VC SILVER CIRCUITS

FIRST Tech Challenge Team #16158

Presenter Introduction

Elise

- 16 Years old
- Sophomore at an Online Highschool Williamsburg Academy
- Role on Team:
  - Business Co-Captain
- 3rd Season on Team
- Goals for upcoming Season
  - Learn CAD
  - Work with and help build the robot
- Accomplishments from the 2023-2024 season:
  - Leadership skills
  - Team management
  - Public speaking skills

Kayline

- 16 Years old
- Sophomore at Virginia City Highschool
- 3rd Season on Team
- Robot Builder, CAD designer, and Media Specialist
- Accomplishments:
  - I am most proud of the team videos I made last year. Mostly because we won an award for it
  - I am also proud of bring the driver coach at Worlds this season
- I want to be able to learn more CAD and CNC skills. I would like to be able to use it without help next year.

Dallin

- 17 Years Old
- Junior at the Davidson Academy
- 2nd Year of FTC
- 1st Year on VC Silver Circuits
- I love...
  - Learning
  - Programming
  - Building new things
  - Sharing the things I learn
- Accomplishments
  - Optimizing a codebase to be edited by a team of people
  - Learning how to keep a team cohesive, even with differing opinions

Hunter

- Freshman - Homeschooled
- Fourth year of FTC
- CAD (Computer Aided Drafting) Designer
- Outdoor enthusiast
- Accomplishments:
  - Creating a major scoring component on robot
  - Efficient understanding of CAD
- I am excited to work together as a team to learn, grow, and share our knowledge of robotics

Tucker

- Sophomore – Homeschooled
- 1st year in FTC
- CAD designer

- Accomplishments:
  - As an introvert, becoming part of the *FIRST* community
  - Learning practical teamwork skills

- Next season, I'm so excited to continue growing as a team and build an awesome robot.

Coen

- Senior, graduating with Associates of Science. Moving on to get my Bachelor degree in Mechanical Engineering.
- Five years on team
- CAD designer, builder, driver
- Accomplishments:
  - World Championship four years
  - Learned CAD, presentation, build, teamwork, and business skills
- Excited to help mentor the VC Silver Circuits next year!

Aiden

- Sophomore at Virginia City High School
- Second year on the team
- Software design, CAD designing
- Accomplishments:
  - Helped create an outreach bot to improve my skills
  - Self-taught in 2 different coding languages
- I want to keep improving and keep learning as much as I can

The VC Silver Circuits (Dallin)

VC Silver Circuits #16158

- 5th Season in FTC
- Rookie Season 2019-2020
- 12 Team Members 2023-2024 season
- Grades 8-12th
- 4 Seniors
- 3rd Season attending International FIRST Tech Challenge Robotics Competition

2023 – 2024 Season Achievements

FIRST League Tournament

- Inspire Award 1st Place
- Winning Alliance - 1st Team Selected
- Promote Award
- Compass Award 2nd Place - Carson Knight

FIRST Nevada State Championship

- Inspire Award 1st Place
- Dean's List Finalist - Dallin Guisti

FIRST Tech Challenge World Championship

- 16th in our division (56 teams)
- 41st in the world out of over 7,000 FTC teams

Worlds 2024 Center Stage

- 50,000 People Attend the World Championship
- 5 Day Event (Tuesday – Saturday)
- Gracious Professionalism
- A lot of work during the whole event
  - Many sleepless nights
  - Stressful
  - Fun
- STEM Professionals/Influencers:
  - Mark Rober
  - Dean Kamen
- Innovation Fair


#FIRSTChamp
#FIRSTChamp
#FIRSTChamp

Outreach
(Elise)

Outreach in our community

- **Hours: 444.5**
- **People Reached: 7,361**
- **Events:**
  - The Future of Reno - Discovery Museum
  - STEM Thursday - Library
  - CANstruction
  - Girl Scouts - Robot Day
  - Carson Tahoe Health - Robot Showcase
  - Community Chest Sumo Bot Battle
  - Girls on the Run
  - EDAWN Presentation
  - Veterans Day Parade
  - Christmas Lights @RH
  - Innovation Session #1
  - STEM Kits
  - PineWild Showcase
  - Innovation Session
  - VCSC "Innovation Session #2"
  - VCSC Trivia Night
  - NCET Tech Wednesday


Virginia City
Silver
Circuits

Outreach with FIRST

- **People Reached: 3,830**
- **Hours: 747**
- **Events:**
  - FLL Table Build
  - FLL Mission Build
  - FLL Kick Off
  - FTC Kick Off
  - Help Setup and Take Down University Challenge
  - FTC Robot in a day workshop
  - FLL Next Level Programming Workshop
  - CAD Workshop
  - FTC Autonomous Workshop
  - FTC Scrimmage
  - FLL Scrimmage #1
  - FLL Scrimmage #2
  - League Meet # 1
  - FLL Qualifier Set up
  - FLL Qualifier #1
  - FLL Qualifier #3
  - FTC Leauge Meet #3
  - FTC Leauge Meet #4
  - FLL NoNV Championships
  - VC Elem. School FLL, FLL Explorer, FLL Discover
  - FTC League Meet #5
  - FTC League Meet #6
  - No.NV League Tournament
  - NV State Championship


Welcome Canada

Connecting and Advocating with STEM

- **Total Connected: 19**
- **Total Hours: 54**
- **People:**
- Alex Shultz
- Chad T.
- Keith K.
- Cody R.
- Joel C.
- Mark T.
- Enri M.
- Scott L.
- Matt M.
- Jess Lattin
- Tomas Herring
- Diane Housken
- Ben Knight
- Chris Reilly
- Pete Renaud
- Commissioner Jay Carmona*
- Summer Pellett*
- Commissioner Clay Mitchell
- Mike Cullen

Mentoring and Assisting FIRST Teams

- **Total People Reached: 98**
- **Total Hours: 602**
- **Teams:**
  - High Rollers FRC
  - Robo Force (CA) #13356
  - SESI SENAI Agro Tech #19193
  - AIM Robotics
  - Infinity Tech
  - Gigabyte
  - Perpetual Motion
  - Minerbots
  - URSA Major
  - Chaos
  - Comstock Coders
  - MCII
  - Octonauts
  - SoftHoarders
  - Magnetitez FLL
  - Dynamitez FLL Explore
  - Mindstorm Masters FLL
  - Comstock Coders

Girls in STEM (Elise)

Girls In STEM

- 4 Girls on team
  - Kayline: Builder/CAD designer
  - Elise: Business Captain
  - Kylie: Fundraising/Portfolio
  - Savannah: Social Media
- Our goal is to INSPIRE other Girls to join robotics.
- We do a lot of outreach events geared towards girls
- Talked to News about how being a Girl in STEM has changed our lives
- Focus on impowering Girls in STEM

Business (Dallin)

VC Silver Circuits

FTC 16158

2024 Engineering Portfolio

Portfolio Contents:

Areas in orange highlighted for Control

"Prospecting for Potential, Mining for Innovation"

Community *FIRST* Tech Challenge Robotics Team
Virginia City, NV USA

Who are the VC Silver Circuits?

