

SOUPERBOTS

Team 203 Camden County Technical Schools



Campbell's

Agenda

1. Chairman's & Outreach
2. About the Team
3. Strategy
4. Build
 - a. Accumulator
 - b. Shooter & Intake
 - c. Chassis
 - d. Climber
5. Coding and Sensors
6. Safety
7. Questions and Answers

Chairman's and Outreach

Levy Mai

“S.O.U.P.E.R. is our mission”

STEAM

Outreach

Unity

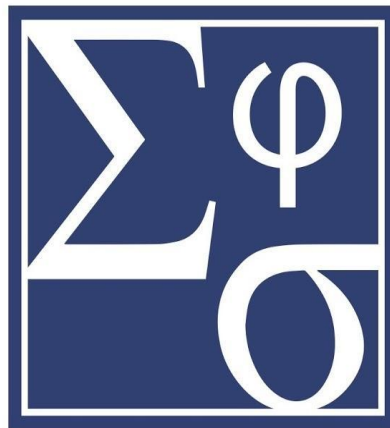
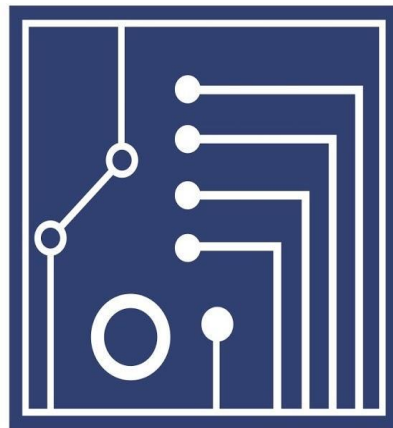
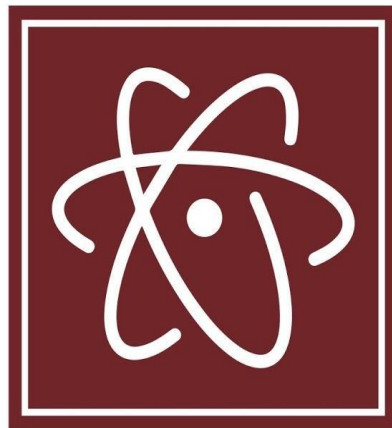
Progress

Excellence

Resilience



CAMDEN COUNTY TECHNICAL SCHOOLS



STEM ACADEMIES

STEAM Summer Middle School Camps



7 out of 10 participants
pursue STEAM Academies at
CCTS

Averages over 100 students
per summer



Began in 2014

Provides scholarships to
underprivileged
participants



Based on FIRST Lego League

Team 203 members
participate as counselors

Rockwell Automation Fair

- Team 203 represented FIRST at the 2018 Rockwell Automation Fair in Philadelphia
- Our team members spoke about the impact of FIRST and how it encourages Career Goals and Education



PACK Expo

- Our team represented FIRST at the PACK Expo in Philadelphia, PA
- Our team talked about the importance of FIRST and the benefits of being in the program
- We will be doing so again March 21st



New Jersey School Boards Association Conference

- Represent FIRST
- Engage school board members and administrators about the benefits of FIRST



FIRST National Advocacy Conference

- In 2019, our team participated in the FIRST National Advocacy Conference in Washington, DC
- Our team talked to members of congress regarding the importance of FIRST
- We will be doing so again in June 2022



Advocating at the NJ State House

- A CTSO (Career and Technical Student Organization)
- Integral to Career and Technical Education programs
- Met with General Assembly Members, State Senators, and staff about recognizing FIRST as a CTSO

***Team 203 Members with
Assemblywoman Patricia Egan Jones
at the NJ State Capitol in Trenton***



Advocating at the NJ State House

- NJ Assembly Bill #2455 and NJ Senate Bill #2204
- Establishment of Pilot Program through the NJ Department of Education to expand Robotics in schools.
- Team #203 is collaborating with teams throughout the state advocating.
- Signed into law in December 2021

***Team #203 Graduate
DeAisha Johnson testifies
Before NJ Assembly Science,
Innovation and Technology
Committee***



Chairman's and Awards

- Our great efforts in our outreach is a massive part as to why we apply for the Chairman's award at the competitions we attend
- We submit our essay and video as well as a presentation by three of our students



