

Dillon Harrington

Mechanical engineering portfolio

I am a first-year mechanical engineering student at Northeastern University and a former captain and mechanical lead of FIRST Robotics Competition Team 467. I am seeking a summer 2027 mechanical engineering internship.

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Ball-E (V1, left) and EVE (V2, right), Team 467's two 2026 robots. I designed V1's shooter and directed the design of V2.

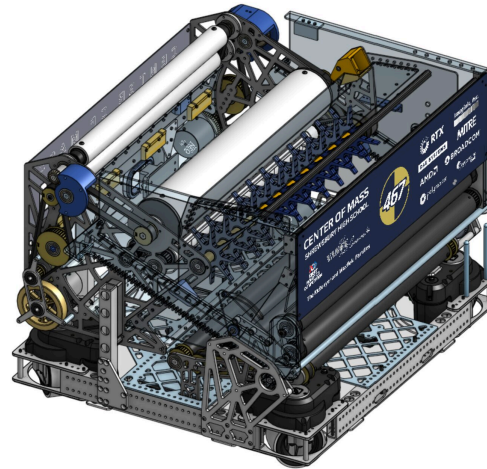
V2 robot redesign

Year 2026	Role Captain and design lead
Scope 130 lb robot, 600+ parts	
Result Scoring rate up from 3 to 9 points per second	

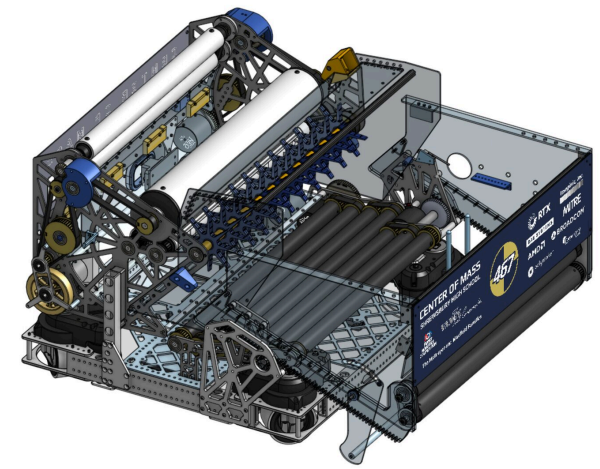
Our first robot of the 2026 season had a disappointing start at our first competition. It wasn't reaching the scoring rate we had hoped for. I raised this concern with the team, and after deliberation, we decided to start work on a V2 robot.

While the team kept working on V1, I directed V2's design. With minimal mentor involvement, I set its archetype with input and feedback from other team members, split the robot into subsystems, and assigned them to designers on the team. I ran design reviews for each subsystem and worked on each one myself, then approved parts and worked with the machining team to get them made.

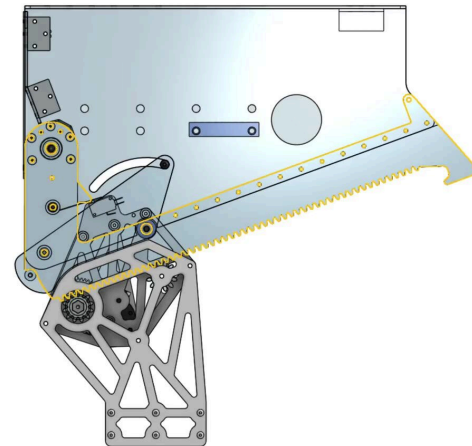
V2 scored three times as fast as V1, at 9 points per second instead of 3. Across both robots that season, I designed and approved over 300 unique custom parts.



V2 in CAD with the intake retracted.

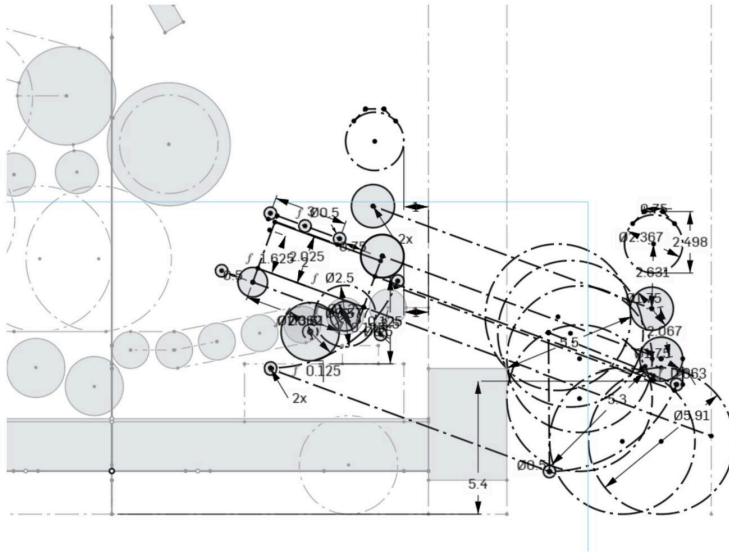


The same model with the intake extended.