QUICK STATS

85+
BUILD MEETINGS

480+
MEETING HOURS

1800+
OUTREACH HOURS

40+
TEAMS MENTORED/ ASSISTED

221,500+
PEOPLE REACHED

About Us

As a 5 year-old FTC team based in a small mining town, Virginia City, Nevada, we strive to **connect** and **inspire** our community through STEM and robotics **outreach** with other teams and individuals. This has made us so much more confident in ourselves, and has brought us closer as a team.

Q: Why so much silver?

A: Virginia City is famous for its mines that helped make Nevada the Silver State. By wearing silver, we represent both our town and our state.

Our Robot:

After Worlds last year, we were inspired by other teams (and our own placement of 21st in the WORLD!). We took what we learned and designed a robot capable of an even higher level of competition. After thousands of hours designing, building, and programming, we are proud to say that we have achieved a level of innovation we have never achieved before.

Our robot...

- Utilizes an **innovative** design to collect and deposit pixels precisely and efficiently.
- Utilizes Fusion360 CAD to design everything before 3D printing and CNC machining the **100+ custom parts** needed for our robot.

Outreach Overview:

Media Outreach = 210,000+ People reached

Mentoring = 5 *FIRST* teams

FIRST Outreach = 2,500 people reached / 1000 hours / 20 events

Motivate Outreach = 7,341 people reached / 425 hours / 17 events

STEM Professionals = 14 professionals / 48 hours

Advocacy = 5 government officials / 4 hours

****Motivate Outreach, FIRST Outreach, STEM Professionals, Government Advocacy = GRAND TOTAL** of 43 outreach, social media and more events, 1,850 hours, and 221,729 people reached**

Mission Statement:

Prospecting for potential, **Mining** for innovation, while **Trailblazing** new paths...

Together *as a* ***Team*** *as a* ***Community***.

Design Process

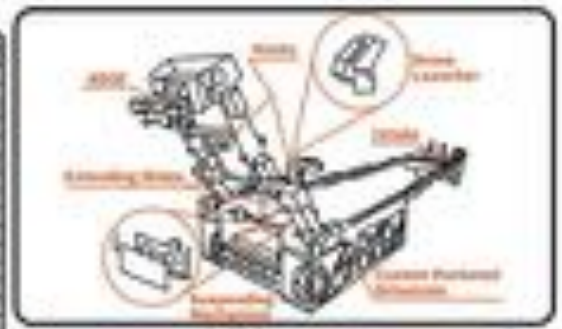
Identify the Problem
- Our drone launcher would not fire consistently
- After repeated testing and recording data, we isolated the initial problem to our use of rubber bands losing tension over time

Explore the Solution
- As a team we proposed various solutions:
  - More rigid construction
  - Chamber to protect drone
  - Switching to springs from rubber bands

IT WORKS!

Make a Design
- Adjusted the CAD for the launcher
- Switch to CNC aluminum
- Replace rubber bands with springs

Create & Test It
- Built the new launcher with CNC machining and 3D printing
- Re-tested the launcher numerous times



Summary of Accomplishments

Connect Award:
- Portfolio shows outreach to the STEM community with a total of **48** hours and meetings with 146 professionals (pg. 11)
- Portfolio shows that the team promotes FIRST in the community and with those in the STEM community (pg. 8, 11)
- Portfolio has our team's goals and accomplishments clearly listed (pg. 1, 8-13)
- Portfolio has an accurate timeline of our season (pg. 12)
- Portfolio has a clear team plan and team sustainability (pg. 13, 14)
- Portfolio clearly shows that our mentors (Rogers, Mellanie, and Carson) have helped us learn business, manufacturing and technical skills (pg. 13)

Inspire Award:
- Creative and innovative intake and output transfer system (pg. 4, 6)
- Elegant and robust design with parts and components clearly listed (pg. 4, 5, 6)
- Portfolio shows the different iterations we took to arrive at our current design solution (pg. 4)
- Portfolio has our team's Engineering Design Process (pg. 3)
- Portfolio has clear CAD designs, clearly shows the steps we have taken to get to our current robot (pg. 4, 5, 6)

Motivate Award:
- Portfolio shows being an ambassador to the FIRST community with **1,252** hours and **3,929** people reached (pg. 8-11)
- Portfolio shows team structure, goals, and organization (pg. 12-14)
- Portfolio identifies fundraising, team marketing, timelines, community service goals, community outreach, FIRST outreach, media outreach, STEM professionals, and advocating with Government officials, with a grand total of **1,830** hours and **221,729** people reached (pg. 8-13, 15)
- Portfolio shows how each team member contributes to the team (pg. 14)

Design Award:
- Portfolio clearly has CAD designs of our robot (pg. 5-6)
- Robot is efficient at completing tasks (pg. 5-7)

Control Award:
- Portfolio outlines information showing control components (pg. 5)
- We submitted a Control Award submission form separately
- We identified the control aspects of our robot (pg. 5-7)

Think Award:
- Engineering Portfolio has CAD designs (pg. 1, 3-7), game strategy (pg. 7), and team Engineering Design Process (pg. 3)
- Portfolio has tables and graphs showing Motivate Outreach to our community, with a total of **7,361** people reached and a total of **625** hours (pg. 8-11)
- Portfolio shows outreach to the community through media, with a total of **210,000+** people reached (pg. 10)
- Portfolio shows FIRST Outreach with a total of **3,929** people reached and **1,252** hours (pg. 9, 10)
- Portfolio has tables and graphs showing the **14** STEM Professionals we connected with for **48** hours (pg. 11)
- Portfolio describes our **advocacy** through reaching out to **6 government officials** for a total of **6 hours**
- Portfolio shows **6** FIRST (3 FTC, 2 FLL, 1 FLL Explore) teams that our team has mentored (pg. 8, 9)
- Portfolio shows the **34** FIRST teams that we have assisted and the unofficial FTC Nevada discord channel we created (pg. 8, 9)
- Portfolio shows team members and skills developed, such as CAD (pg. 12, 14), programming (pg. 7), mentors (pg. 4, 5, 6) and business documentation (pg. 1-15)

Inspire Award:
- Our team FULLY embraces the FIRST program. We are creating a legacy of impact by growing and supporting new teams. This is part of the expansion of our outreach efforts.
- Our team shows Gracious Professionalism (VERIFIABLE)
- We can clearly demonstrate all of the award information listed above

Robot Design: Iterations

Output Mk 1:

We used a similar style to what we are currently using, except we didn't have as much control of the pixels. We redesigned the system because we wanted to have more control over the pixels.

Output Mk 2:

Our first revision of the output sought after increased mobility. We mounted our claw pods to a linear rail so we could slide them across the back board without having to move the chassis.

Drone Launcher Mk 1:

We started with prototyping our design out of c320's with rubber bands and a manual lever. This allowed us to figure out the sizing of the launcher and the drone design.

Drone Launcher Mk 2:

Next, we utilized Fusion360 and were able to 3D print the new design with a super speed servo. We initially used rubber bands but found after testing that springs are more consistent and accurate.

Drone Launcher Mk 3:

With the help of claw motion videos and spreadsheets, we discovered that vibration in the launcher caused the drone to change trajectory. We upgraded the mounting plate from a 3D printed PLA part to a CNC machined aluminum plate.

Drone Launcher Mk 4:

This design is modified to utilize a mini servo so that it is more compact. While this design has been efficient, we are realizing that we need to be able to adjust the spring tension for more fine tuning.