About the Team

Kush Patel

Team History

REGIONAL CHAMPIONSHIP

Chesapeake
Regionals

**February
2007**

EXCELLENCE ENGINEERING

Spring Side
Chestnut Hill

**March
2016**

INDUSTRIAL DESIGN

Seneca District
Award

**March
2018**

ENGINEERING INSPIRATION

Lehigh District
Event

**April
2019**

**January
1998**

TEAM 203 FOUNDED

First Competitive
Season

**March
2015**

DISTRICT CHAMPIONSHIP

**March
2017**

CHAIRMENS AWARD

Seneca District
Award

**March
2019**

ENGINEERING INSPIRATION

Seneca District
Award

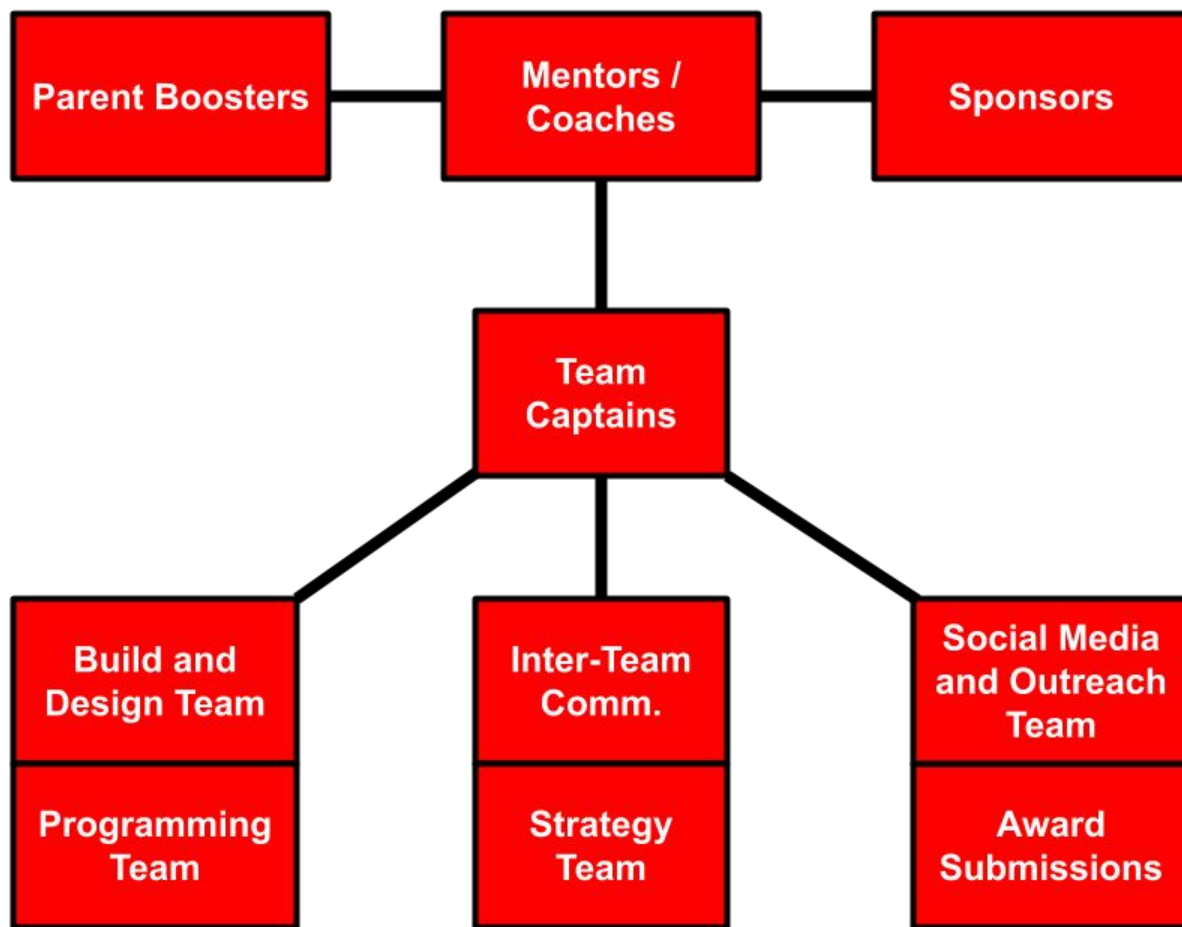
55 Members

15 Female : 36 Male : 4 Nonbinary

50% of our team consists of people of color

20 Different Towns

We have members living all across Camden County.



Mentors

Lockheed Martin Engineers

Campbell's Soup Engineers

Alumni Mentors

Jimmy Cuffari
Vanessa Mento
Cullen Barr

Faculty Mentors / Coaches

Anthony DePrince
Alan Norton
Andrew McAlpin
John Kammler

Strategy

Kush Patel

Competitions this Season

1. Duel on the Delaware
(off season event)
October 16
2. Bridgewater
Competition
March 4-6
3. Seneca Competition
March 25-27

Schedule of 2022 Season



Schedule of 2022 Season

Week 1: Research

- The team watched the challenge reveal
- Researched what kind of subsystems we needed
- Discussed what needed to be built

Schedule of 2022 Season

Week 2: Develop

- Broke out into groups to develop parts
- Used CAD to make “prototypes”
- Made a prototype with cardboard with an extra robot

Schedule of 2022 Season

Week 3: Design

- Subsystem captains used Fusion to make their parts
- We held our own CDR to give constructive criticism to each system to make them better
- Parts were finalized and brought to life to test

Schedule of 2022 Season

Week 4: Build

- Team leads/subsystem captains work with team members to construct prototypes
- The team members working here get a chance to see team leads and upperclassmen working

Schedule of 2022 Season

Week 4: Test

- We tested our robot on our mock practice field
- At the Bridgewater competition we were able to see how our robot held up in a high stakes field
- We were able to see which components needed improvements

