

#13684



Infinity Tech Robotics
13684
East Middle School

Introduction

We are a FTC Robotics team, established in 2017. We have many members ranging from 6th grade to 8th grade. Our team teaches people new to robotics and helps more experienced members as well. Our 2020-2021 team consists of 9 team members and 2 coaches.

On our first meeting, which was October 22, 2020, we got to meet all of the team members for the first time. We went over what the game was mostly about this year and what we needed to make the robot do. We also decided that we would meet 2 times a week on tuesday and thursday.

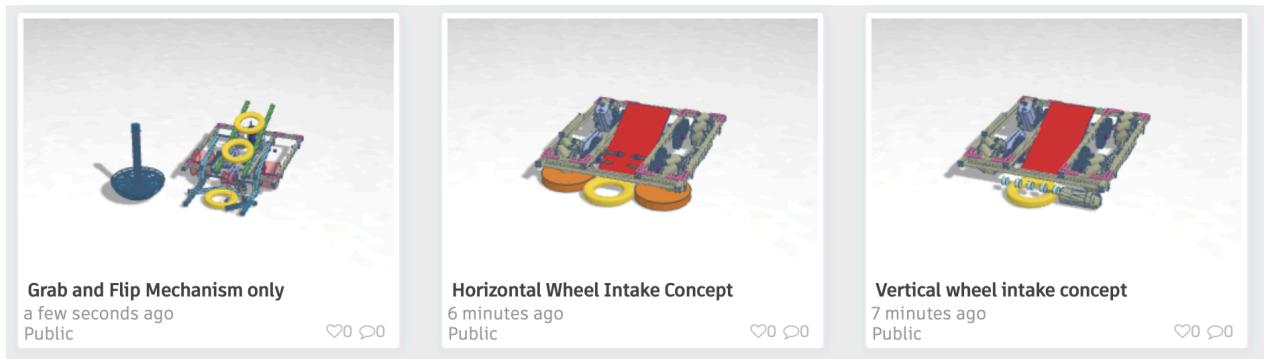
We sort of went through 5 steps.

1. **Strategizing and defining perimeters**
2. **Drawing/CADing**
3. **Building**
4. **Coding**
5. **Testing**

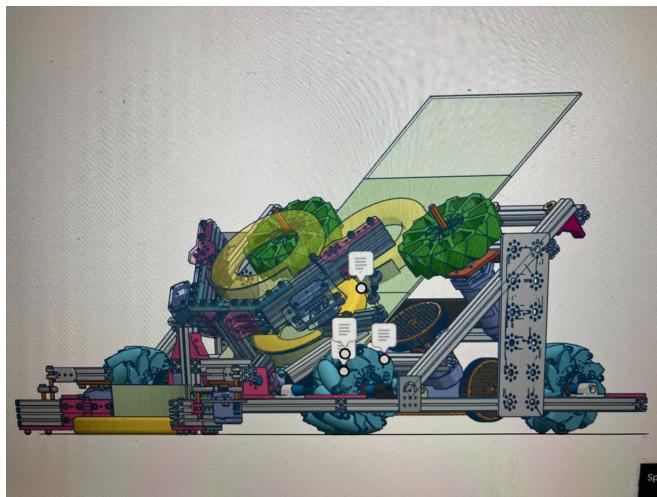
Designing

First we had to go through the game manual and looked through the requirements the robot had to meet. We also went through what the robot could and could not do in the playing field, And based off that we started thinking of ideas for our design.

We had everyone think of different ideas for the design of the robot. We already had a chassis built so we mainly had to think of where things like the shooter would be. Some people displayed their ideas on TinkerCad and some people drew their ideas. Here are some examples from TinkerCad.

