We were not getting a big enough variety of IR values to figure out the position	We attached another IR sensor which is facing 30° to right. Now we can add 2 variables, IR2, and IR Diff.

Recorded by:

Ankit Udega

# FTC #6134 Black Frogs

Session # 67

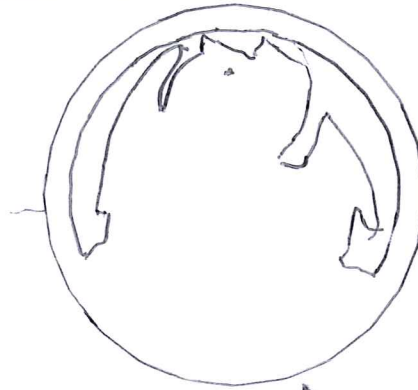
Attendees: All

Location: Aaron's house

Date: April 12

## Plan for the day

- Use cad to create 3D printed trinkets to decorate the pit
- create replacement parts for the robots bucket ~~and~~ scoop



↑ rough draft of 1/3 scale frog coin

Task	Reflections
Cad the 4 inch frog coin	<p>The frog coin was coded in sketchup because sketchup allowed exporting in the files needed for our next piece of software, Cubify.</p> <p>Cubify allowed us to convert the cad files to print files to print files. The print files now uploaded to the Ekocycle 3D printer, the 4 in diameter coin made an appearance in the pit in North superregionals.</p>

Recorded by:

Alex Moore



Session # 67

Attendees: Ankit, Serdar

Location: Arnav's house

Date: 4/12/15

Plan for the day

Fia: problem of being inaccurate.

Task	Reflections
The center goal <del>is</del> can be up to 4 inches off so we are inaccurate	We decided to use IR values several times in the code so we are constantly in the same place relative to the center goal for example occasionally
if we hard code it w/ numbers.	We will go forward until the IR value is 7.

Recorded by:

Ankit Wd 2u

# Section Ek

## Design Validation

FTC #6134 Black Frogs

Session # 23

Attendees:

Sydney, Sabith, Nishita,  
Arun, Arnav, Alex

Location: Arnav's basement

Date: 11.11.14

Plan for the day

Validate that the robot is fit for competition

Task	Reflections
Autonomous -r	Robot drives down the ramp
pick up balls	Scoop uses curved edges and arms to pick up balls. A Built in funnel transfers the balls to the chute

Recorded by:

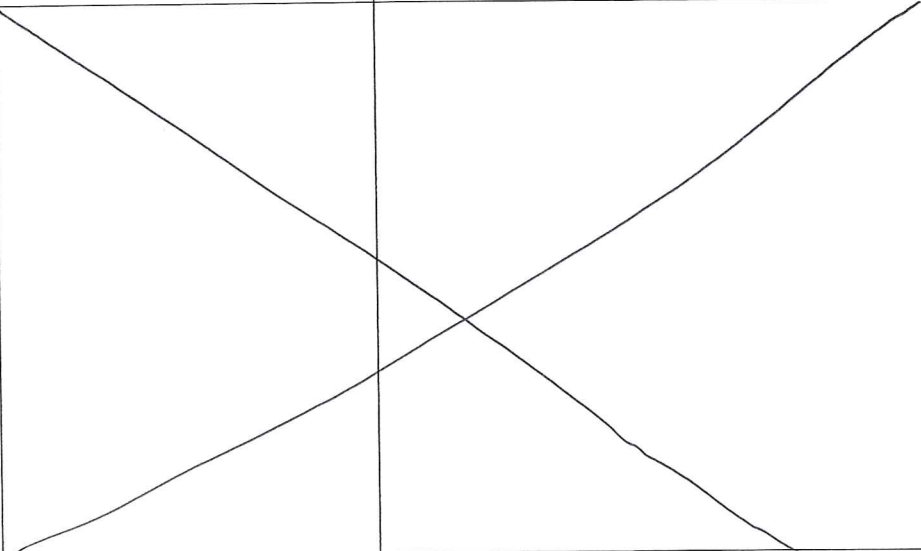
Alex Moore



# FTC #6134 Black Frogs

Session # 23

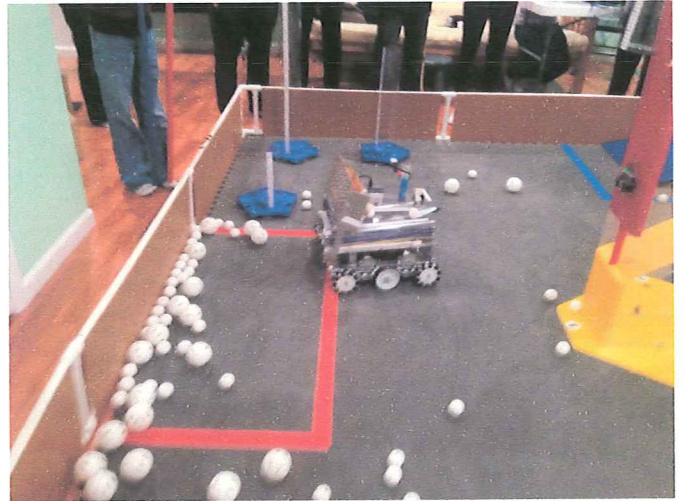
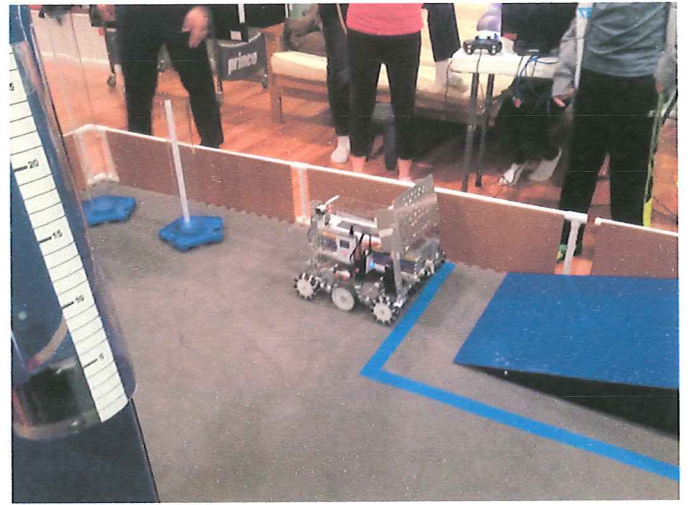
Date: 11-11-14

Task	Reflections
raise scissor lift	the lead screw is able to lift the scissor lift with the help of rubber bands. It raises balls over 48 inches
dump balls	the servo along with a curved piece of plastic used for a bridge is able to dump the balls.
	

Recorded by:

Alex Moore

Ek-2



# Section EI

## Test Results



# FTC #6134 Black Frogs

Session # 15

Attendees: Emerson

Location: Arnav's House

Date: 10-23-14

## Plan for the day

Find the problem with  
slow ~~the~~ running back wheels

Task	Reflections
measure RPM of wheels	<p>We used a tachometer to measure the RPM of the <del>motors</del> motors.</p> <p>Front left → 124.7 RPM  Back left → 11.4 RPM  Front right → 102.7 RPM  Back right → 110.57 RPM  <del>We measured</del></p>
measure voltage of motors	<p>We measured the input voltage at each motor.</p> <p>Right Front → 10.69 v  Left <del>Front</del> Front → 11.31 v  Right back → 11.42 v  Left Back → 10.86 v</p>

Recorded by:

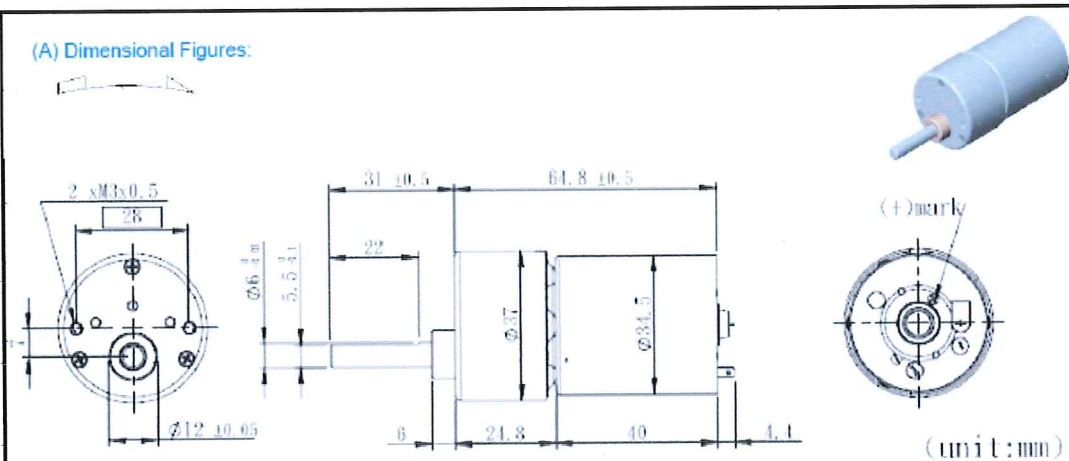
Sydney Grassmeyer

Updated: 2011.01.28

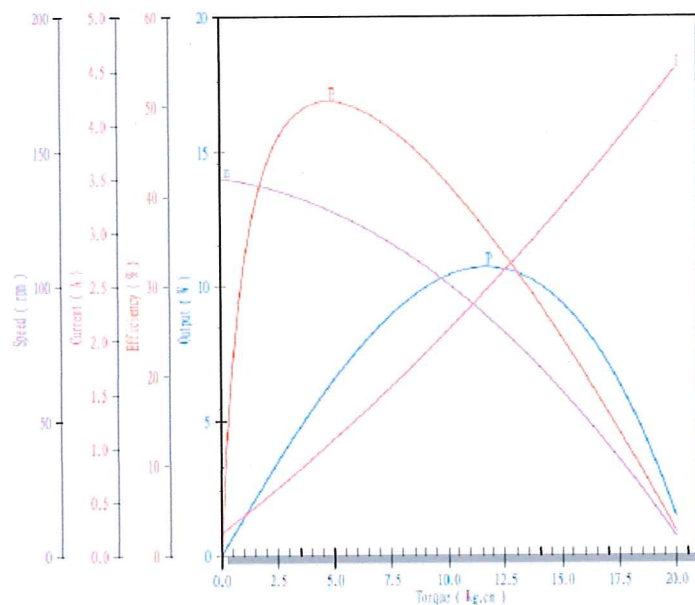
### GENERAL SPECIFICATION FOR TETRIX DC DRIVE MOTOR

Test Voltage : 12 Volts DC  
No Load Speed : 146 RPM (nominal) can deviate +/- due to manufacturing tolerances  
No Load Current : 0.17 Amps  
Gear Ratio : 1:52

(A) Dimensional Figures:



(B) MOTOR PERFORMANCE CURVES AND CHARACTERISTICS:



Supply Voltage = 12 VDC

AT NO LOAD

SPEED = 146 RPM  
CURRENT = 0.17 AMP

AT STALL EXTRAPOLATION

TORQUE = 20 kg-cm  
CURRENT = 4.55 AMP

AT MAXIMUM EFFICIENCY

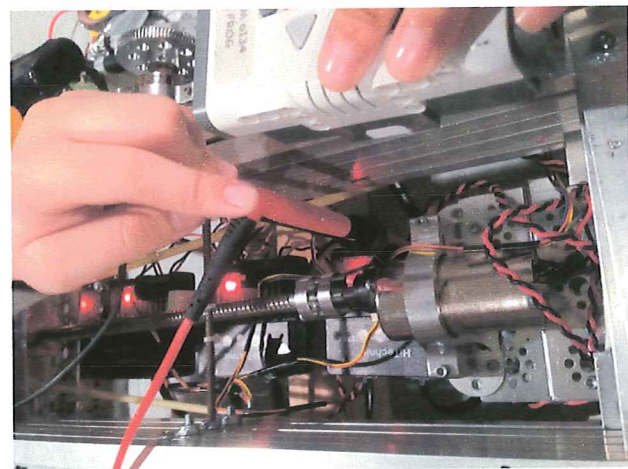
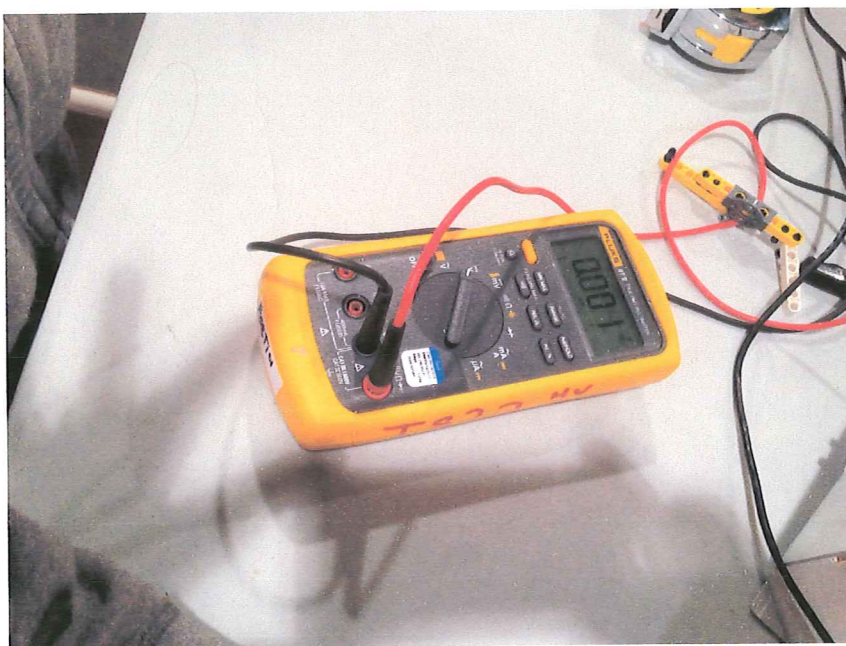
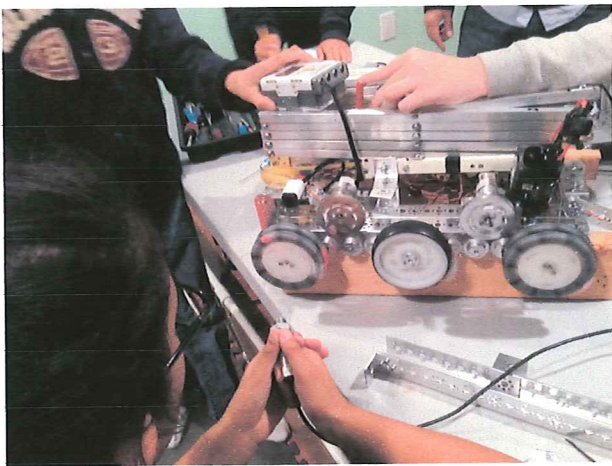
EFFICIENCY = 50 %  
SPEED = 128 RPM  
TORQUE = 4.85 kg-cm  
CURRENT = 1.05 AMP  
OUTPUT = 6.38 WATTS