Schedule of 2022 Season

Week 5: Improve

- We're making improvements to our robot based off of our performance at Bridgewater
- Fixing flaws in previous climber as well as building a back up
- Making accumulator more resilient when it comes to bumping into other robots and walls

Auto

Turns around, picks up one ball, and shoots (5 seconds)

Teleoperate

Pushes out accumulator to collect 2 balls off of the ground, The robot indexes 2 balls and pulls the accumulator back, The robot shoots both balls rapidly into the upper goal (5-10 seconds on average)

Endgame

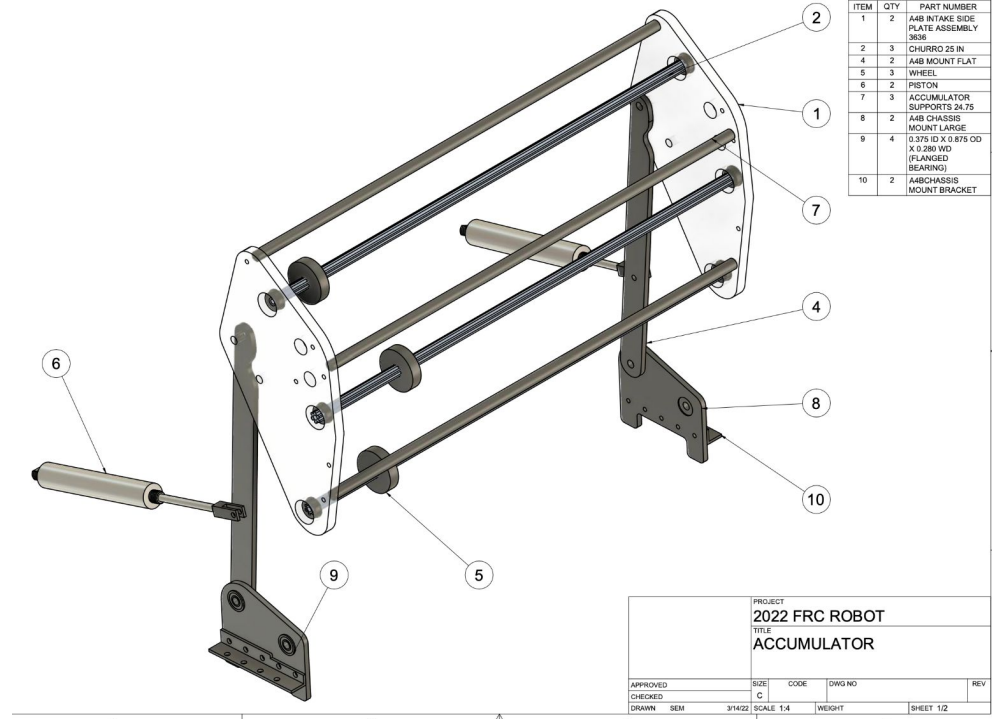
Climb to traversal and hang

Accumulator

Sarah McGovern and Bella Davenport

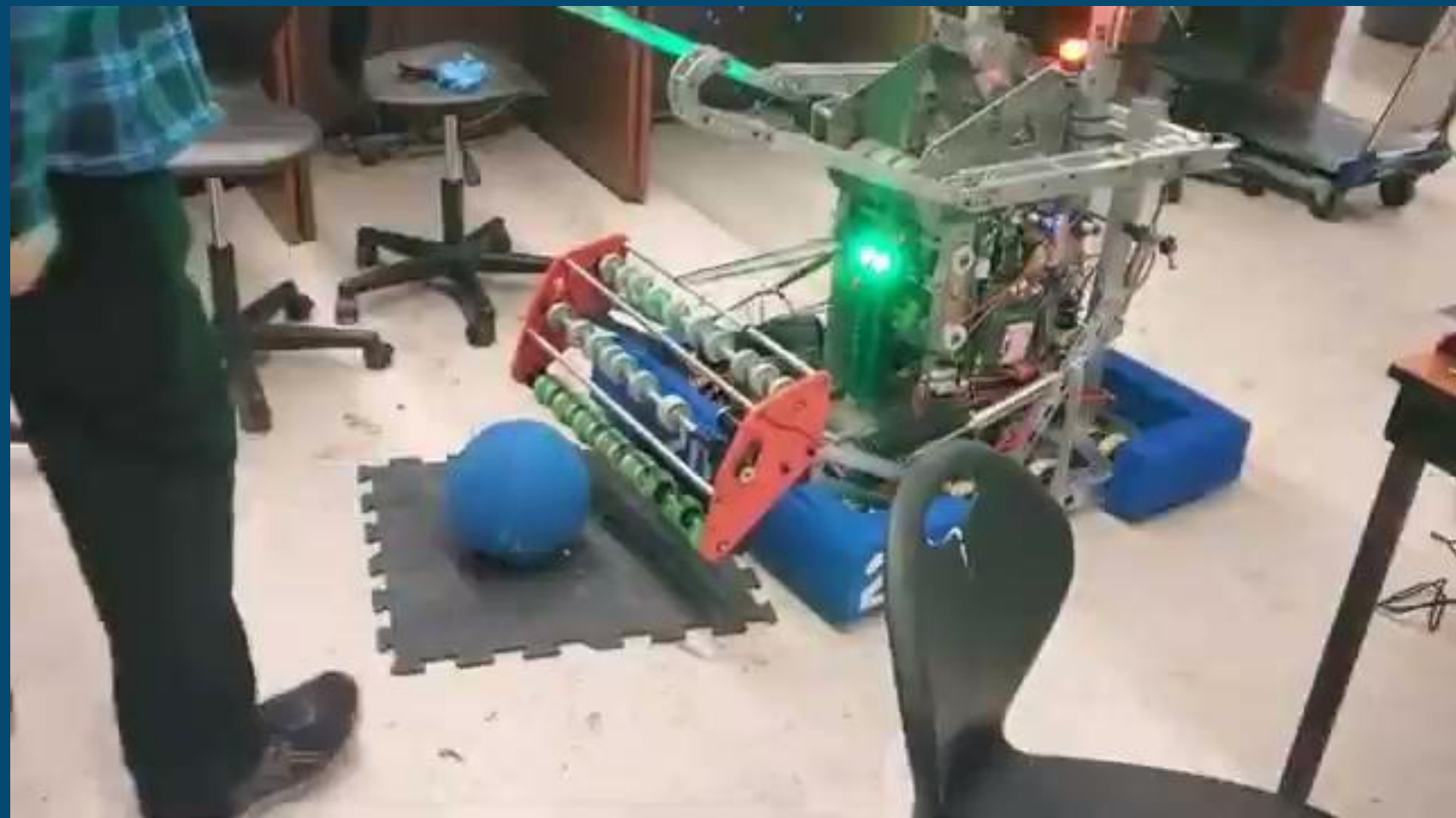
Goals for Accumulator

- Able to take some damage without losing functionality
- Easy to repair or replace
- Flexible design



Accumulator Design

Design	Capabilities	Limitations
3 Bar Accumulator	<ul style="list-style-type: none">❑ Cargo is picked up and moved into the frame of the robot❑ Cargo can be picked up as the robot is driving❑ Flexible structure allows the robot to adapt❑ Easy to eject wrong colored cargo without shooting	<ul style="list-style-type: none">❑ Can only withstand so much damage❑ Uses rigid materials