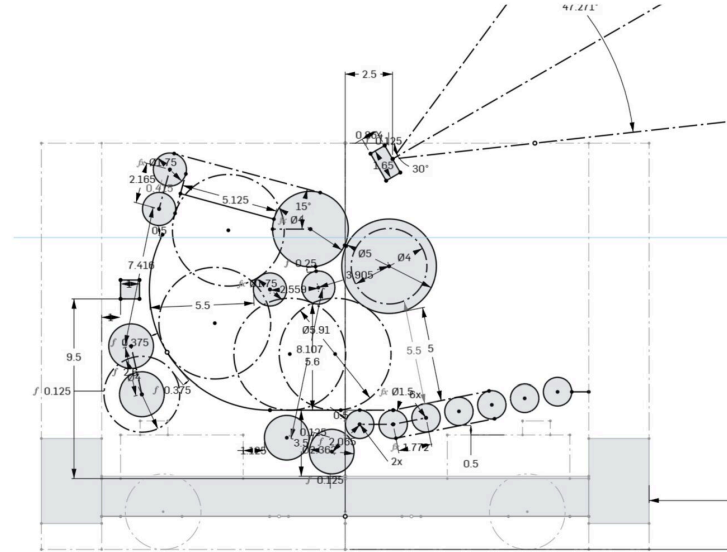


Intake, side view (from the CAD animation on the website).

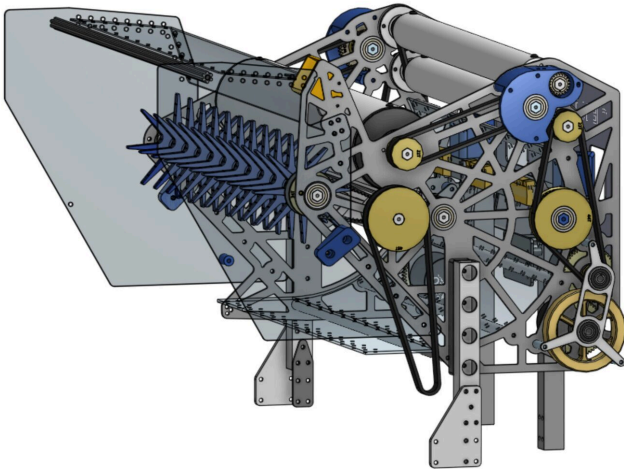
V2 robot redesign: intake and shooter



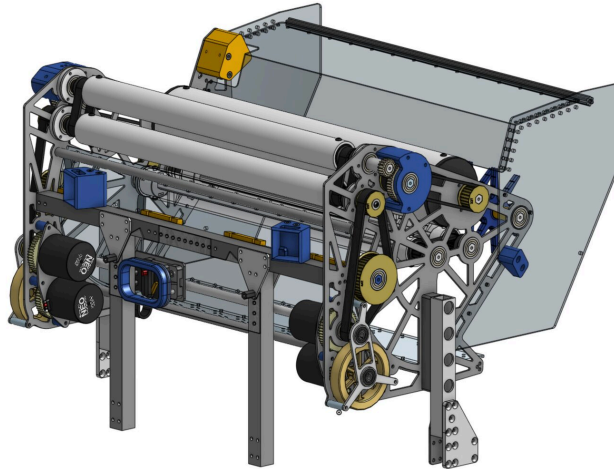
Intake master sketch. The key geometry lives in one 2D layout that the 3D parts are built from.



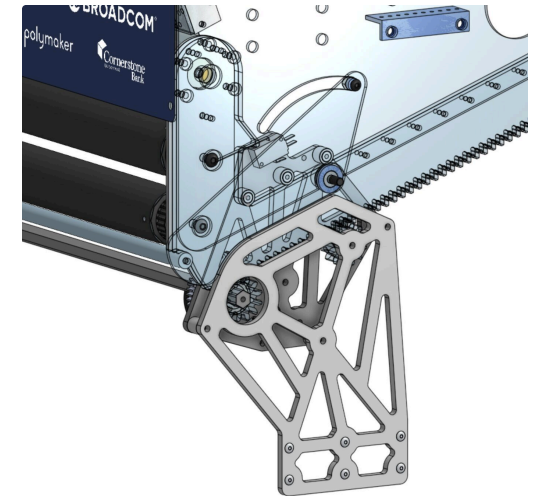
Shooter and indexer master sketch.