Intake Mk 1:

Our first attempt at an intake was difficult because we have never attempted an active intake before. We decided to make the intake on a virtual four bar, but this had several negative side effects, the biggest being our inability to travel under the rigging, while transferring because the output would need to be lifted higher than the rigging to let the intake in.

Intake Mk 2:

The second iteration of the intake came with a full robot redesign, this allowed for a wider, low to the ground intake with a fixed pixel holding bay. It was geared to use two sets of surgical tubing to pull pixels up the long ramp into the robot. This allowed the transfer to be faster but led to poorer intaking performance.

Intake Mk 3:

The third iteration of the intake came with slight modifications to the surgical tubing rollers and pixel retaining locations. More modifications were made to optimize the path of the pixel to the transfer location.

Suspension Mk 1:

Our first concept was constructed with spring loaded extending aluminum tubes to quickly extend hooks to the rigging. Because only one motor was available, we developed a ratchet driven winching system to prevent backdriving.

Suspension Mk 2:

We started making use of the output to lift the hooks to the rigging with a sprung retraction robot to keep the cord taut.

Suspension Mk 3:

Our third iteration hanging mechanism was comprised of two pull cords that ran over to the hooks, which have a hole similar to that of a pixel, allowing the robot to grab and place them on the rigging to be safely retracted to lift the robot.

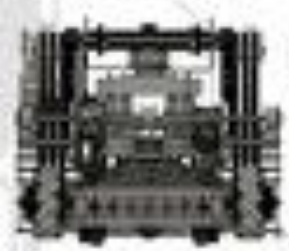
Current Robot Design: Chassis / Drone / Suspension

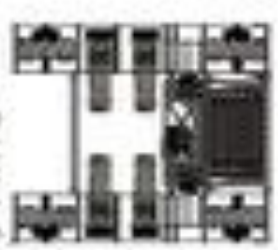
Chassis 3.4:

We use a parallel plate style chassis; this allows us to have a very robust and compact robot. We have almost no extra space in the chassis, and this helps us to be smaller. This season our chassis is designed around our scoring systems which allows for everything on our robot to cooperate well. Using some equations we developed, we are able to calculate what gear ratio we would need to make sure our drive motors are running as efficiently as possible based on the weight.

Chassis 3.4 Actuators:

We have four REV UltraPlanetary motors that drive our mecanum wheels. These motors are connected to our wheels using timing belts and custom designed pulleys. We also have three GoBilda odometry pods that, while taking up more space compared to our previous custom implementation, allow us to more accurately track our movement on the field.





Drone Launcher Mk 3:

Our current drone launcher is compact, lightweight, and efficient. It is designed in Fusion360 and manufactured on a 3D printer. We also utilized a CNC machine for the mounting plate. Our launcher is a simple design that uses two springs with adjustable tensioners and a mini servo to activate the launch.

Suspension Mk 4:

Our fourth iteration (and ultimate) hanging mechanism is comprised of one motor geared to a ratchet locking assembly which drives a set of winches. We have our hooks mounted to our output slides so that we can lift them up to the rigging. We have the string that runs to our hooks in an actively retracting spool so that we don't have any excess string.

FUN FACT!

AUTODESK Fusion 360

Our robot has so many sub-components that we cannot have them all loaded in one CAD file without it crashing! This is why we have to keep each item separate and well-organized.

Current Robot Design: Intake / Transfer / Output

Intake Mk. 5

We have developed an intake that allows us to pick up pixels quickly and easily. This style is called an "active intake". It has three separate bars with surgical tubing attached perpendicularly. These bars spin at roughly 1200 RPM. This allows us to pull the pixels up our ramp and into our transfer area, the trough. This ramp is fixed and we have moved the 3rd row of surgical tubing down for better collection off the stacks and to fit within the sizing requirements.

Our intake is mounted onto two sets of five stage linear slides, allowing us to collect pixels up to 6 feet away from the robot, which reduces driving distance in autonomous and TeleOp.

Intake Mk. 5 Actuators

We use a REV UltraPlanetary motor geared to spin the surgical tubing at a high RPM; this differs from our previous systems because we now don't use a servo, which was empirically proven to be weak and unable to effectively pull off of the stacks well without stalling.

We also have an Axon Mini servo to actuate a small arm with the third row of surgical tubing attached to it, with this we can now pull off the stacks effectively by lowering the bar to its proper height.

Our intake linear slides are powered by a single REV UltraPlanetary motor geared to spin at 1000 RPM to extend our slides quickly.

Output Mk. 4 Actuators

We use a total of 4 servos and one motor for our output. We use two Axon Mini's to actuate our claws, this gives us plenty of power in a very compact format. There is one Axon Max that controls the turret, giving us a fast, robust, and strong way to control the angle of our end effector. We use another Axon Max servo for our "wrist" and have two more Axon Minis that control the angle of our dual bar. This system is also counter spaced to reduce the perceivable weight of the output. Finally, two sets of three stage linear slides are driven by one REV UltraPlanetary motor to extend our output slides vertically.

Output Mk. 4

This output contains 4 degrees of freedom and allows us to reach nearly the entire backdrop. We have two grab pods that grab the back of the pixels. This new design allows us to deposit much faster and have more room for error. This system needs to be rigid and precise, so we have it mounted to a custom-designed turret which supports the servo that controls the angle.

The end of the turret is mounted onto a joint we call the wrist, which is subsequently attached to the dual bar base joint. The dual bar is counter sprung to reduce the perceived weight of the system. All of this is on two sets of three stage linear slides so we can reach the very top of the backdrop.

Game Strategy

Autonomous Period

Autonomous Goal: Achieve maximum reliability

Localization Approach:
- GoBilda odometry pods
- IMI distance sensor

Prop Identification:
- Open CV pipeline for team prop recognition based on color
- Custom positional PID controller for error correction

Scoring Goals:
- Deposit pixels on the backdrop and spike mark simultaneously using both sets of slides
- Quick scoring for efficient pixel cycling

End of Auto:
- Time tracking to determine when to stop cycling and go park
- Move to the backdrop and park

Driver-Controlled Period

TeleOp Strategy:
- Maximize point scoring through:
  - Mosaics
  - Set lines
  - Total pixels scored

Start of Match:
- Start with a yellow pixel mosaic, leveraging the one from autonomous
- Score second mosaic, padding with white pixels

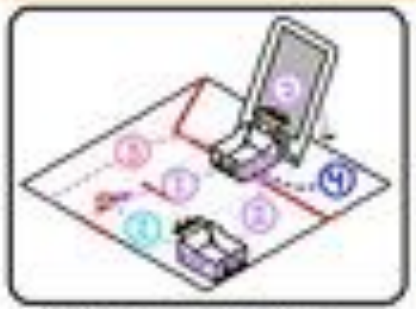
Mid-Game:
- Cross the first set line on the board
- Continue scoring pixels until end game

End Game

End Game Strategy:
- Score drone in highest point zone
- End match suspended by rigging

Drone Automation:
- Automatically launches while scoring at right position
- Eliminates manual input and precise alignment

Suspension and Hooking:
- Output lifts hooks up to the rigging for suspending
- Lifts the robot using innovative and robust ratchet system



Goals for Autonomous period

1. Identify the scoring zone using Open CV
2. Place preloaded pixels in the correct locations on the board and spike mark
3. Collect and place extra pixels on the backdrop
4. Park in the backstage

Strategy Summary

1. Score the first mosaic quickly
2. Set up a secure location and score the second mosaic
3. Achieve the first set line bonus
4. Launch drone and suspend robot on the rigging

FIRST and Community Outreach

FIRST Outreach / Volunteering

- FLL Kick-off, Scrimmages 1 & 2
- FLL Mission and Table Build
- FLL Robot in a day
- FLL Qualifier 1 & 2
- FLL Championship
- FTC Kick-off and Scrimmage
- FTC League Meets 1, 3, 6
- FTC Host League Meet 2 & 5
- FTC Host for Autonomous Workshop
- FTC Host for CAD Workshop
- FTC League Tournament

Hosted League Meets 1 & 5

We organized and hosted two league meets. Several team members volunteered for tasks such as field resetting and robot inspection, ensuring smooth operations.