AT MAXIMUM OUTPUT

SPEED = 89 RPM  
TORQUE = 11.72 kg-cm  
CURRENT = 2.46 AMP  
OUTPUT = 10.7 WATTS  
EFFICIENCY = 38.22 %

Torque Conversions:  
1.0 kgf-cm = 0.098 Nm = 98 mNm  
= 13.887 oz-in = 0.867 lb-in







# FTC #6134 Black Frogs

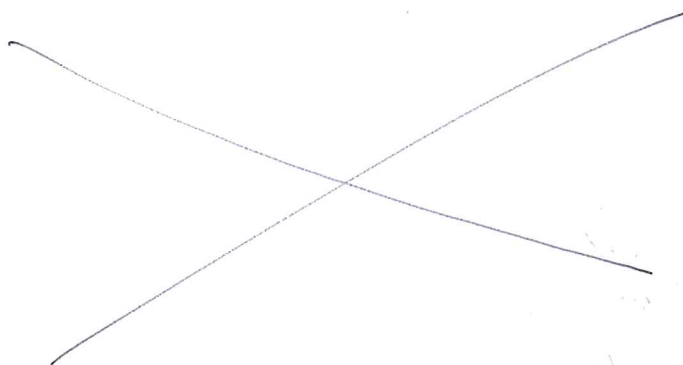
Session # 19

Attendees: Everyone

Location: Arnav's house

Date: 11-1-19

## Plan for the day



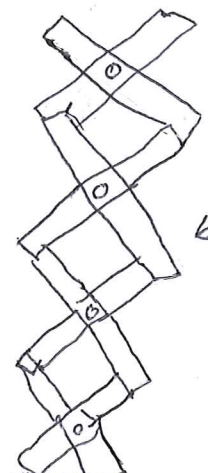
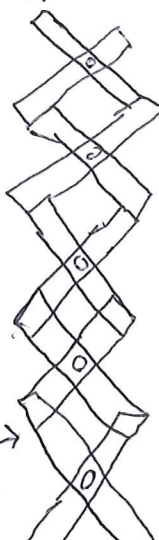
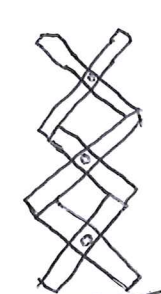
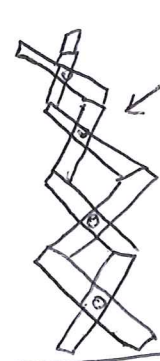
Task	Reflections
Test scissor lift	After finishing our scissor lift we tested it to make sure we could go <del>up</del> up 48 inches. We found two problems when we tested the scissor mechanism. Our first problem
	was that the scissor was not tall enough with the current number of layers. To solve this problem we added another layer to the scissor mechanism.