Shooter, front.



Shooter, back.



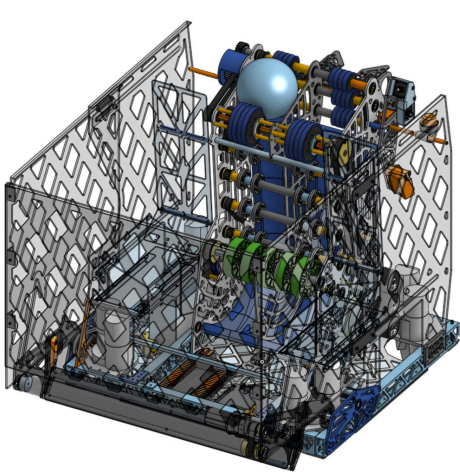
Intake close-up.

V1 shooter

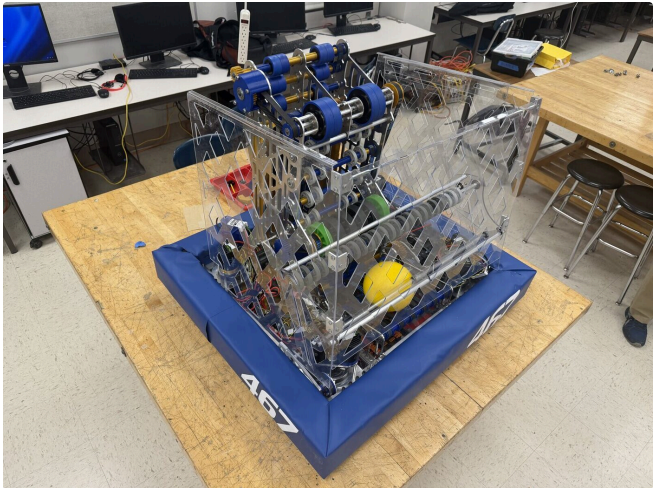
Year 2026	Role Sole designer
Scope 80 unique parts	
Methods Parametric CAD, motor sizing from power calculations, launch-distance model	

The shooter on our first robot of the 2026 season was its most complex subsystem, with 80 unique parts, and it was entirely my design.

I modeled it parametrically so design changes could be made very quickly, since things can change very fast and flexibility is a must. I used power calculations to size the motors and find how many we would need, and I even built a model within the CAD that showed the predicted launch distance from the motor specs and launch angle, so the team could visualize different setups.



V1 in CAD.



V1 assembled.



V1 in competition.

Concrete-filled lathe

Year
Summer 2026

Role
Designer

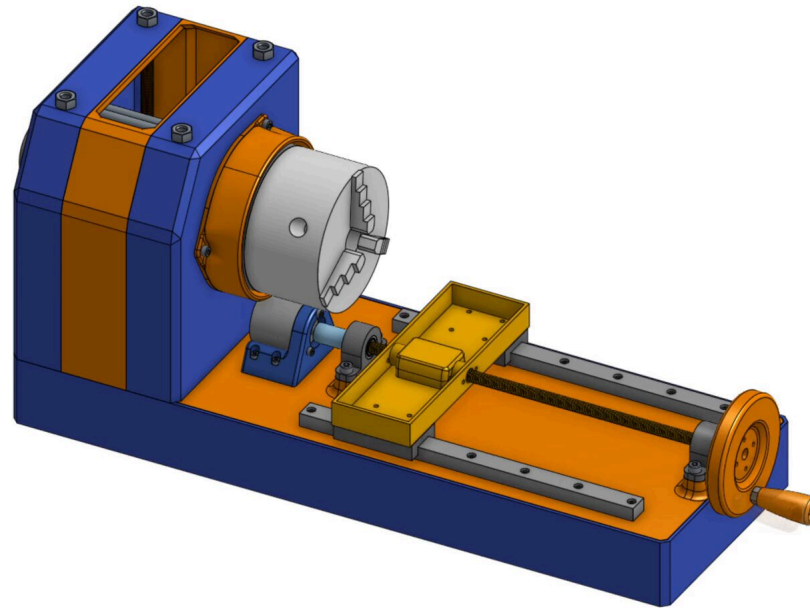
Goal
An open-source lathe anyone could download, 3D-print, and build cheaply