Elise served as the game announcer whose, energizing both the FIRST teams and the audience. We ran a food stand to raise funds and enhance the atmosphere of the meets, making it more vibrant and enjoyable.

Hosted CAD & Autonomous Workshops

We hosted two workshops for FIRST Nevada: the CAD and Autonomous Workshops providing valuable learning and guidance opportunities for teams, enriching their skills and knowledge.

Community Choir Sumo Bot Battle

Instructed 30 children on creating attachments for an EV3 robot for participation in a sumo bot competition.

Virginia City Parade

We promoted robotics and STEM by taking part in a parade downtown. Following the parade, we cleaned up the trash from the street leftover from the parade viewers.

Girls on the Run

Delivered a presentation to approximately 90 girls about our experiences in FIRST and our aspirations for STEM in the future.

STEM Kits for Our Community

Assembled more than 100 STEM Kits to be donated to children at local schools to facilitate learning and knowledge expansion.

Community Outreach

- The Future of Reno - Discovery Museum
- STEM Thursday - Library
- Girl Scouts - Robert Fay
- Celebrations
- Carson Tahoe Health - Robot Showcase
- Community Choir Sumobot Battle
- Girls on the Run
- STEMIN Presentation
- VC Veterans Day Parade
- Roasting Marshmallows
- STEMkits for Africa
- Pine Nihil Showcase

Innovation Sessions

We hosted and organized **two Innovation Sessions** at the K-12 robotics center. We spent a total of **36 hours** helping a total of **seven ATK teams** prepare for upcoming competitions. We practiced robot matches, offered full field access, had collaborative improvement efforts, and had some enjoyable pizza. It was an **excellent chance for us to create connections with other FIRST teams**.

Advocacy

Our team realizes the importance of sharing the value of FIRST with our community. This is why we reached out to **5 government officials** in our area for a total of **8 hours**. We showed our robot and explained the large impact FIRST has on our lives. From county commissioners to our local sheriff, we have **advocated** for FIRST programs in our community. These leaders emphasized their excitement for advancing these programs!

Mentoring *FIRST* Teams

Mentoring FLL Teams

- Had **OVER 100 MEETINGS** with the FLL teams we mentored
- Helped members to come together as a team, developing projects such as a Math Mismatch and a parking piano
- Helped teams learn how to program EV3 and SPIKE PRIME robots and work on building and iterating on their robots
- Taught teams about the importance of teamwork, collaboration, and being Graciously Professional on their everyday lives
- Raised over **$17,000** for teams, helping fund robot parts, laptops, greenhouse projects, and innovation project parts

Mentoring FTC Teams

- Helped teams learn and use Fusion360 CAD software
- Helped teams solve programming bugs ahead of and during competitions
- Gave teams mechanical tips and helped craft solutions to mechanical problems

Kylie (left) won the Coach/Mentor award at the Northern Nevada FLL Championships for her work coaching Team 12190 Magnetites

Assisting *FIRST* Teams

Assisting FIRST Teams

- Innovation Session hosted 7 **teams**, providing mechanical and programming support, and guidance on their Engineering Portfolios. Offered field access to a team without one, enhancing their autonomous programming.
- Managed Nevada FTC district with **nearly 60 FTC students**.
- Assisted 12 **FLL teams** and aided numerous others with programming, robot understanding, fundraising, publicity, website functionality, and costs. Provided assistance via YouTube comments and email, reaching many teams (53 students didn't share their team number).

Social Media Outreach

Published Resources Analytics	
Online Published Resource	People Reached
CAD Workshop	[illegible]
Autonomous Workshop	[illegible]
Introduction to CAD Video	[illegible]
FLL Mission 1	[illegible]
FLL Mission 2	[illegible]
FLL Mission 3	[illegible]
FLL Mission 4	[illegible]
FLL Mission 5	[illegible]
FLL Mission 6	[illegible]
FLL Mission 7	[illegible]
FLL Mission 8	[illegible]
FLL Mission 9	[illegible]
FLL Mission 10	[illegible]
FLL Mission 11	[illegible]
FLL Mission 12	[illegible]
FLL Mission 13	[illegible]
FLL Mission 14	[illegible]
FLL Mission 15	[illegible]
Website Portfolio Help	[illegible]

Online Published Resources

[illegible]

Content:

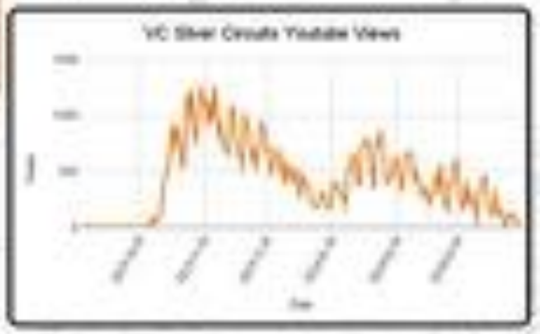
[illegible]

Social Media Views and Followers		
Platform	Reach	Followers
YouTube	[illegible]	[illegible]
Instagram	[illegible]	[illegible]
Facebook	[illegible]	[illegible]
TikTok	[illegible]	[illegible]
Website	[illegible]	N/A

Top 10 Country Views	
Country	Views
United States	[illegible]
Brazil	[illegible]
Turkey	[illegible]
Kazakhstan	[illegible]
Mexico	[illegible]
Spain	[illegible]
Saudi Arabia	[illegible]
Rwanda	[illegible]
Singapore	[illegible]
Canada	[illegible]

Reach:

[illegible]



Connecting with STEM Commmunity

Spotlight:

[illegible]

Spotlight:

[illegible]

Total Connected: 14 Total Hours: 48

[illegible]

Team Goals

Team Goals:

- Follow FIRST Core Values
- Uphold safety values
- Connect with the community and STEM field to share knowledge and excitement through outreach events and scheduled meetings
- Keep the FIRST program going and build new teams
- Respect team members and do the work needed to succeed
- Make every team member contribute to the Engineering Notebook and Engineering Portfolio documentation
- Learn more about CAD, 3D printing and CNC machining
- Host two FTC League meets
- Earn an invitation to the Worlds Championship
- Participate in Extravaganza event for the Northern Nevada Food Bank
- Make sure that everyone is included and has a job to complete

Build Team Goals:

- Have a robust, stable, and competition-ready robot in time for the scrimmage
- Improve the robot design as desired for each subsequent meet
- Make the robot easy to repair by designing it with modular subcomponents
- Design robot in CAD
- Learn the skills needed to build and modify a robot through online research and STEM contacts
- Keep the robot functional for programmers to use

Programming Goals:

- Maximally reliable autonomous
- Robust localization
- Cycle 6-10 pixels in autonomous from the stacks of white pixels
- Keeps the controls to 1 driver
- Effectively use GitHub for version control and to allow multiple people to work on code in parallel
- Use state machines to control robot's actions, even in TeleOp, to reduce the load on the driver
- Utilize carefully tuned set positions to use our output to its full potential

Business + Team Goals:

- Motivate team members to participate in upcoming FIRST events
- Create a helpful scouting document for meets
- Start Fundraising for upcoming events early
- Create an engaging presentation that gives the team the best chance at winning awards
- Track finances and stick to a budget
- Create team meeting agendas to keep track of homework and upcoming events
- Create an Engineering Notebook and portfolio that highlights all of our strengths and our season
- Fundraise $16,000 for robot parts, traveling expenses, team gear and outreach funds
- Connect with 25 engineers or people in the STEM community
- Reach 1,500 people
- Mentor 5 FIRST teams
- Document the season early
- Put Nevada robotics on the map!

"VC Silver Circuits, you need to Aspire to INSPIRE before you Expire, now go to work as you can Perspire!"

Eric – VC Silver Circuits Coach

Business Plan and Fundraising

Strategic Plan

- Define our vision and goals
- Assess our current situation and position
- Determine our priorities and objectives
- Research different ways to achieve objectives
- Choose our plan of action and define responsibilities
- Develop a supporting plan and allocate resources
- Execute and manage the plan
- Review and revise the plan as needed

Fundraising & Marketing

- 501(c)(3) tax status, nonprofit
- Apply for grants
- Meet with STEM Companies
- Meet with STEM professionals
- Sponsor Request letters to send to local businesses
- Dollar Days Project competition
- Hosting Events for FIRST NV
- Host robot showcases
- Proudly represent our community and gain local support
- Social media
- News outlets
- GoFundMe
- Venmo
- Paypal

Instagram

YouTube

facebook

TikTok

Team Sustainability

- Mentor the VC Middle School robotics class that feeds into our team
- Coach an FLL team, Minuteman Masters, that also feeds into our team
- Provide outreach to the community, where we sometimes find new team members
- Connect with STEM professionals who wish to include their children in FIRST
- Recruit younger siblings for the team
- VC Silver Circuits alumni return to mentor and volunteer at FIRST events
- Create a lasting impression on sponsors for future funding of the team
- Create a fun environment that makes everyone want to join the team or want to come back

TESLA REV DOLAN comeback

Recruiting Mentors

- Engage with STEM Professionals
- Extend invitations to FIRST Events for new acquaintances
- Recruit parents of team members
- Organize robot showcases at local businesses
- Host events and welcome the community
- Seek expert assistance through social media
- Gain support from STEM professionals through media interviews

Team Structure and Responsibilities

Lessons Learned by the Team:

Elias: Learned how to follow in the footsteps of experienced team members and build a thorough but elegant Engineering Portfolio.

Aidan T.: Learned how to utilize everyone's skills effectively to create something great!

Coen: Learned valuable life lessons and how to be more effective at 3D design.

Adam: Found the importance of setting clear requirements and constraints when starting a project to allow for effective development down the road.

Hunter: Learned the value of teamwork and how to work alongside a group of other passionate individuals.

Kaylee: Gained experience in recording, editing, and producing promotional videos.

Aiden S.: Starting from scratch, building up foundational programming skills to help bring a robot to life.

Kylie: Found ways to help share her knowledge with younger members and guide them in their FIRST journey.

Dallin: Developed valuable social skills and learned how to bridge differences among large groups of people to allow everyone to come together and succeed.

Tucker: Realized the importance of working together with a team and how to fit your individual piece into the overall puzzle.

William: Gained practice performing repeated testing to break designs until they are effective.

Savannah: Learned how consistent, hard work as a team pays off in the end.

What does Gracious Professionalism mean to you?

"Gracious Professionalism is about focusing on the journey — not just our journey, but everyone's journey. No matter who's robot is flawless and who's is broken, being a Gracious Professional is about committing to help everyone to be able to get the most they can out of the FIRST experience - it's about what we set aside our differences to allow everyone to build something better."

Dallin, 2024 Dean's List Finalist

Season Timeline

Reached: 2,000 (+media)
Motivate: Discovery Museum STEM Thursday, CAN-struction, Girl Scouts, Robot Day, Robot Showcase, Sumo Bot Battle, Girls on the Run, FLL Table Build, FLL Mission Build FLL Kickoff, All You Tube videos
Technical: Developed parallel plate chassis

Reached: 250
Motivate: Volunteered at FLL events, hosted multiple FTC events, Won Solon Class Project grant with over 3,000 community votes
Technical: Finished first version of competition robot. First version of the drone launcher, intake system, and deposit system complete.

Reached: 870
Motivate: Volunteered for FLL Qualifier 1, and FLL Qualifier 2
Technical: Manufactured and built the second version of our competition robot. Added first version of our suspending mechanism.

Reached: 570
Motivate: Hosted Innovation Sessions 1 and 2, FTC league meets 5 & 6, Volunteered at FTC MMV League Tournament
Technical: Developed new hanging system using output. Added hat to our league. Won No. MV inspire award, Winning Alliance, and Motivate Awards.

Summer 2023 | October 2023 | December 2023 | February 2024

September 2023 | November 2023 | January 2024 | March-April 2024

Reached: 105
Mentoring: Meeting weekly with FIRST teams (2 FLL, 1 FLL explore, 1 FTC)
Motivate: FTC Kick-off, University Challenge FTC Robot in a day workshop.
Technical: Started robot design for this season. Optimize for efficient and reliable scoring in Auto and TeleOp.

Reached: 4,760
Motivate: Volunteered at FLL Scrimmages 1 & 2, FTC League Meet 1, Marched in Veterans Day Parade in VC with FLL team Magnetism, and hung Rotating mouse Christmas lights.
Technical: Started second version of our competition robot. Redesigned the output and intake.

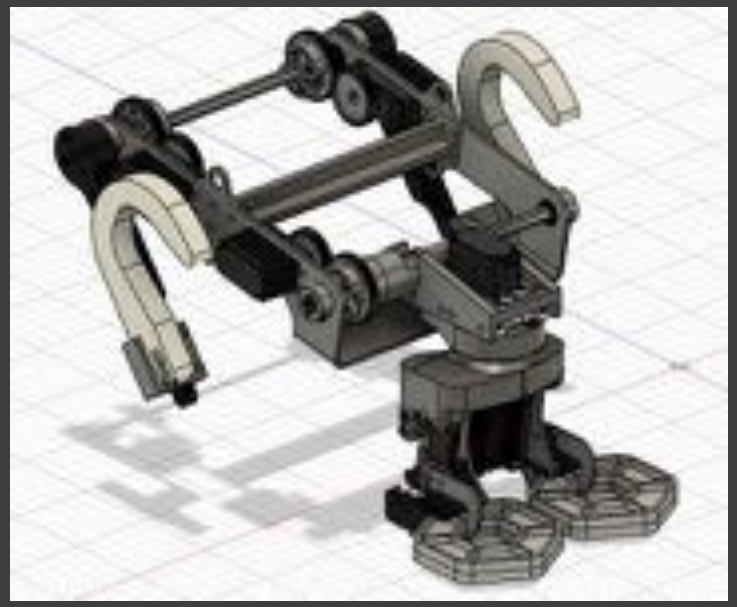
Reached: 1,231
Motivate: Created STEM kits for kids in our community, Pine Wild showcase, Volunteered at League Meets 3 and 4, and FLL MMV State Championship
Technical: Wrote TeleOp code for swerve controls, improved intake and suspension.

