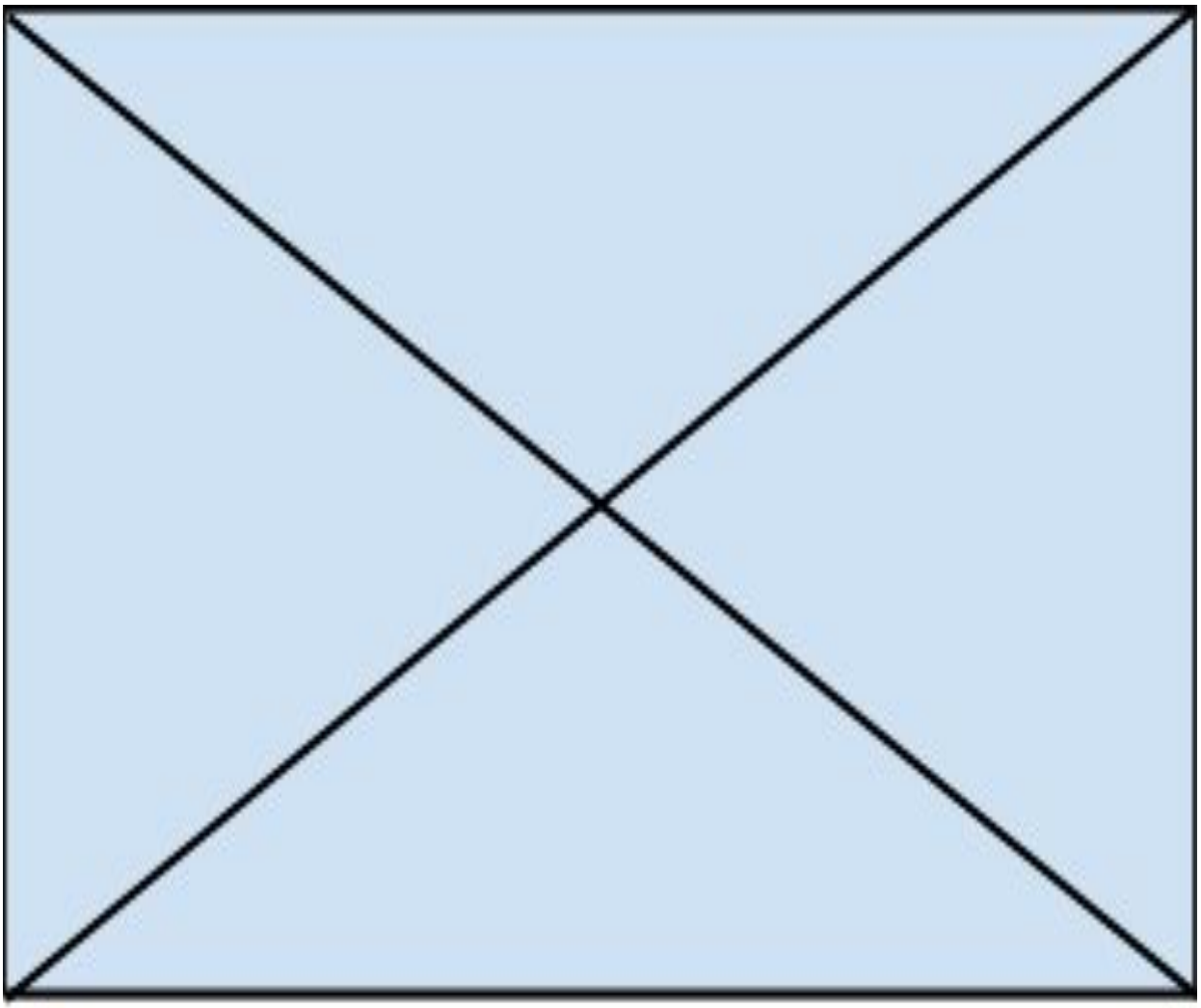
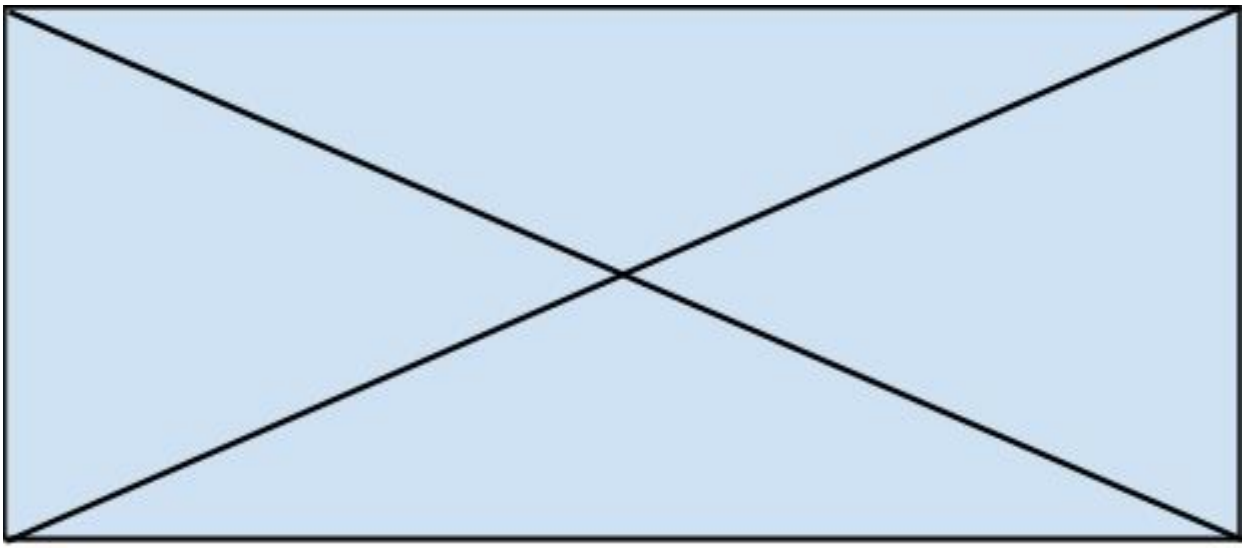
Attendance	Date	Duration
Simon, Mr. Auderset, and The Robotics club	9/9/2016	30 minutes