Status
Unfinished: planned, most of the CAD done, parts sourced

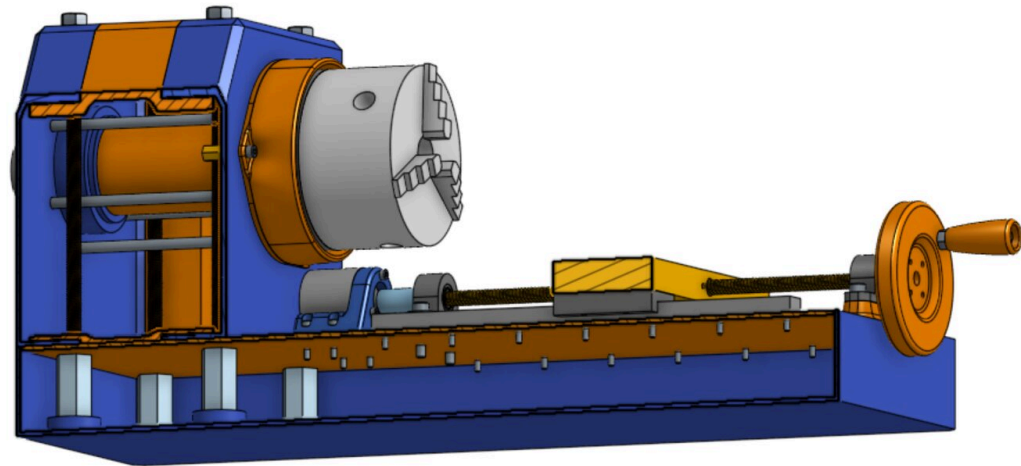
Parts made on a lathe are very important for building FRC robots. Lathes make parts like standoffs and shafts, which are integral to every robot many teams make. Unfortunately, the lathe is one of our team's biggest bottlenecks, since making parts on it is rather slow and we can only make one at a time.

My idea to solve this was an open-source lathe that anyone could download, 3D print, and build from cheap materials. It would have a 3D-printed body, filled with concrete and reinforced with aluminum for stability.

While I didn't complete the project, I got about halfway. I planned the build, finished most of the CAD, and even sourced the parts online from different sellers and modeled them into the CAD.



The lathe in CAD. The website shows the carriage moving along the leadscrew.



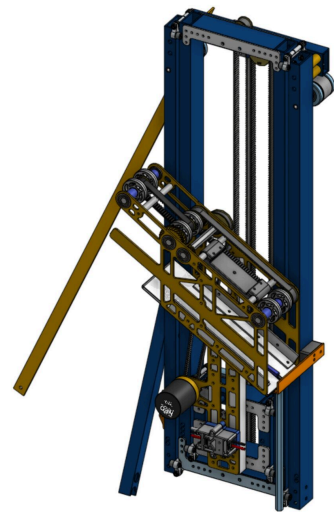
Cross-section. The hollow printed body would be filled with concrete for stability.

Elevator and end effector

Year 2025	Role Designer
Scope Elevator and end effector	
Season Reached the World Championship, the team's first in 8 years	

For the team's 2025 robot, I designed the elevator and the end effector. The elevator is the mechanism that lifts and lowers the end effector, and the end effector grabs and holds game pieces for scoring.

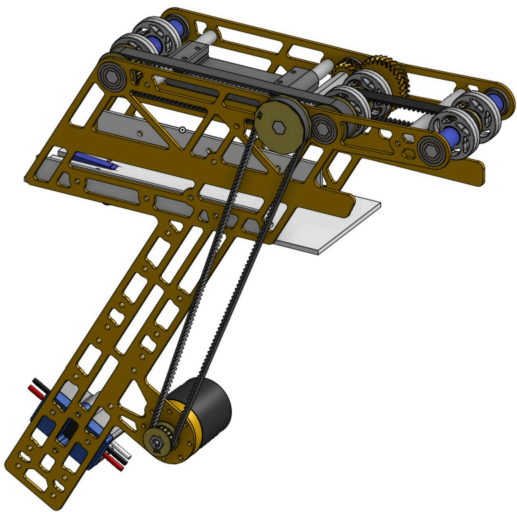
This robot was very successful and took the team to the World Championship for the first time in eight years. I also led the physical assembly of the final competition robot, which I did three years in a row: 2024, 2025, and 2026.



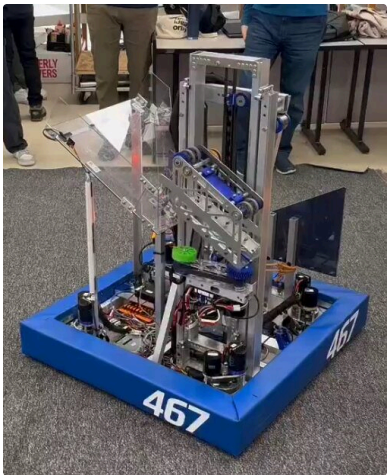
Elevator and end effector, retracted.