Reached: +1000 (+media)
Motivate: Hosted Trivia/silent auction event to fundraise for the trip to Worlds. Interviewed by all major local news channels
Technical: Redesigned output and intake to further optimize scoring on the field

Mentors:

- **Roger:** acts as an engineering mentor, guiding us on manufacturing processes, problem-solving strategies, innovative solutions for challenges, and CNC part production. Additionally, he generously allows us to utilize his garage and tools for crafting custom parts.
- **Melanie:** serves as a business mentor, offering valuable input on grammar and spelling in our written work. She has also shared her expertise in event planning and food sales with us.
- **Carson:** a FIRST Alumni, supports us by providing fresh perspectives and assisting in problem-solving. His skills in videography and editing have greatly contributed to the creation of our FLL mission video series and various team marketing materials.

C.A.D.
(Computer Aided Drafting)
(Hunter)

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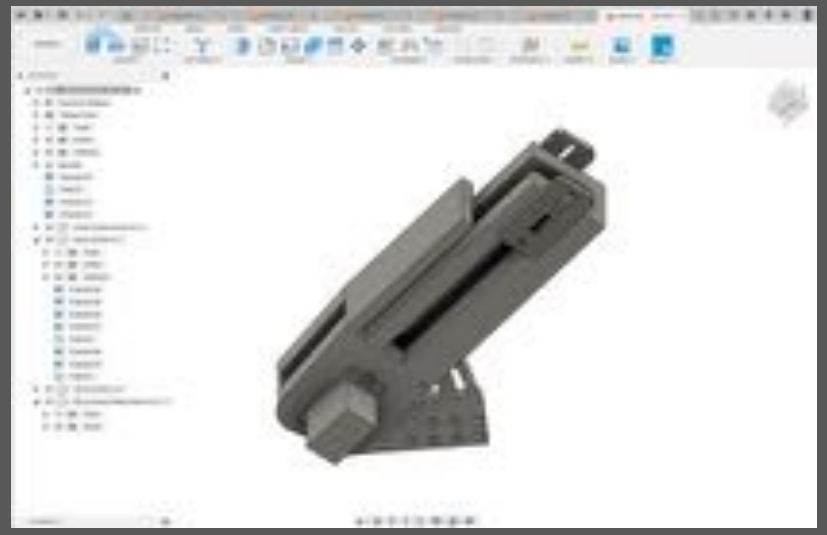
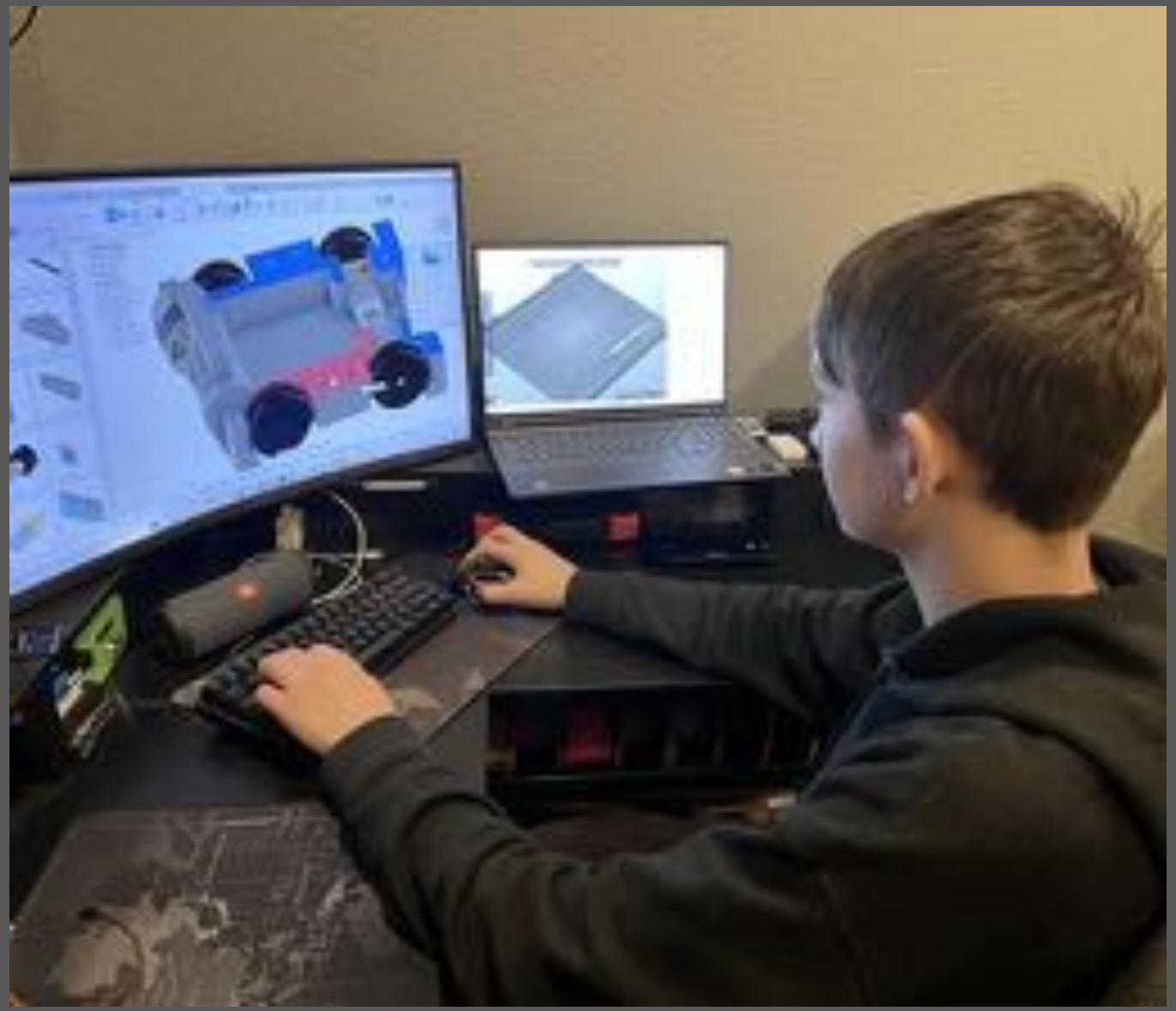
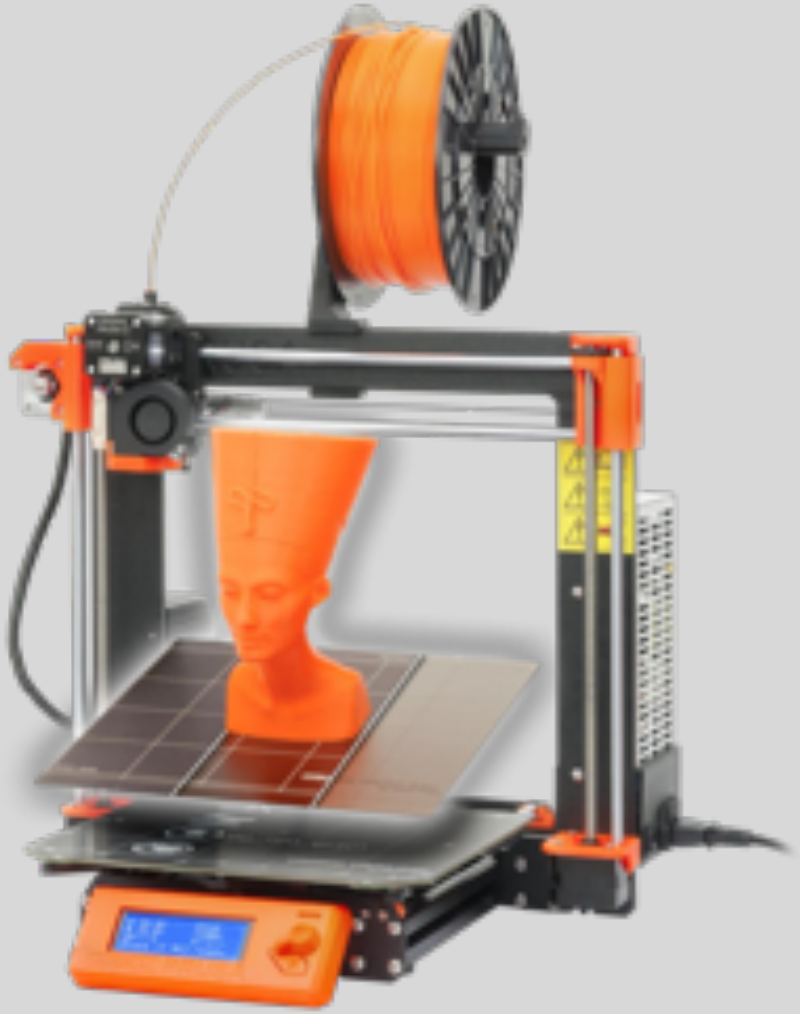
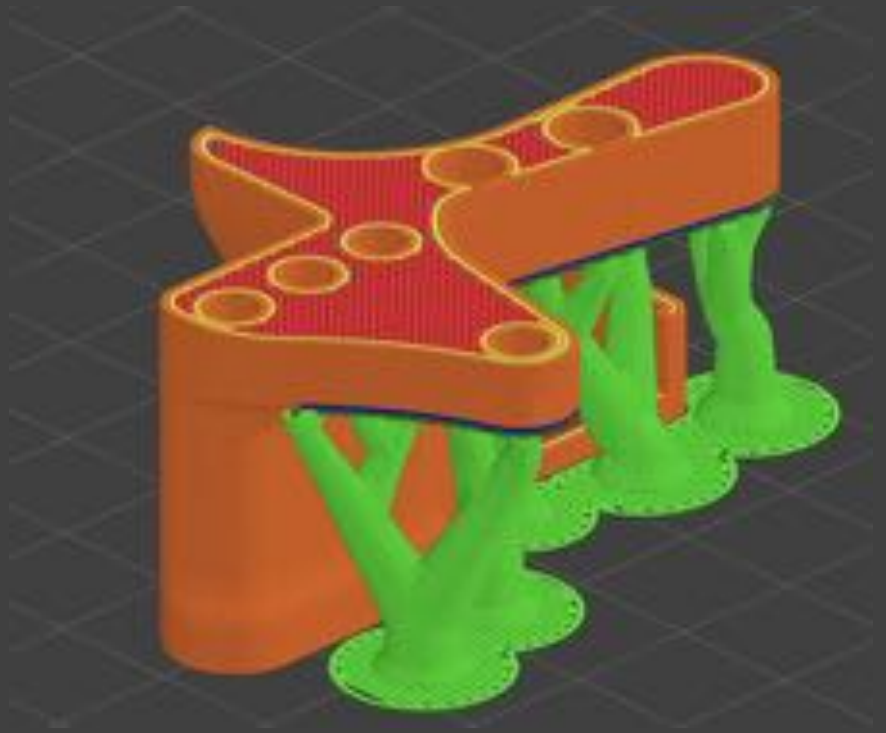
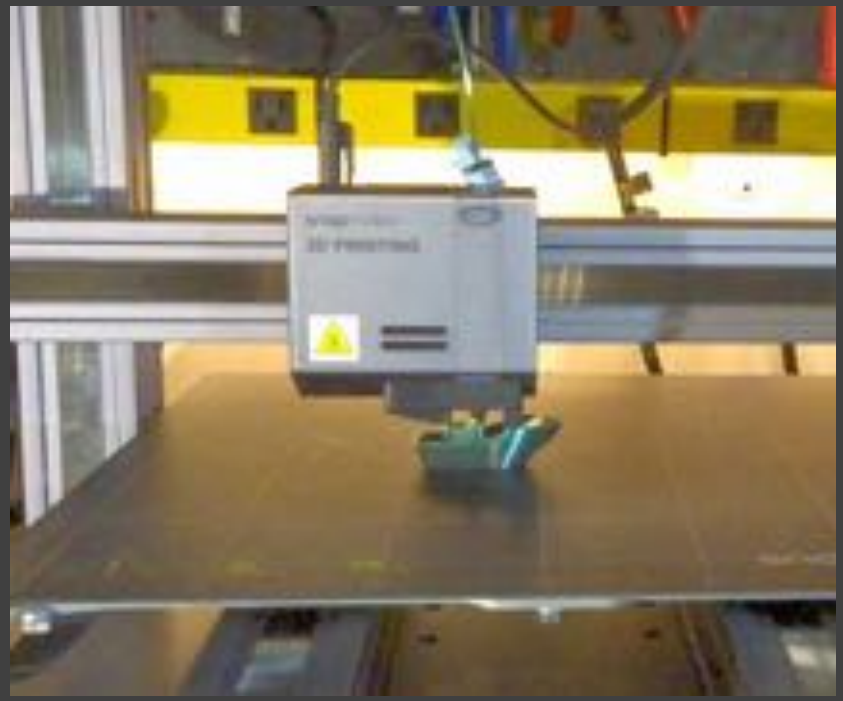




3D Printing & CNC Machining (Tucker)