Objectives	Reflections
1. Recruit members for the first FTC team at Urbana High school in 10 years	1. The presentation went pretty well; 8 students were interested. We exchanged conversation about how we could acquire parts and fundraise. Turns out one of the teammates knows a guy who owns a FTC kit that could lend us the parts. The members of the team all seem dedicated and also have connections to tech companies which opens doors to future fundraising/sponsorship opportunities. We also discussed what days would work to meet since we all have busy schedules.



Attendance	Date	Duration
Simon, Viktor, Nickolas, Nicholas, Jorgen, Harry, Jason, Michael, Charlie, Jeff, Neelam, Jude and Mr. Auderset.	9/12/2016	30 minutes

Objectives	Reflections
1. Discuss team names 2. Follow up on previous meeting (9/9/16) 3. Find a way to communicate as a team 4. Meeting on weekends	1. Because of new members joining and a limited time today due to a debate team meeting and a NHS meeting we postponed the team naming to the next meeting on Friday. 2. We followed up the last meeting by talking about the different fundraiser opportunities could be confirmed. We learned that a Verizon sponsorship would be a viable option as well as buffalo wild wings. We also confirmed the availability of the robot kit. 3. Because we were currently using remind, we decided that it would be better if we communicated in more a team oriented way, so we started a group me group chat. 4. Because of the limited time to meet on the weekdays due to other extracurriculars we agreed that meeting on the weekends would be a better option for everyone, specifically on Sundays. We will be contacting the Chinese school that runs during Sundays to see if we could use one of the rooms in the school. We will also ask our parents to see if one of our homes can host the weekend meetings.



Attendance	Date	Duration
Simon, Viktor, Nickolas, Nicholas, Jorgen, Harry, Jason, Michael, Charlie, Jeff, Neelam, Jude and Ms. Elias.	9/16/2016	1 hour

Objectives	Reflections
1. Discuss team name 2. Meeting days 3. Introduce the game to the team	1. We decided after much though that our team name should be Urbana Bananas, for embodies the wacky spirit of the team. 2. We decided that we should try to meet at least once during the weekdays to accommodate everyone's busy schedule. After discussing the basic administrative/logistics aspects of the team we all sat down to look at what this year's challenging was all out. 3. We all watched the introducing animation and took notes of what challenges we wanted to aim for. We adjourned the meeting with the decision to meet on either Mondays or Fridays, with a weekend meeting at Charlie's house on Sundays.

Discussion after viewing the game animation

Attendance	Date	Duration
Simon, Viktor, Nickolas, Nicholas, Jorgen, Harry, Jason, Michael, Charlie, Jude and Jason	9/18/2016	4 hours

Objectives	Reflections
1. Create an inventory of what we have so far 2. Decide on the points we will prioritize. 3. Decide on our drive train 4. Decide on a basic shooter system	1. We started off by sorting out the matrix kit that was donated to us and identifying what we had. We discovered that we nearly nothing what we needed to succeed. By the end of the meeting we had come to realize that we had nowhere near the adequate amount of parts to even begin building a drive train. We unanimously concluded that we desperately needed to fundraise, in order to buy parts. We all went home thinking about how to overcome this challenge of being a rookie team. 2. Afterward, we began to brainstorm a general idea of what our robot was going to be capable of. We also talked about what we were going to aim for points wise. We also decided that we should build our robot in a way that it could be successful in the autonomous round. Rather than during the drive period, in order to have a more accurate robot. We also deprioritized the Cap ball and agreed that we should focus on making our robot work with more challenges than just one. 3. We researched and brainstormed for a solid 3 hours. We decided that a four-wheeled robot with two 4 inch wheels in the back and two omni wheels in the front all directly connected to motors were going to best way to go. 4. We also decided that we were going to mimic the way that tennis ball servers worked with our launcher to provide a fast way to deliver the balls.

Autonomous Period	Control Period
- start with shooting two particles into center vortex - hit cap ball of base - activate beacons - drive onto corner vortex	- ignore corner vortexes and focus on center vortex - cap ball at the end of the match -capture beacons if there is time or if other team has a better method of capping ball

Organizing all of the Matrix parts

Brainstorming strategy

Beginning to build a drive train

Jorgen and Harry configuring wheels

Attendance	Date	Duration
Simon, Viktor, Nickolas, Nicholas, Jorgen, Harry, Jason, Michael, Charlie, Eziki, Jason, and Jude	9/22/16	2 hours