Recorded by:

Arnav Talukder

Session # 19

Date: 11-1-14

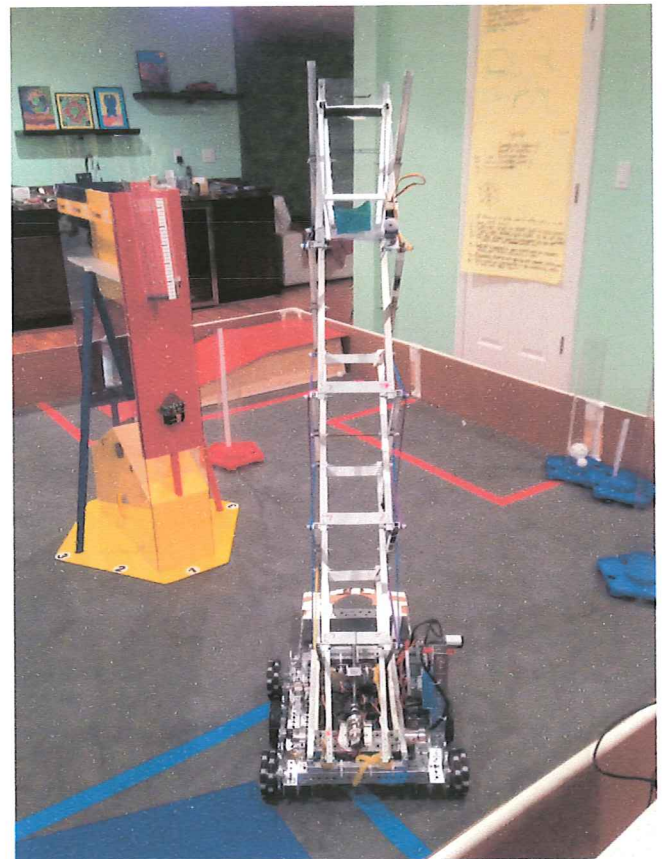
Task	Reflections
<p>Test scissor lift continued</p>	<div data-bbox="558 369 1356 985"> <p>Before</p>  <p>Scissor with four layers when it wouldn't reach 48 in</p> <p>We <del>add</del> added a fifth layer to make sure we successfully reach 48 in</p>  <p>After</p> </div> <p>Our second problem was that when the scissors rose it would start to tilt. To fix this problem we added rubber bands horizontally to balance it on one side and we added rubber bands diagonally to balance it on the other side.</p> <div data-bbox="558 1366 1356 1792"> <p>Ideal state</p>  <p>Error state (Tilting)</p>  </div>

Recorded by:

Arnav Talukder



Before Rubber Bands



After Rubber Bands



FTC #6134 Black Frogs

Session # 21

Attendees: Everyone

Location: Arnav's house

Date: 11/7/14

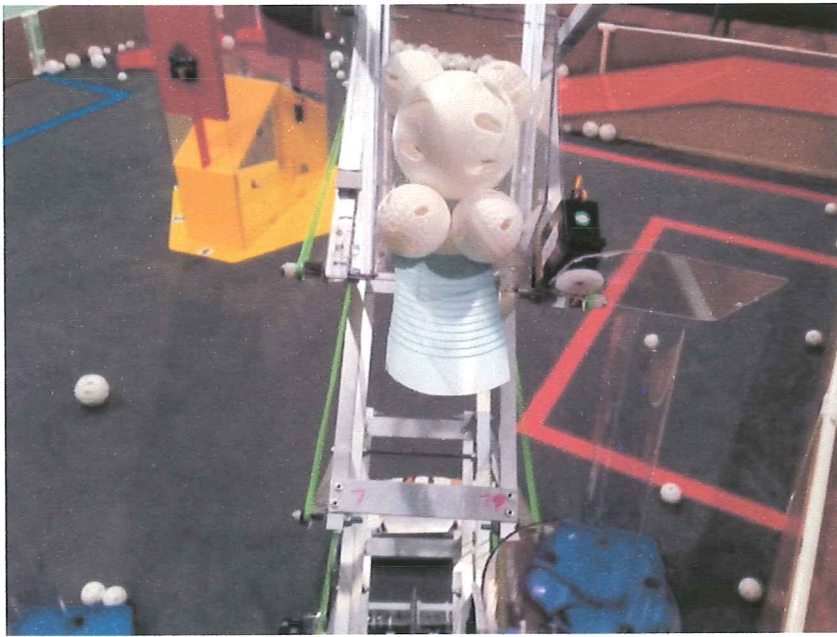
Plan for the day

Tried to drop balls, but two balls got stuck in the dropper

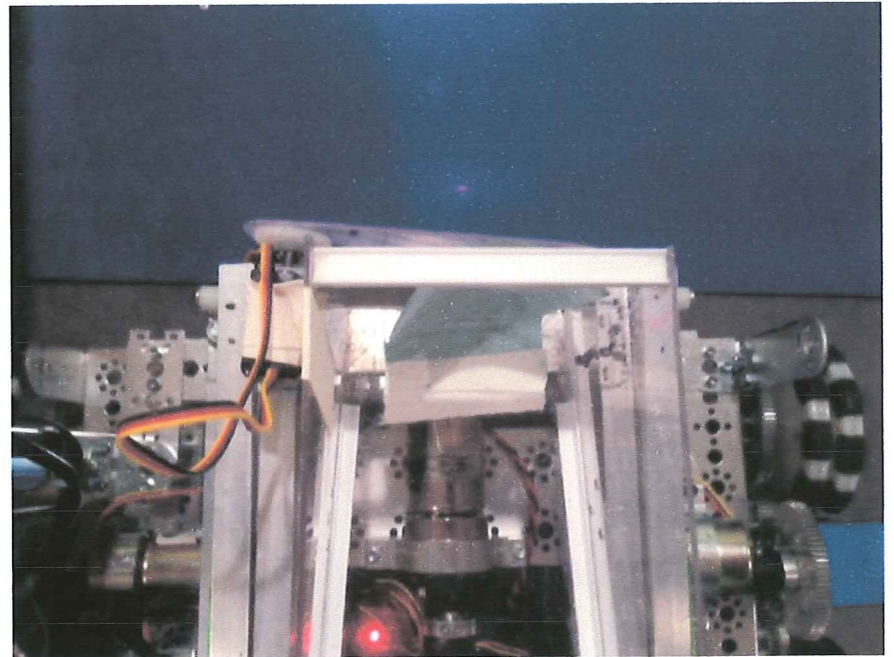
Task	Reflections
Tried to fix the dropper	The original width of the dropper mechanism was 3 inches, so the two small balls got stuck. To fix it, we added a plastic I-beam, and that increased the width to 4 inches.

Recorded by:

Vinay Panyam



When the balls got stuck



Our Solution

FTC #6134 Black Frogs

Session # 22

Attendees: Everyone

Location: Arnav's House

Date: 11-10-14

Plan for the day

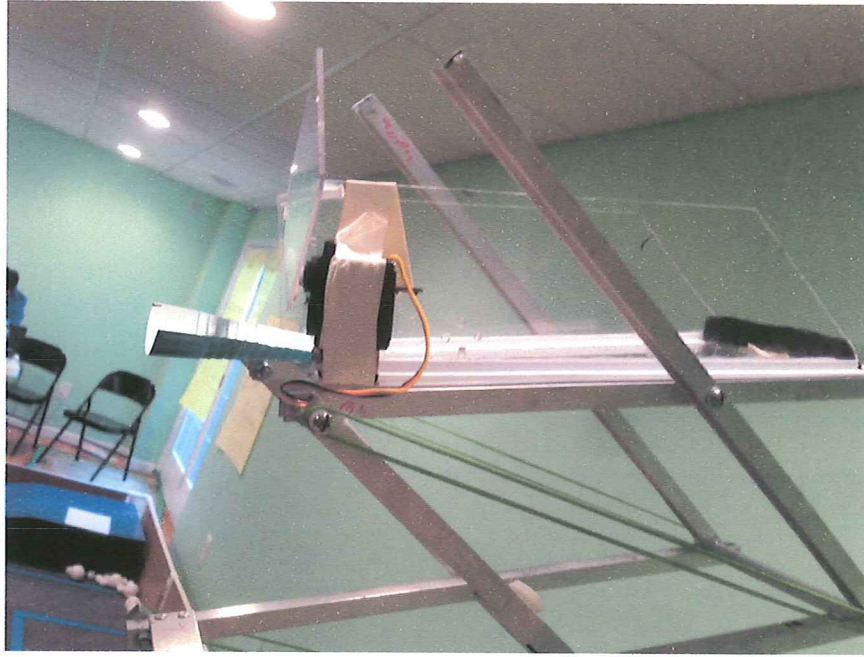
- Testing balls dropping in rolling goal

Task	Reflections
testing the ball drop mechanism	As we were practice driving we saw that our aim in the rolling goal was poor. Our balls weren't falling in the goal. Out of 5 balls 1 would get in. We decided to think of solutions to this problem.
solutions to our problem	We all decided on a plastic cup side/tongue to be put on the back of our mechanism. This cup would guide the ball into the goal and proved to be very accurate.