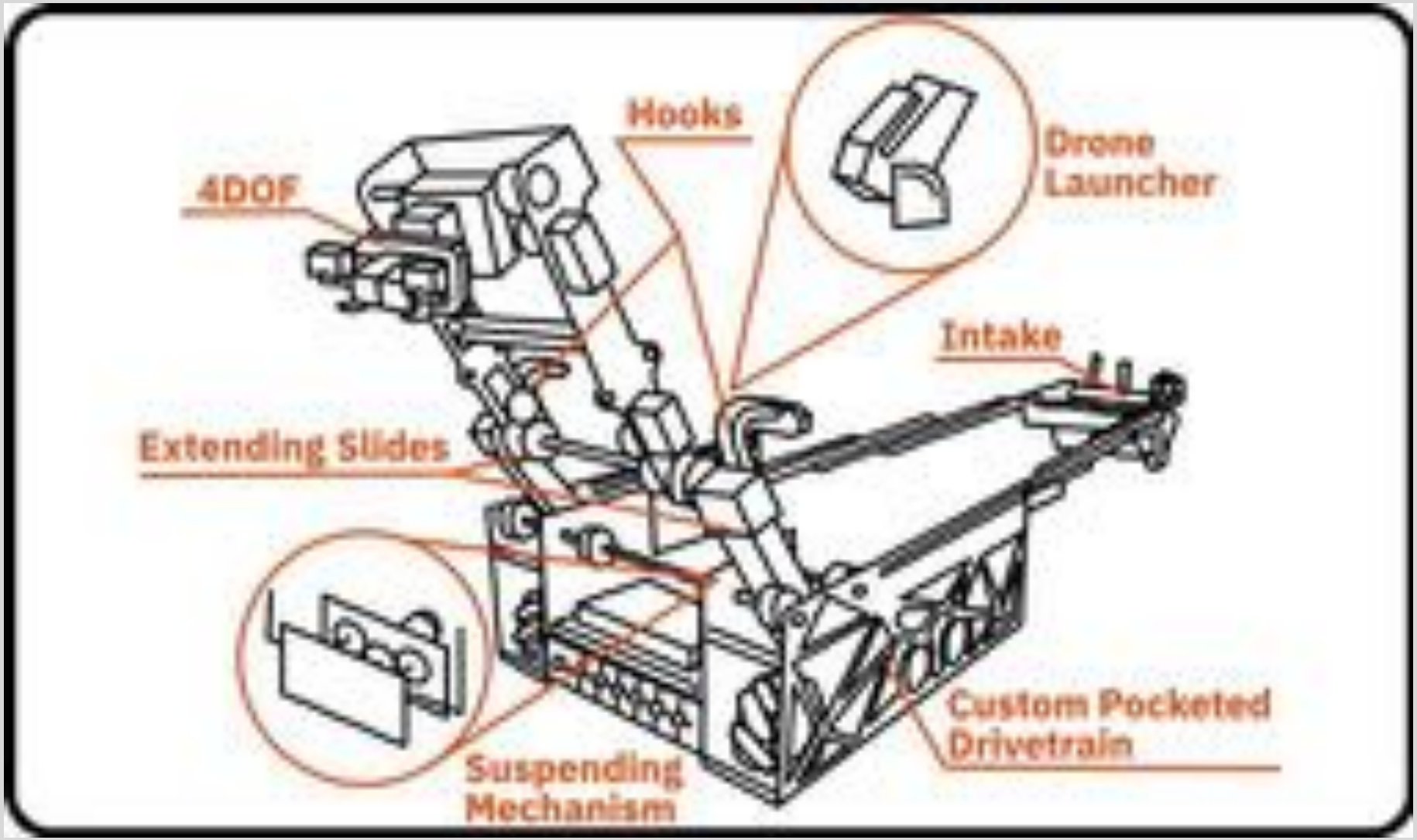




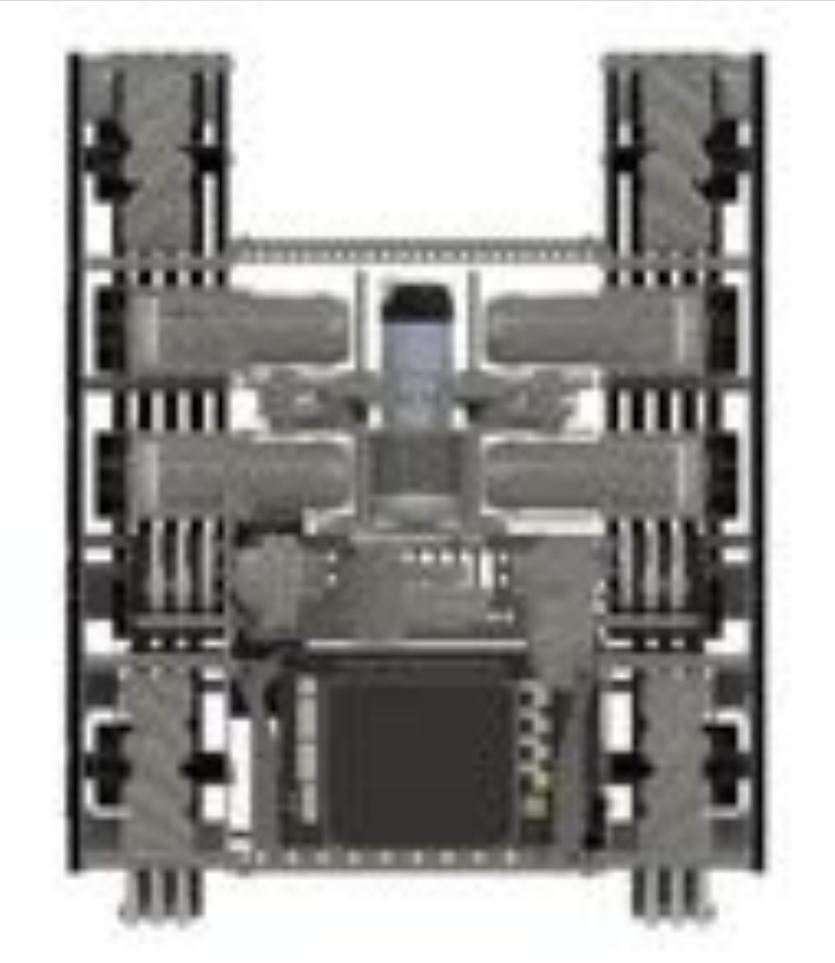
CAD TO MANUFACTURING

Our 2023-24 Robot (Coen)

OUR ROBOT: INVICTUS


Hooks
Drone Launcher
4DOF
Intake
Extending Slides
Custom Pocketed Drivetrain
Suspending Mechanism

Robot Chassis



- Parallel plate chassis with dead axle wheel mount.
- Odometry
- Compact inset drive motor placement
- Mechanum wheel drive
- Compact and out of the way suspension retraction system
- Compact Expansion and Control hub placement

When we design....

We take into consideration the:

- Space needed to fit the intake and the output.
- Mounting places for Intake and output slides.
- Keeping the total width of the robot to a minimum.
- Having ample space between drive motors for suspension mechanism.

Suspension

What is does...

- Ratcheting mechanism for stability.
- Is freely retractable for the output to lift repeatedly.
- Hook is deployed on hooks by output.wuqz

Its Features...

- A hook mechanism to prevent strain on the servo.
- Adjustable Spring tensioning and aiming.
- 70% accurate zone 1

Drone Launcher

The Intake

- Spins rows of surgical tubing close to 600 rpm.
- Holds the pixels in the trough in preparation of collection by the output.
- Has a door that secures them when intaking and transfering.
- Movable row of surgical tubing for collection off the stack.

The Output

Components...

- Has mounts for the previously mentioned suspension to sit in.
- 4 degrees of freedom
- Collects pixels in two separate claws

The output sits in the intake like so:

Robot Match (Aiden)

1st Match at World Championship

Robot Demonstration (Coen)