Objectives	Reflections
1. Brainstorm ideas for sponsors 2. Community outreach ideas 3. Fundraising event ideas 4. Create a basic list of grants and parts we need to buy	1. We met in the Urbana High school library to brainstorm various community outreach and fundraising ideas. We contacted QIAGEN for information about scheduling a sponsorship meetup, as well as JTB engineering. We also are getting in contact with a Verizon campus for a sponsorship. 2. We decided to create a twitter and Facebook page for our team as part of Community outreach. We also talked about making a Website in the future and visiting a book fair, or some other type of event to expose the nearby elementary schools to FIRST. 3. We also start talking to the horticulture teacher about creating a compost program where we would donate banana peels to a compost pile which would be used to grow plants for the homeless shelter/soup kitchen. The banana peels would be acquired from handing bananas out at the qualifiers, various fundraising events, and hopefully at the lunch room. One fundraising idea we came up with a was a super smash bros tournament at the Urbana Library, where an entrance fee would be our source of profit, and gamers eating the provided bananas would be our source of compost. Harry is in charge of this project. Another fundraising idea is to make a video for the announcements announcing that our team would be collecting donations every fourth period from each class and that the class that raises the most money would be treated to a pizza/banana party. Another idea was to have a banana stand in the lunchroom and have a donation bucket outside our football stadium during home games. We also created a list of grants and parts we will buy. We decided an Actobotics kit with many bars as well as Actobotic's 4 inch wheels were what we were going to buy upon receiving enough money to buy the parts that we needed.

Our Social media links

Twitter: https://twitter.com/urbanaftc

Facebook: https://www.facebook.com/Team12063/

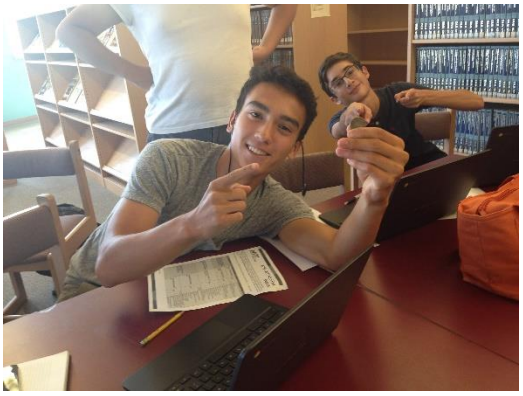
Instagram: https://www.instagram.com/themandelbots/

YouTube: https://www.youtube.com/channel/UCPvDhf4c15mjKNb2U0naZSQ

Website: www.themandelbots.com

Brainstorming

Brainstorming

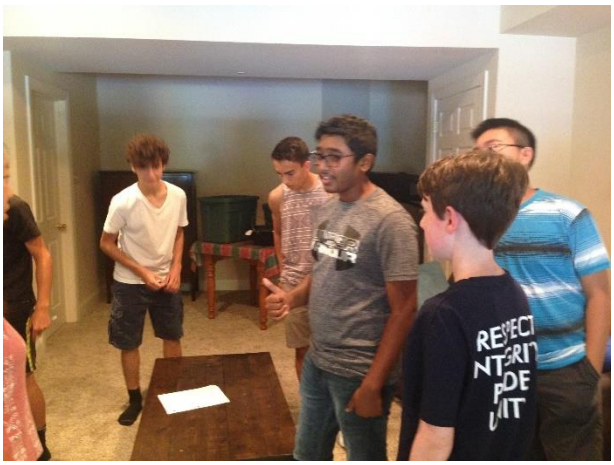


OUR FIRST DONATION BY RYAN Z. OF 25 CENTS!!!!!!!!!!!!!!!

Eziki creating starting up a website

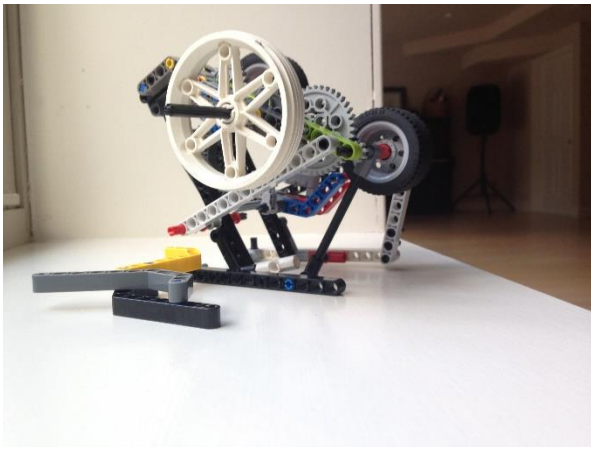
Attendance	Date	Duration
Harry, Charlie, Jorgen, Michael, Simon, Viktor, Nick, Jude, Jessica, and Alex	9/25/2016	3 hours

Objectives	Reflections
1. Shoot an advertisement for the morning announcements 2. Research into more Robot ideas 3. Prototype shooter 4. Create a RACI matrix	1. We filmed the first ½ of our advertisement as well as photos but we still have to do our voiceover. [Update] because of logistical problems with our school we were unable to air our advertisement 2. We did research on other FTC teams robots and what they are doing and we saw a lot of interesting ideas, we think we are going to use the wheel method for our launcher. 3. We prototyped a shooter out of Legos. This prototype can launch ping pong balls at an excellent trajectory. We were satisfied with this design. 4. We spent the last 20 minutes of the meeting deciding the different responsibilities that the members of our team have using a RACI matrix which stand for Responsible Accountable Consulted and Informed.