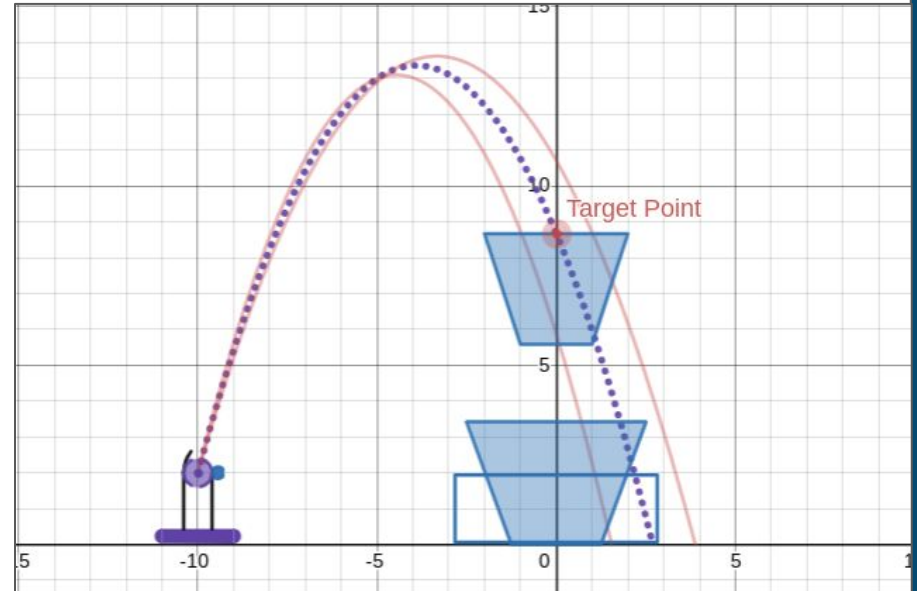


Shooter and Intake

Christopher Iuliucci

Goals for Shooter

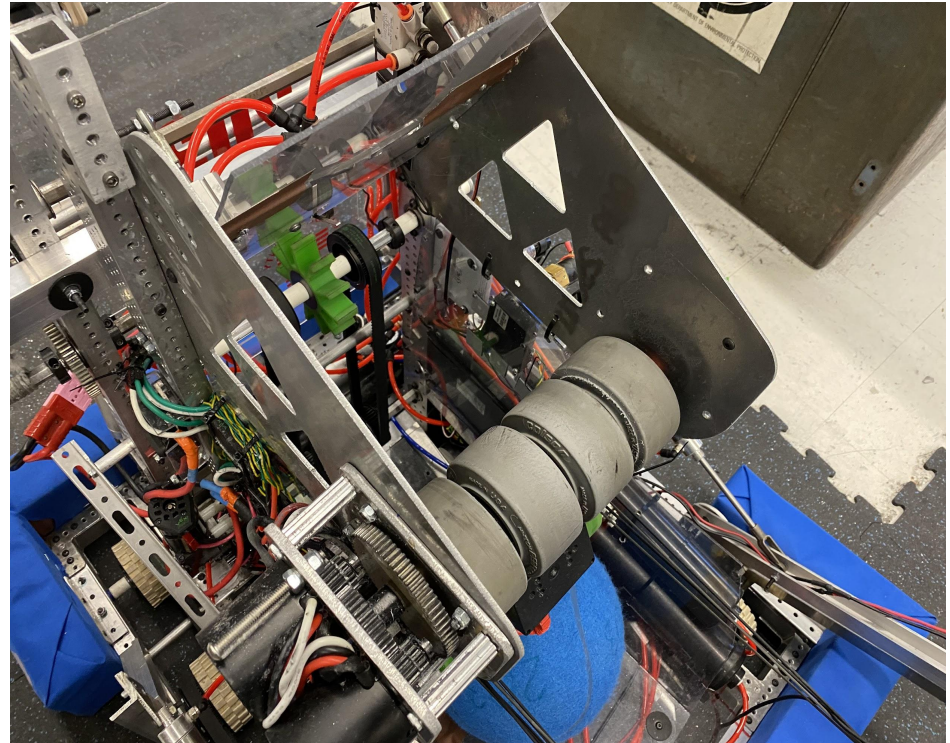
- Consistently and successfully make shots from medium to long range into the upper hub.
- Easy maintenance and repair.
- Successfully use vision targeting and PID to be able to make shots from anywhere in the field.



Shooter Design

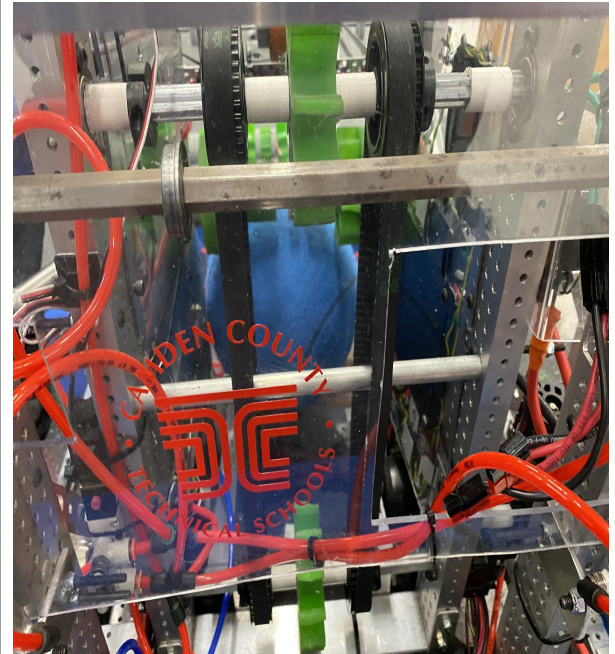
Design

- ❑ Indexing uses a combination of a gravity feed system and a powered wheel system.
- ❑ The Flywheel utilizes a gearbox using 2 NEOs at a 1.15 : 1 gear ratio



Shooter Design Continued

Capabilities	Limitations