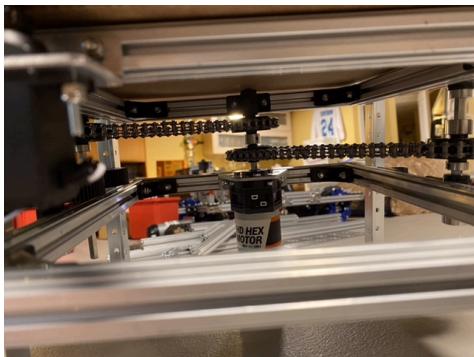
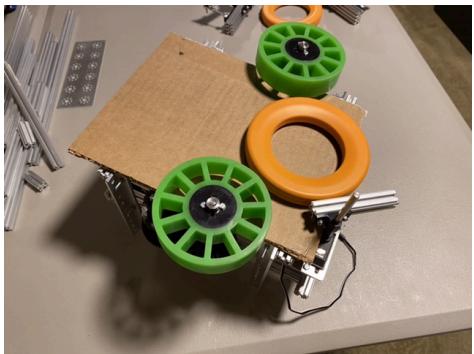
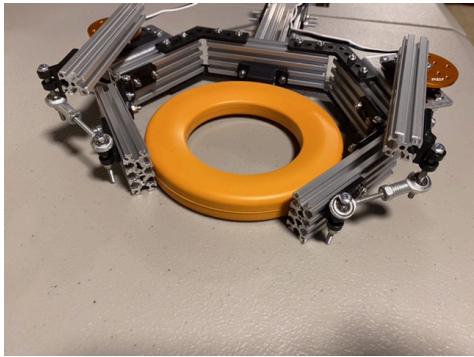


After going through all of the designs, we made a new one that was a combination of all of these.



Build

We had built the shooter and grabber but they hadn't been mounted on the robot or tested yet.





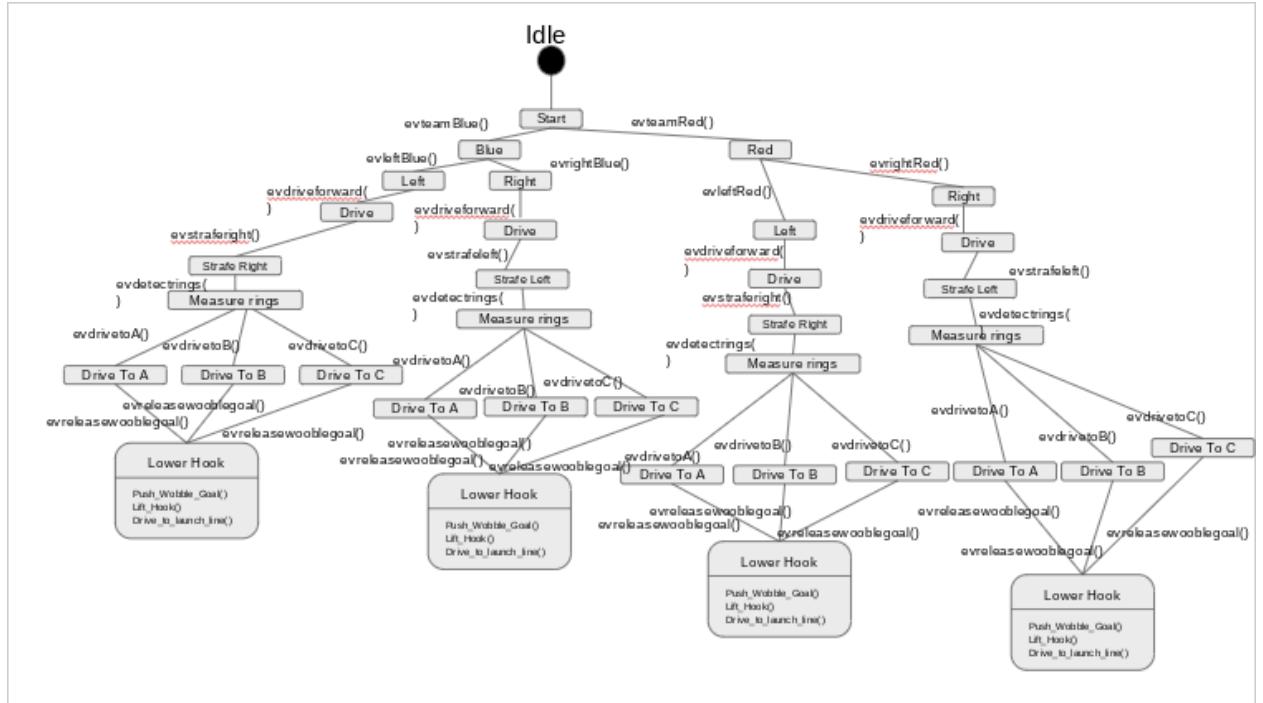
We had a few problems with the overall design. Since the robot had to fit in an 18 inch by 18 inch square, our back motors were pointed up at an angle because there wasn't enough space. So we adjusted the chassis and the fit, and the battery and hub fit snugly in the middle. But to accomplish this we had to flip some hex motors so we had to change some programming. At this point we have also attached the grabber and shooter to the robot. We also had to alter the design to fit a camera on.