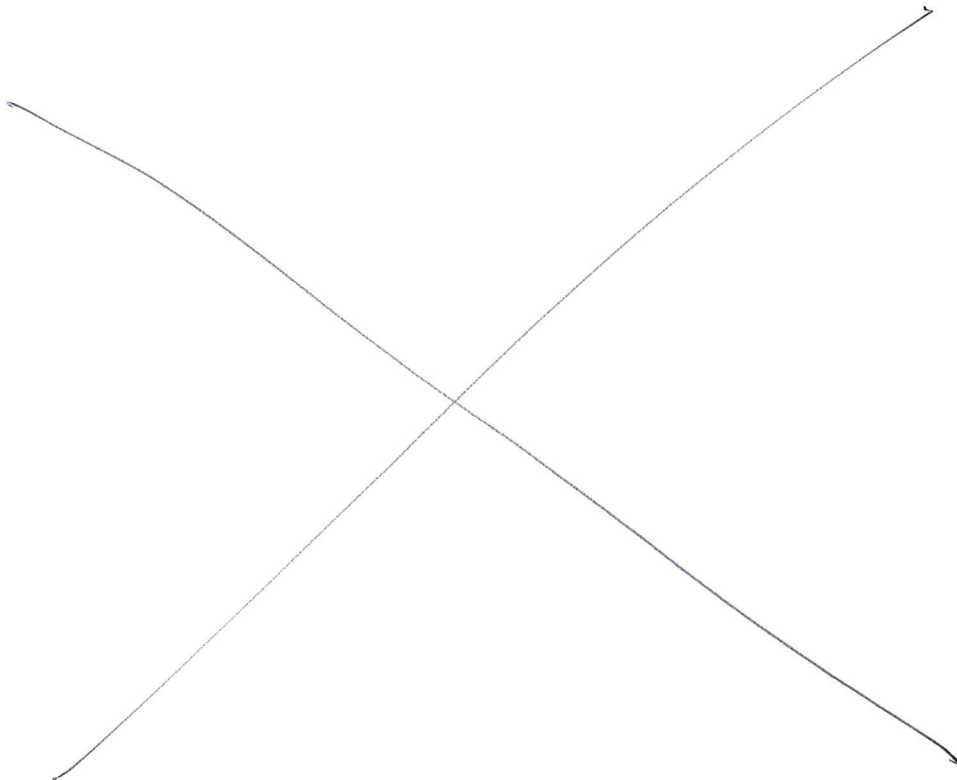
Recorded by:

Nishtha Kakar





cup slide



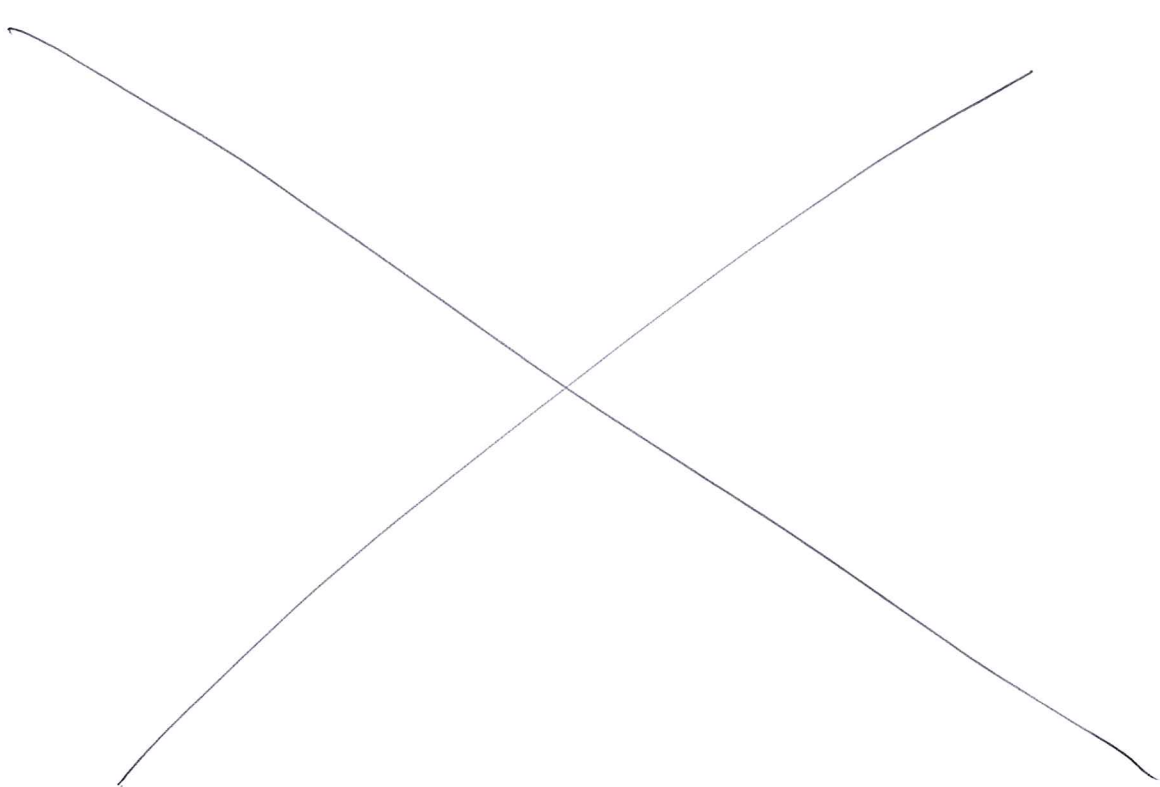
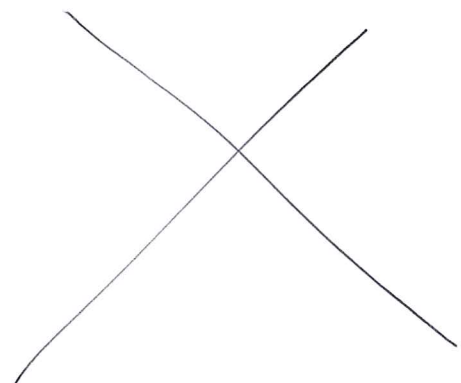
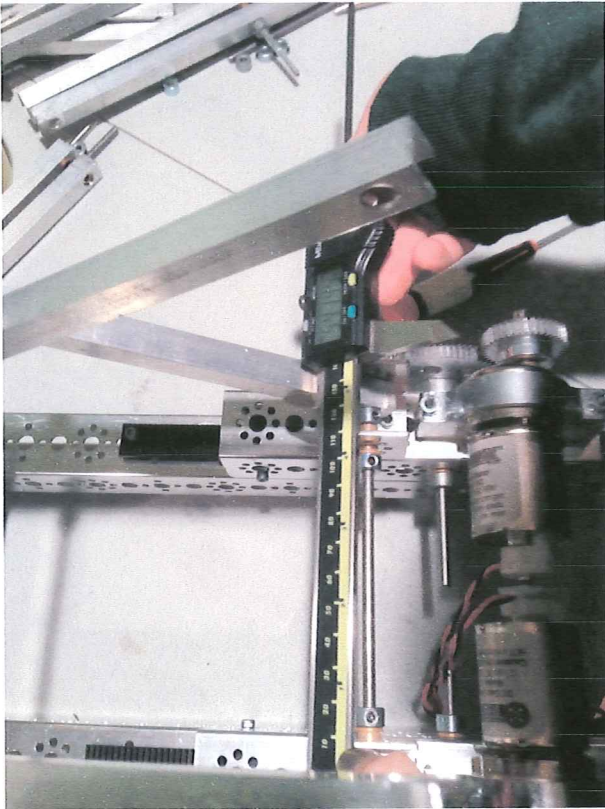
Session # 37

Date: December 17, 2014

Task	Reflections
Measurements using vernier caliper	5.3795 in - inside 5.3950 in - outside
	<div> <div>5.41 in</div> <div>5.41</div> <div>4.1 inches</div> <div>4.2</div> </div>
	Using the vernier caliper we measured the distance between the inside and outside of the C-channels, we <del>precisely</del> precisely measured all the layers to make them equal.

Recorded by:

Sydney & Alex



EL-1



# Section Em

## Innovation

FTC #6134 Black Frogs

Session # 22

Attendees: Everyone

Location: Arnav's House

Date: 11-10-14

Plan for the day

- innovation observation

Task	Reflections
- bucket mechanism	- We made our bucket to innovatively scoop the balls. We also made holes in the bucket to decrease the weight.
- drop mechanism	- We created a mechanism to drop the balls into the goals. We had a problem with gravity allowing the balls to drop too early so we added a door a servo and we added a guide / tongue made of plastic to lead the balls to the goals.

Recorded by:

Nishtha Kakar and Sydney Brassmyer

Em-

# Section En BOM



FTC Robot Bill of Material		
Team Number: <b>6134</b>		
Part Description	Game Rule / Forum Reference	
3-D printed ball guides	<R08>, <R04>b, <R07>	
3-D printed flag holder	<R08>, <R04>b, <R07>	
Acrylic sheet	<R04>a	
Aluminum Rods	<R04>a	
Brass Nut	<R04>a	
Convolute	<R04>a	
Electric insulation tape	<R10>f	
Electric wire & connector	<R10>f	
Hose Clamps	<R04>a	
Lead Screw	<R04>a	
Lubricant	<R06>	
On/off switch	<R08>h	
Plastic Cup pieces	<R04>a	
Soldering material	<R05>	
Shelf Liner	<R04>a	
Super Glue	<R04>a	
Off-the-shelf springs	<R04>a	
Adhesive tape	<R04>a	
Velcro	<R04>a	
Zip Ties	<R04>a	

EN-1