<ul style="list-style-type: none">❑ The flywheel has a top speed of 4,900 RPM.❑ The Shooter system is able to consistently make medium to long range shots into the upper hub.❑ Our average cycle time, from accumulating, indexing, and shooting is 4-5 seconds.	<ul style="list-style-type: none">❑ The angle of the hood makes it impossible to make shots into the upper hub when we're extremely close to the hub.❑ Longer range shots are more likely to bounce out of the upper hub due to backspin.

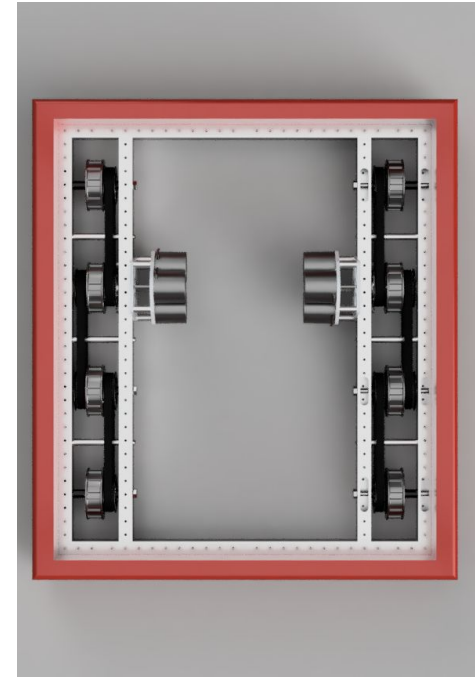


Chassis

Anthony Brogan

Goals for Chassis

- Fast driving
- Easy to operate
- Versatility with Subsystem Integration
- Easy of repair
- Quick to assemble
 - More time to focus on other subsystems