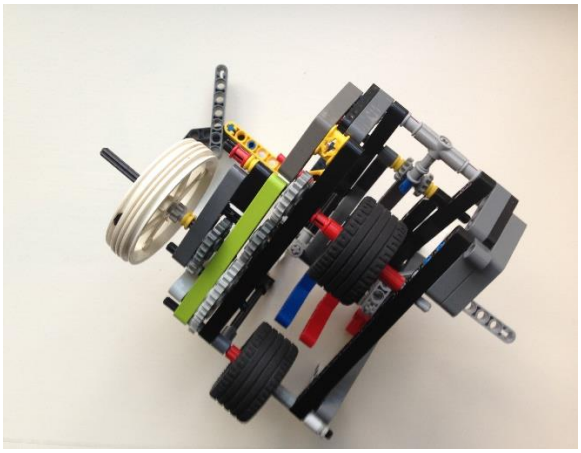


Discussing our script

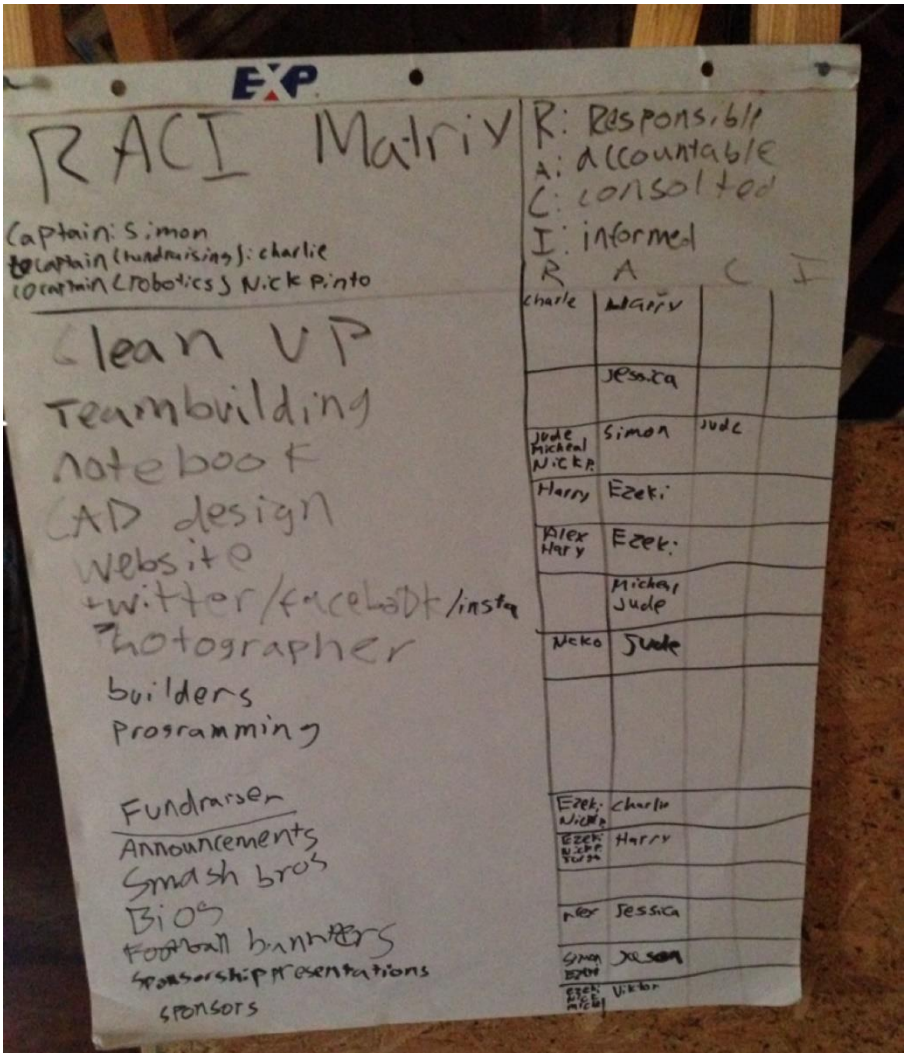
Eziki, our spokesperson, talking about FTC



Our Lego shooter prototype



Our Lego shooter prototype



Our current RACI matrix, will be updated as we acquire parts

Attendance	Date	Duration
Harry, Charlie, Jorgen, Michael, Simon, Viktor, Nick, Jude, Jessica, and Alex	10/2/2016	3.5 hours

Objectives	Reflections
1. Check in on sponsorship details 2. Begin Conceptualizing the robot. 3. Team-building 4. Team name discussion 5. Meeting log discussion	1. We were informed that the JTB sponsorship would fall through, all we needed to do is to visit the JTB shop. The JTB engineering firm offered 100 dollars + unlimited request to machining if we pay for the materials. We are still waiting on Verizon. QIAGEN will not work unfortunately. 2. Nicholas and Charlie opened the meeting by setting some guidelines for the building the robot. Knowing that the team would start with a functionality of the autonomous period, they informed the rest that they would need to focus on consistency and efficiency. Charlie had created a modified design matrix called p/c/h/w (Pros/Cons/How/Why). Following Charlie's explanation of his p/c/h/w modified design process. We spent the rest of the of the meeting going through every single idea that we as a team had a going through the p/c/h/w process to set the basis for the prototype robot and so Simon could do a rough 3d model on Autodesk inventor of the robot. Harry, Eziki, and Nick also proposed of an idea similar to AI for the Autonomous period. They decided that they would work on such a program/system on top of the responsibilities they already had on the team to attempt to make such a difficult idea work. 3. Jessica, the team member "accountable" for team building activities decided by our RACI matrix, put together a team building activity based on communication where different teams had to direct one person that was blind to a certain location. We learned how valuable good communication is to being successful in completing a mission. Afterward we played a short game of basketball and adjourned our meeting. 4. After much talk we decided that we should change our team name to The Mandelbots for it is a much more "cool" name and is somewhat relevant to robotics. As much as we like bananas the Mandelbrot set will always be cooler.

	5. The Meeting log committee got together and modified our log format to something that is Mandelbrot related.

Focus: Autonomous Period
Game Plan:

1. Pre-load two particles into the robot to be shot into the center vortex.
2. Claim a beacon
3. Move a capball and park on the center line

Main Question: How do we design a robot to best embody the traits needed to success in the autonomous period?