Fully extended.



End effector.



The finished 2025 robot.

Driver station console

Years
2023–24

Role
Designer and builder

Tools
Fusion 360

Status
In use since the 2025 season

As the team's driver, I used the driver's console every match, yet it was one of the weakest parts of our setup. It was simply a plank of wood with door-hardware handles and a tangle of wires, and the controller would often fall off and break.

To solve this, I decided to design a custom driver console for the team. I began with requirements, separating must-haves from nice-to-haves, and then designed it in Fusion 360. I built in:

- Handles
- Tool and marker storage
- Whiteboard storage
- Extra operator controls
- Cooling fans for the internal components
- LEDs
- Electronics, including a Raspberry Pi Pico-based operator console
- A battery to power the LEDs and inner workings
- An external AC power port for charging everything inside

I pitched the design to the team's head mentor, then built and finished it just in time for the 2025 season, when we made it to the World Championship. The team still uses it to this day.



The finished console with its LEDs on.

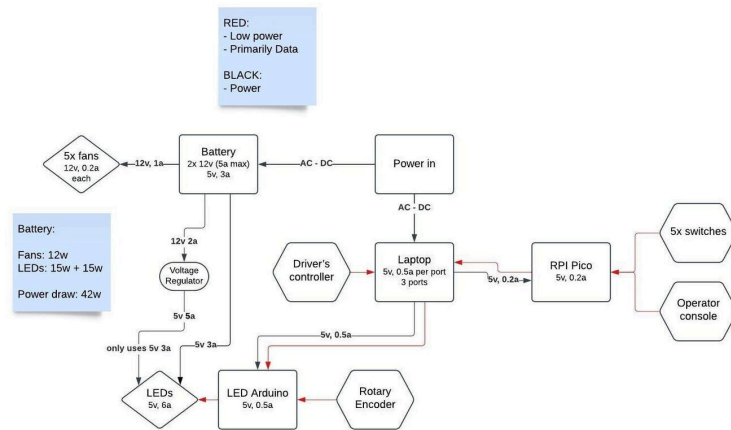


Marker storage, LEDs, and fan grilles.



Fusion 360 model with the laptop, operator buttons, and controller tray.

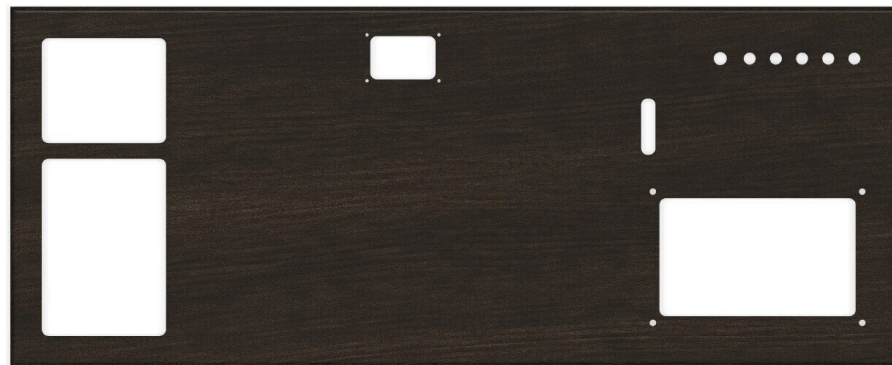
Driver station console: design



Power and data plan. The fans and LEDs draw about 42 W.



Back, with the fan vents.



Top panel, CNC-routed from 34 by 14 inch plywood.



Without the laptop.

About

I'm studying mechanical engineering at Northeastern University (B.S. expected May 2030). At Shrewsbury High School, I was captain and mechanical/CAD lead of FRC Team 467, a 68-member team, and a FIRST Robotics Competition Dean's List Semi-Finalist in 2025.

I design with manufacturability in mind, whether a part will be made on a CNC router, vertical mill, lathe, or 3D printer, and I'm able to make technical drawings for the people running the machines. I've also machined parts on the vertical mill and used 3D printers myself.

I also ran a car detailing business for all four years of high school, serving nearly 100 cars, and built a custom website for it from scratch: DillonsCarDetailing.com. I ran it solo, taking on customers and completing the jobs myself.

Skills

CAD	Onshape, Fusion 360, Inventor
Fabrication	3D printing, vertical mill, soldering; design for CNC router, lathe, and laser cutting
Electronics	Power system and wiring planning, motor sizing, Raspberry Pi Pico prototyping
Design	Parametric design, design for manufacturability, technical drawings, design reviews, rapid prototyping
Software	Excel, Google Sheets, Python (basic)

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