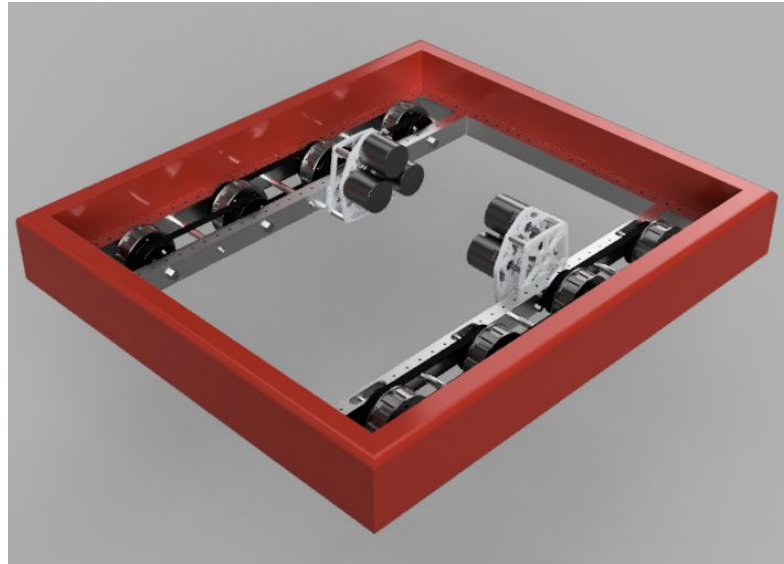
Chassis Design

Design

32" x 27.75" frame
8 wheel drive
(4" wheels)
All wheels belt driven

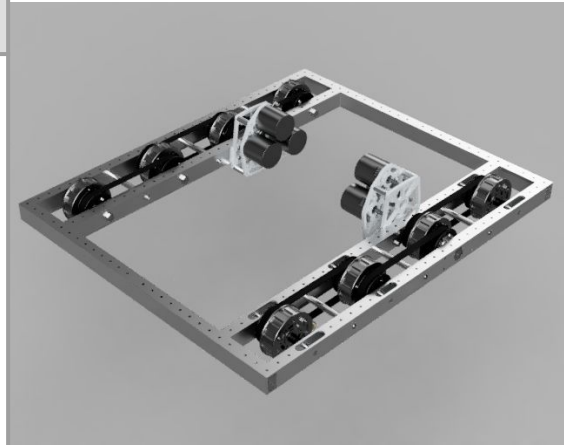
**0.05" Drop Center on
middle four wheels**

**Powered by 6 NEO
Brushless motors w/
7.56:1 GR EvoSlim
Gearbox**



Chassis Design

Capabilities	Limitations
<ul style="list-style-type: none">❑ 13.11 ft/s drive speed❑ 43.50 ft-lb stall torque❑ Weight \approx 35 lb❑ Modular components.❑ Easy to detach drive motors❑ Versatility in attaching subsystems<ul style="list-style-type: none">○ #10 Mounting Holes spaced every 0.50"	<ul style="list-style-type: none">❑ Limited mobility compared to advanced drive systems<ul style="list-style-type: none">○ swerve drive, mecanum drive, etc.❑ Available belt and pulley sizes dictate wheel spacing



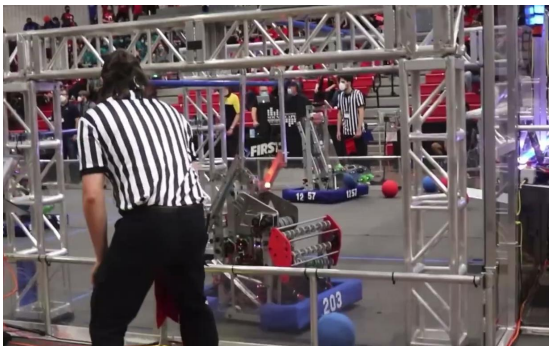
Climber

Shane Skelly

Climber Design A

Design: “Monkey Arms”

- Climbs up to traversal rung using two pistons and two winch motors
- Can climb to mid rung in 5 seconds, high rung in 10 seconds, and traversal rung in 20 seconds



During Competition:

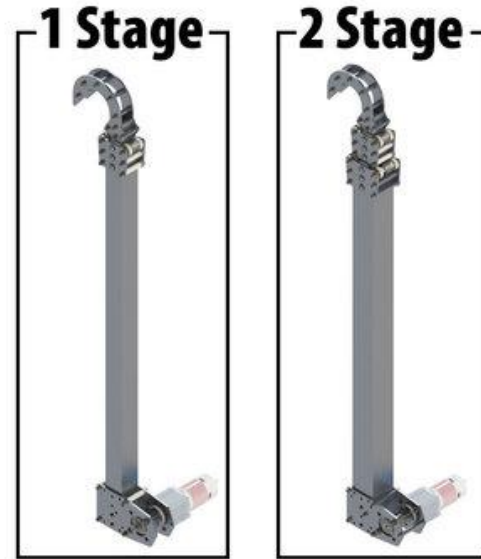
- Not always consistent
- Did well climbing but not lining up
- Could not reach the traversal rung due to lack of air pressure during endgame



Climber Design B

Design: Climber in a Box with Tilt

- Can climb to the traversal rung using two pistons and two winch motors
- Uses popular “Climber in a Box” model from Andymark
- Possible speed of up to 12 seconds