- Movment
  - Four wheels
    - 2 omni wheels and 2 regular wheels
      - Pro: easier to steer
      - Con: less consistent, may not move in a vertical line due to omni wheels
      - How: put motor on all wheels
      - Why: it's easier to turn and a little more accurate than all omni wheels
    - All omni wheels
      - Pro: more degrees of freedom
      - Con: hard to steer, inaccurate turns
      - How: same as above but back wheels slip
      - Why: you have two pivot points
    - Slanted four wheels (mechanum)
      - Pro: Moving in four directions without having to turn
      - Con: Slips a lot, less control, expensive.
      - How: move all wheels in the same rotation; a pair of wheels moving in counter direction to the opposite pair
      - Why: provide more axis of straight rotation/movement
  - Six wheels
    - Four omniwheels, two regular wheels.
      - Pro: Pivot on two standard wheels (center) , move in full circles. Only six-wheel configuration which is feasible.
      - Con: If center wheels slip, there would be a lot of error. If the wheels are unlevel, it will be highly unstable.
      - How: Drive at least the two middles wheels for turning, when doing straight movement, drive all wheels.
      - Why: Middle rotation point allows for turning in full circles, ergo better mobility.
  - Treads:
    - Two Treads:
      - Pros: No need to worry about turning.
      - Cons: Requires lots of gearing, turning is quite slow.
      - How: Need to acquire treads.

Pg. 1: We decided to use six wheels with a four omni wheel and two standard wheel combo

- Why: Allows for center rotation with minimal slippage. Most likely more slipping than six wheels.

- Scoring
  - Particle (Center Vortex)
    - Flinger
      - Pro: Consistent, Lots of range, Only requires one actuator.
      - Cons: Slow, Inaccurate, Strong, Cannot control angles. Need to frequently repair.
      - How: One motor with acrylic cylindrical catapult which has one end which has a shorter radius and a bar which the end is compressed against which stores potential energy which is released upon the ball when the shorter end is loosened.
      - Why: Only one actuator is required, simplest construction, very consistent
    - Flywheel (angle adjusted by wheel speed)
      - Pros: Faster than flinger, Angle is adjustable.
      - Cons: Whatever model is used to determine angle is inaccurate, potential deadzone when too close to the target
      - How: Two actuators moving the wheels, one other actuator pushing the ball towards the mouth of the wheels
      - Why: Easier to feed into than a flywheel adjusted by servo, uses less actuators, angle is adjustable.
    - Flywheel (angle adjusted by servo)
      - Pro: Very accurate control, Faster than the flinger, large angle range.
      - Con: Hard to feed the ball into
      - How: Two flywheels going at the same speed mounted on a servo which would adjust the angle along with a plunger. A loading mechanism which would be compatible with all angles is required.
      - Why: Extremely accurate which is very good in autonomous mode, allows for the ball to be launched from any location.
    - Piston system (angle adjusted by servo)
      - Pro: fast
      - Con: hard to predict velocity and hard to have variations with trajectories
      - How: https://www.youtube.com/watch?v=ZfcQTZlKp8Q
      - Why: Extremely fast
    - One wheel semicircle spoon thing (angle adjusted by servo)
      - Pro: fast, trajectories can be modified with wheel speed
      - Con: hard to predict velocity and hard to have variations with trajectories

Pg. 2: We decided to use a vertical flywheel system.

- How:
- Why: Extremely fast, easy to build

- Particle (Corner Vortex)
  - Windshield wiper arm things (angle adjusted by servo)
    - Pro: Also accumulates particles very fast for undercarriage particle gathering.
    - Con: can get caught on other robots

    - How:
    - Why:is multipurposes
  - Idea 2

- Beacon
  - 90 degree angle button presser with color sensor
    - Pro: fast only uses one servo
    - Con: Open-loop control, you must steer until directly in front of the beacon, very small margin for error
    - How: https://www.youtube.com/watch?v=Zx_s51OLMCw
    - Why: Simplistic.

  - 90 degree angle button presser with color sensor (AI)
    - Pro: always works, win moneys
    - Con: Very Complicated, conflict with FTC framework

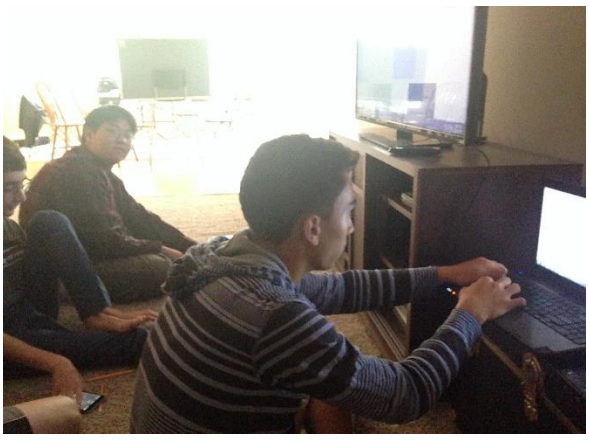
Pg. 3: We decided to use a "windshield wipers" system to access balls that are either side of our Robot. For Beacon pressing we created a 90 arm that would allow us to hit both buttons with only on servo. Three team members (Harry, Eziki and Nick will helm the AI aspect of this sub assembly

- How: Using image recognition with tensorflow to find the relative positions of beacons and balls, in combination with the phone accelerometer finds the robot position. Java or Python implementation.
- Why: Completely closed looped.