Testing

After we had built the parts we decided to have a few tests. We positioned the robot halfway between the back wall and launch line and directly in front of the powershots. We shot 6

rings and saw how many powershots we would knock down. Our first result was 0 out of 6 rings. Our second test was a speed test. We put our robot in the same position and made it shoot rings as fast as possible for 2 minutes straight. We determined that it would be considered to fail if not all rings are shot properly or mechanism breaks/jams were to occur. If all 20 rings were shot properly it would pass. In the end when analyzed that the motor was moving too slowly and that the chain system driving both wheels plus the reversing gear arrangement is too much for one motor. So we Removed the chain driving one wheel with reversing gear arrangement and removed the 3:1 ultraplanetary module, resulting in a 1:1 ratio. We also Moved HD Hex Motor to the side, and positioned the spinning side inward to ensure contact with both wheels (one spinning, one not spinning) as the ring passes between them.

Code



For coding we used Java, but for the autonomous period we used neural networks. A neural network is a series of algorithms that endeavors to recognize underlying relationships in a set of data through a process that mimics the way the human brain operates. Neural networks can be used for time-series predictions, anomaly detection in data, and natural language understanding.

Driving/strategy

Soon enough we got the chance to meet up and practice driving. We first started off by building the remote playing field. Everyone who wanted to try had a chance and we soon started scoring really high. We also came up with a few strategies along the way like preloading the wobble goal and holding two rings at a time. We also had to play out the autonomous period because the code wasn't ready yet. We had also labelled what each button would do on the remote controller.

Gamepad 1

(Start+A)

Right Bumper: Shoot

Left Bumper: pulley up/down manual override

Left Trigger:

Right Trigger: Unused

Grabber Positions on Dpad

Up: RETRACTED

Right: CLEAR_PULLEY

Down: LOWERED

Left: CARRY



X: Shooter Speed: Midfield Middle Goal

Y: Shooter Speed: Midfield High Goal

B: Midfield powershot

A: Shooter Speed: Wall Dump

Left Stick + Right Stick: Tank Drive

Gamepad 2

(Start+B)

Right Bumper: Shoot

Left Bumper: grabber open/close

Left Trigger:

Right Trigger: Unused

Grabber Positions on Dpad

Up: RETRACTED

Right: CLEAR_PULLEY

Down: LOWERED

Left: CARRY



X: Shooter Speed: Midfield Low Goal

Y: Shooter Speed: Midfield High Goal

B: Midfield powershot

A: Shooter Speed: Wall Dump

Extra

For fun, we also had a sponsor event with the team. This was the first time we all met each other in real life. We visited a facility in Livonia that was called Caresoft Global. We got to see how they used CAD and other methods to compare cars. We also got to learn about how robotics is important in real life. We also decided on a t-shirt design and name for the robot-Mr. Rings.