Plan and Goals

Step-By-Step Plan:

- Make Improvements to the “Monkey Arms” while the Climber in a Box is assembled and mounted
- Run testing on design A
- Replace design A with B and test to compare

Goals:

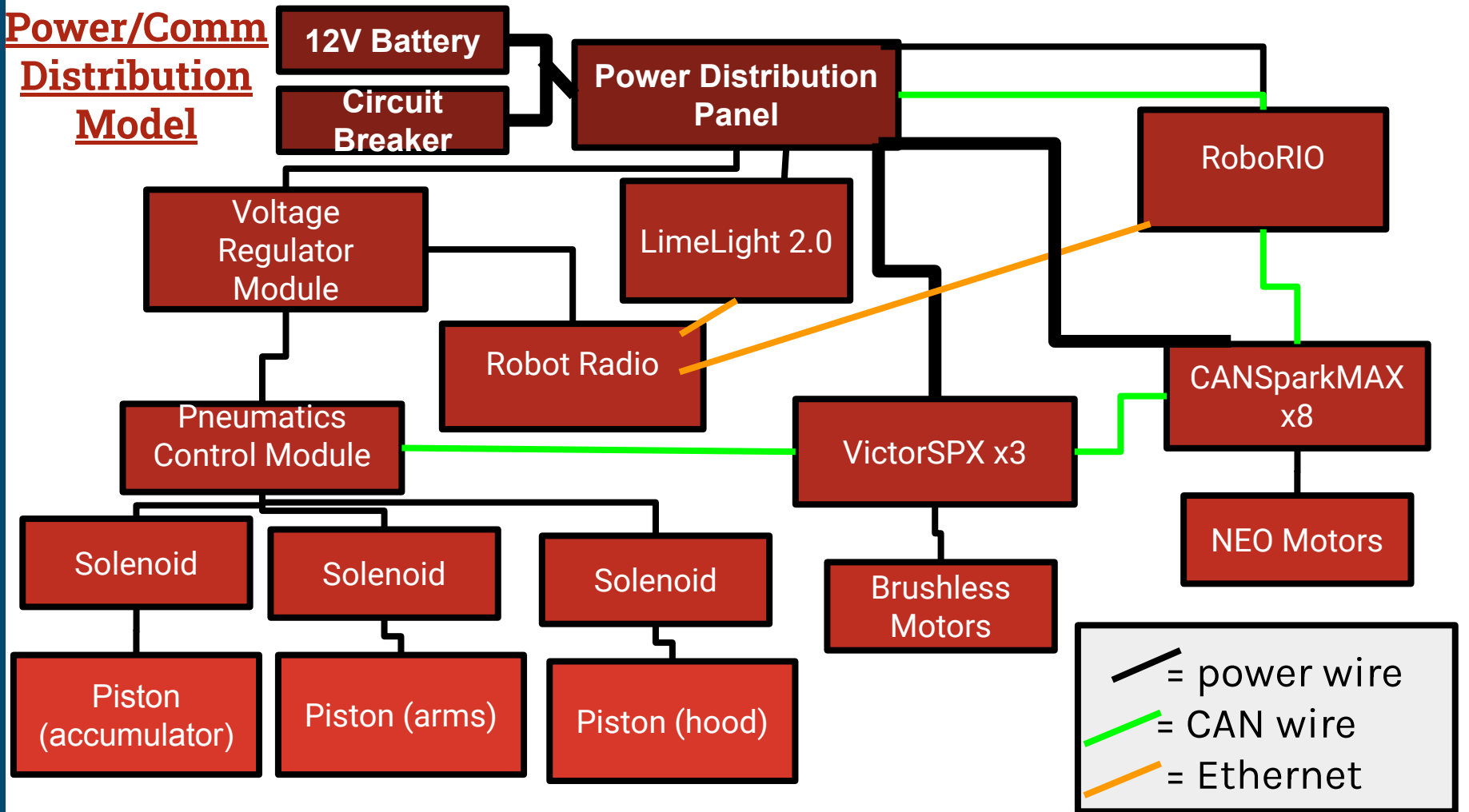
- Get to the traversal rung as efficiently and consistently as possible



Hardware and Software

Julius Stewart and Spencer Murray

Power/Comm Distribution Model



Coding Plan/Goals

- The primary goal of this year was to take some of the operator controls and make them autonomous/less prone to human error
- Bringing PID(Proportional Integral Derivative) to control the RPM of the shooter and the position of the hood

Sensor Plan

LimeLight 2.0

- ❖ Emits bright green light that reflects, identifies, and provides distance values of the hub's silver tape

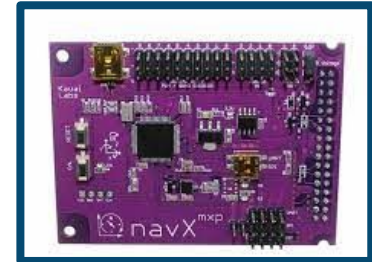


Encoders

- ❖ Measures values and rotations of motors to measure distance and RPM
- ❖ Used with limelight for PID