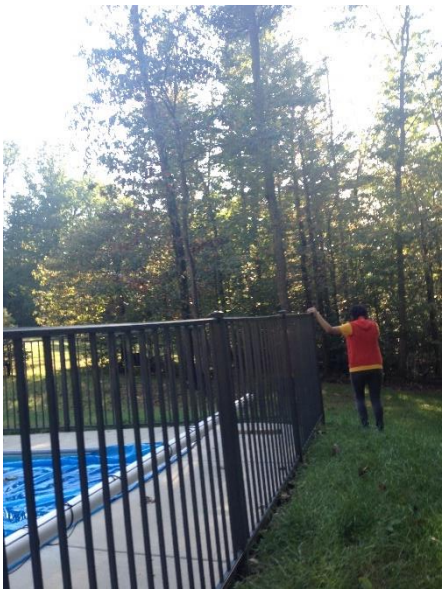
- Idea 3

- Capball
  - Just push the ball of the center platform
    - Pro: simple and easy
    - Con: not very in depth
    - How: run into the cap ball
    - Why: Simplistic.
  - Pick up ball with the front windshield wipers
    - Pro: more points
    - Con: hard to work out and build
    - How: Add extra servos on the windshield wipers so we can move the ball up or the windshield wipers can bring the cap ball onto the robots in which there will be a "choo choo" system in which we launch the ball into the center vortex
    - Why: more style points
- Undercarriage particle collectors
  - Spinning tube with zipties
    - Pro: fast easy to make
    - Con: ?
    - How: something with zip-ties
    - Why: fast

Pg. 4: We decided to combine the "windshield wiper" system with our cap ball system. We also decided to use a tube with zip ties to "suck" particles into our robot



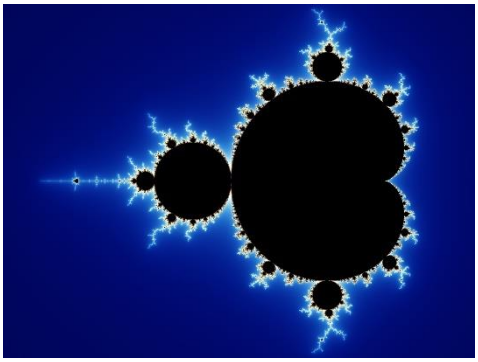
The team filling out our team's design matrix



Jessica navigating a course with her team's instructions

Simon being transported to the starting line of a course

The team playing a game of basketball



The Mandelbrot set plotted and generated with color

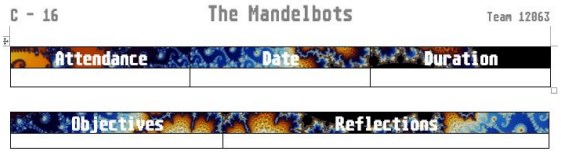
Date	Time

Attendance

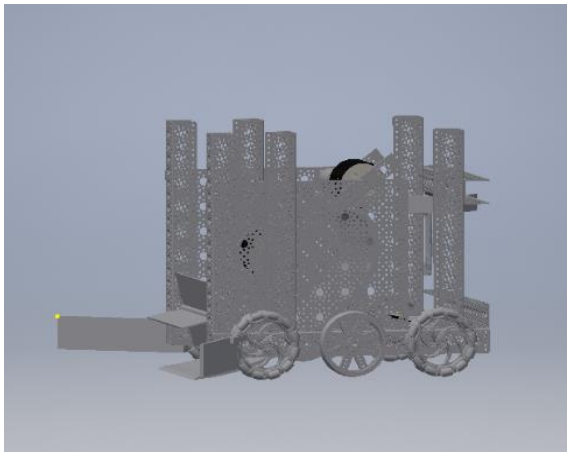
Objectives	Reflections

Our old meeting log format

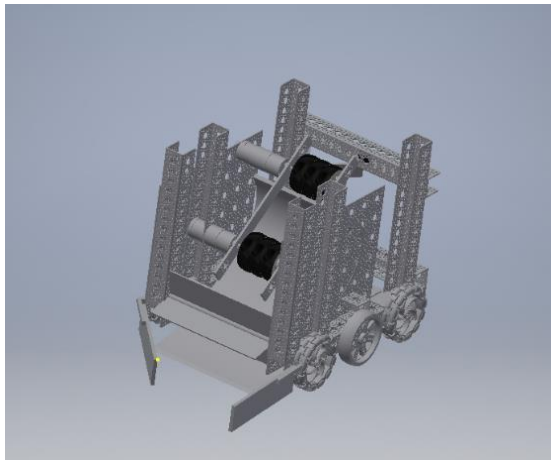
->



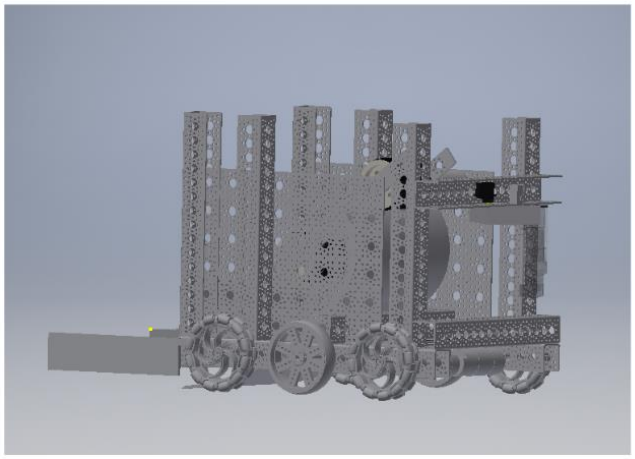
Our new meeting log format



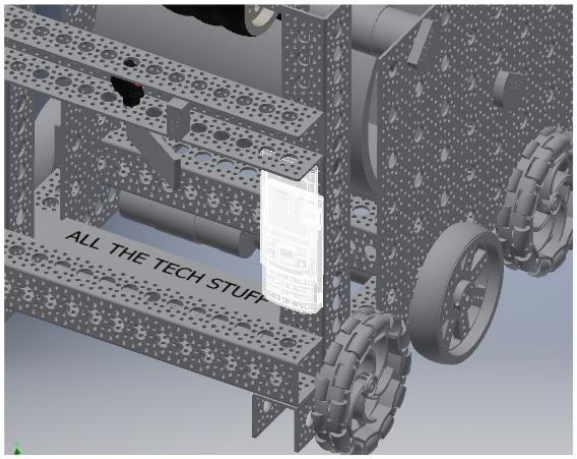
Rough 3D model of our robot concept created by our modified design matrix



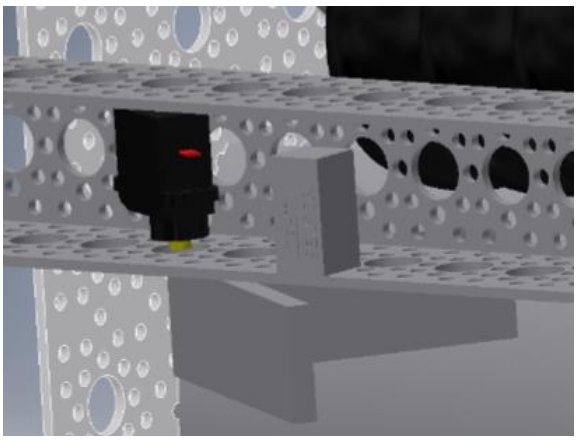
Screen grab of our robot



Screen grab of the back of our robot



Screen grab of the tech configuration of our robot

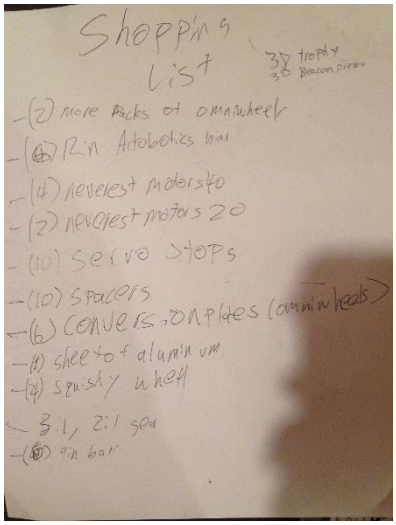


Beacon configuration

**All models were done in Autodesk Inventor*

Attendance	Date	Duration
Charlie, Nick, Michael, Jude, Jessica, Alex, Jorgen, Harry, Viktor, and Eziki.	10/9/16	4 hours

Objectives	Reflections
1. Conduct a Parent-Team meeting 2. Get an inventory on our parts 3. Build a drive train 4. Create a "shopping list" for the rest of the parts that we need to complete the robot. 5. Team building	1. The meeting was a success. The parents sat through an interactive PowerPoint lead by the Simon where we spoke of the financial, scheduling, transportation, aspects of our team. We also shared a brief discussion of our strategy and a rough 3d model of the robot (which was modeled by Simon). 2. We opened up all the Actobotics parts we order in our FTC completion kit from Servo city. We were very happy with our parts. 3. We began to build our drive train but encountered a problem when trying to mount to Tetrix wheels to the Actobotics frame. We concluded we were going to have to buy axle converters. 4. We put together a shopping list. 5. Jessica led the team through a human knot activity.



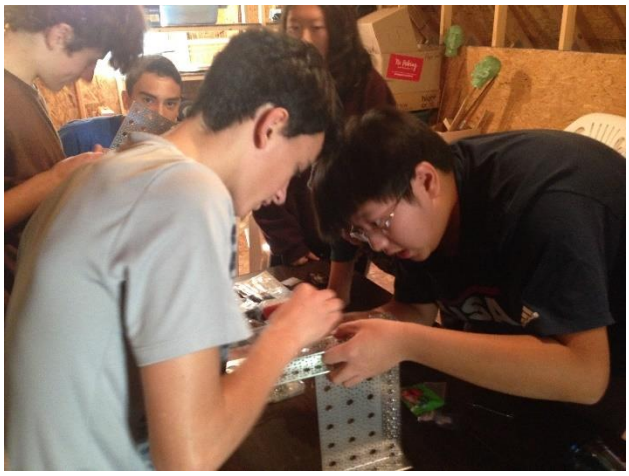
Shopping list

Completion of the parent meeting

Parents observing the team begin to work on the robot

Christmas came early: Actobotics kit came through… Thank You Servo City!

A glorious sight



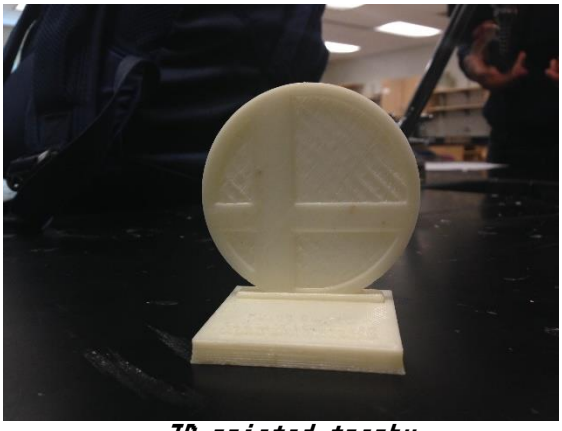
Harry and Charlie constructing a frame (can you spot Simon lurkin?)