NAV X

- ❖ Gives values for the rotations/angles of the robot, useful in autonomous, fixes onto Rio



Programming Software/Applications

Using Visual Studio Code with Java

- VScode is used to program the different subsystems, commands, and functions of the robot
- Teleoperated and autonomous
- Allows extensions to be added and utilized within, making storage and the language accessible

GitHub

- Website/extension used for uploading code and collaborating with other programmers



Programming Software/Applications

Using WPILib

- Provides a library containing different firmware and references for hardware and terms in robotics
- Extensive documentation of the different hardware



Controls/Structure

Drive Style/Driver Controller

- Programmed to use Arcade Drive
- **Accumulator** pneumatics and spin control
- **Compressor** control
- **Arm** control

Operator controller

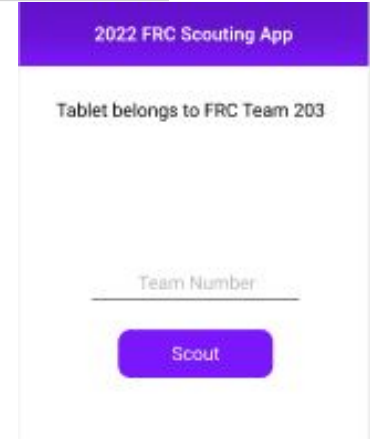
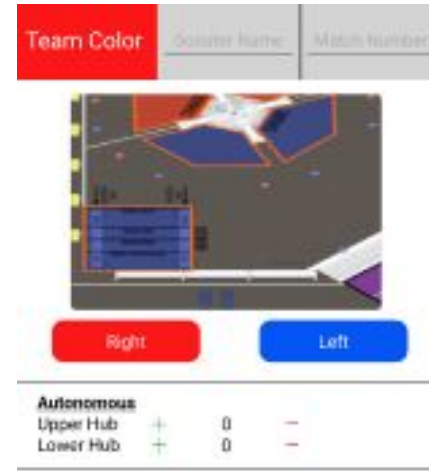
- **Shooter/PID** control
- **Intake** control
- **Winch** control
- **Shooter hood**
position

**Forward/
Backward**



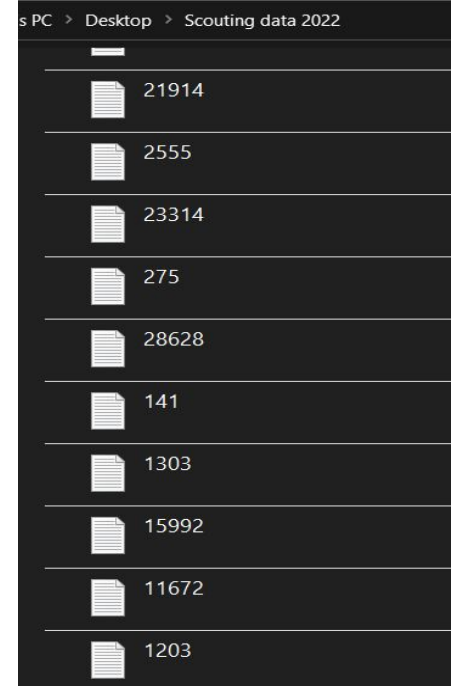
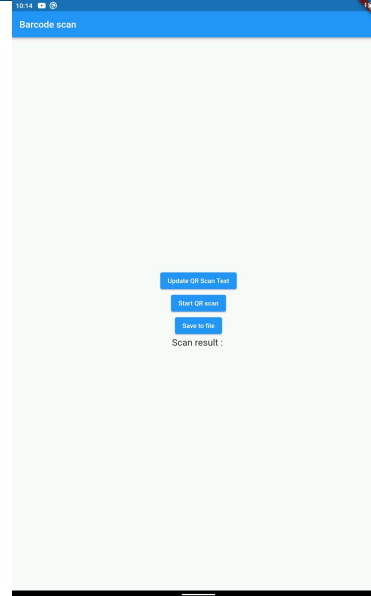
Scouting App

- Making use of the “Flutter” framework, derived from the Dart language, a flexible scouting app was completed
- The app was developed to be easily understood with little training required.
- The scouting app allows our team to record precise data in realtime during the matches of all robots.



Scanner App

- The QR code scanner allowed the team to take the data from the individual scouter inputs and save them into one space for future analyzation.
- the scanner application was made with the same flutter framework, but with the “qr_flutter” package



Safety

Marlene Smith



Safety Culture

We take pride in our priority for safety!

- We give safety presentations every weekend based off of the
UL & First Safety Learning Portal
- We perform safety checks every 30 minutes for every
competition
- The team abided by COVID-19 regulations to ensure the
safety of everyone



Safety Culture

We take pride in our priority for safety!

- There is safety captain at all times in the pit
- Constantly checking around the shop to make sure everyone is being safe
- Always wearing safety glasses while using tools

Thank You To Our Sponsors!

Lockheed Martin

Campbell's Soup

Garrison Architects

Team 203's Family Boosters

Camden County Technical Schools

Questions?