Team Building activity: The Human Knot

Team Building activity: The Human Knot

Attendance	Date	Duration
Nick, Harry, Jude, Michael, Eziki, and Simon	10/14/16	3 hours

Objectives	Reflections
1. Host a Super Smash Bros Tournament to raise money for our team	1. We hosted this tournament in Mr. Kline's room. We had an attendance of 8 other players besides the members on our team. Simon 3D modelled a trophy for the event and printed it out with the school's 3D printer. This trophy was awarded to Nick P. A member of our team who has played Super Smash Bros competitively. We earned 40$ dollars from this event and another 2$ from a generous donation.



3D printed trophy

Nick holding his trophy with Simon his "manager"

Competitors go head to head on the classical fighting game

Attendance	Date	Duration
Nick, Harry, Jude, and Simon	10/15/16	7 hours

Objectives	Reflections
2. Attend the Meet-The-Field Event in Columbia, MD. 3. Accumulate knowledge from the programming workshop led by "The Mechanical paradox" 4. Socialize with other teams	2. We analyzed the field and confirmed that our strategy would be possible. 3. This workshop was very helpful. It helped us understand the way we were going to communicate with our robot and how to configure android studio in a way that could work for our team. 4. We met with the team, the "Green Machine Reloaded" a veteran team who has been to internationals multiple times. They walked us through their robot from the previous year. They are a very knowledgeable team and will be using their tips throughout the season.

The team analyzing the field

Getting things to work during the programming workshop

The Green Machine Reloaded walking us through their robot

Attendance	Date	Duration
Charlie, Nick, Michael, Jude, Jessica, Alex, Jorgen, Harry, Viktor, and Eziki.	10/16/16	3.5 hours

Objectives

1. Create a ball grabber prototype
2. Create a ball shooter "ramp" prototype
3. Complete the drive train
4. Decide on team uniform
5. Decide on a timeline of events and objectives
6. Team building

Reflections

1. Nick, Jessica, Alex, Jorgen, and Charlie created multiple grabber prototypes and created a grabber that was a combination of looped zip ties and straight zip ties.
2. Simon and Nick created a prototype for the ramp out of cardboard and duct tape. Over the weekend we discussed in our group chat that ABS plastic would be the best option for our shooter "ramp" so Charlie and Simon began to preform tests on a sheet of ABS plastic to compare the material to plexi-glass. We will complete our ramp shooter at the next meeting.
3. Viktor, Harry, and Jorgen tested with various motor mounting methods. They concluded the best way to mount the motors would be through 90 degree brackets, 90-degree motor mounts and the basic Tetrix motor "hugger". We could not complete putting the entire thing together however, for the axle connectors that we had ordered had not arrived in time for the meeting.
4. Jessica, Alex and Simon created two different Uniform concepts. We will decide on the uniform next meeting for there was not enough time during this weekend's.
5. We created a timeline of events and objectives:

October 15th: A Meet-the-field event/workshop on programming.

October 16th: Finish Drivetrain

October 23rd: Decide on Team uniform/Have a moving robot

October 30th: Finish Website

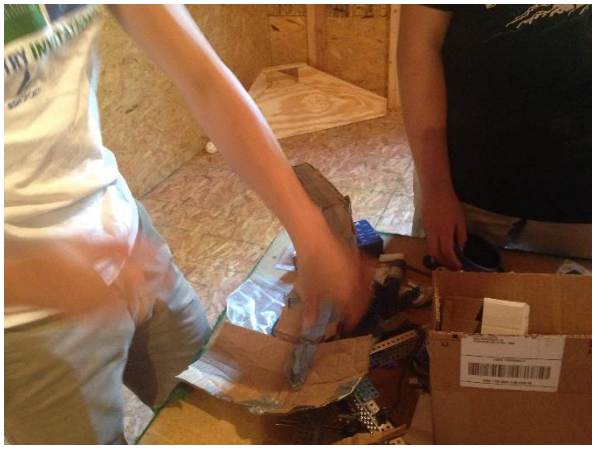
October 31st: First Prototype of Robot Complete

...

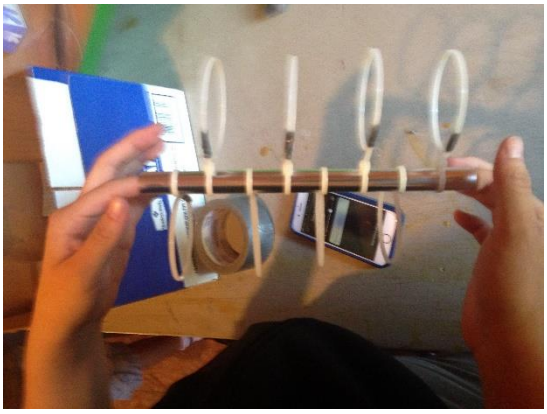
December 11th: DC qualifier

January 15th: Montgomery Qualifier (We are going to two qualifiers for experience, for a chance to socialize with other teams, and to prepare for states)

6. We had a 30 minute nerf gun war with Charlie's nerf guns.



Nick and Simon creating a prototype of the shooter ramp.



Prototype of the ball grabber

Viktor, Harry, Jorgen and Charlie working on the Drive train

Nerf gun war

0

Jorgen and Charlie working on the Drive train

Simon and Charlie working with ABS plastic

Plexi-Glass vs ABS plastic
on a scale of 1 – 10 (Worst – Best)

	Plexi- Glass (0.125″ thick)	ABS plastic (0.125″ thick)
Melting Point	160°C	105 °C.
Sturdiness	6	8
Easy to manipulate	3	6
Stiffness	4	4
Aesthetics	5	6
TOTAL	18	24

Attendance	Date	Duration
	10/23/16	4 hours

Objectives	Reflections
1. Configure all the wheels to have a completely working Drive train 2. Update RACI matrix 3. Create a shooter out of ABS plastic 4. Configure beacon presser	