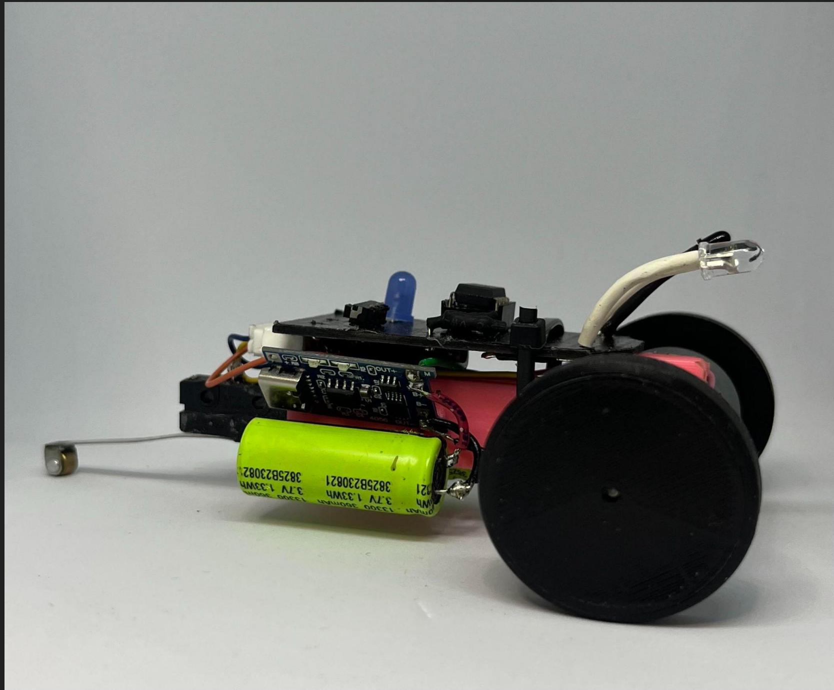
# SunBEAM-Robot-2

Re-imagining an old BEAM robot I made when I was 16 using a custom pcb, recycled components, and a perpetual artificial infrared source.

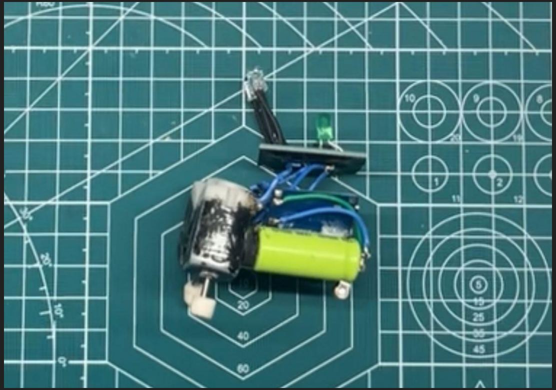
https://makezine.com/projects/sunbeam-seeker-bot/



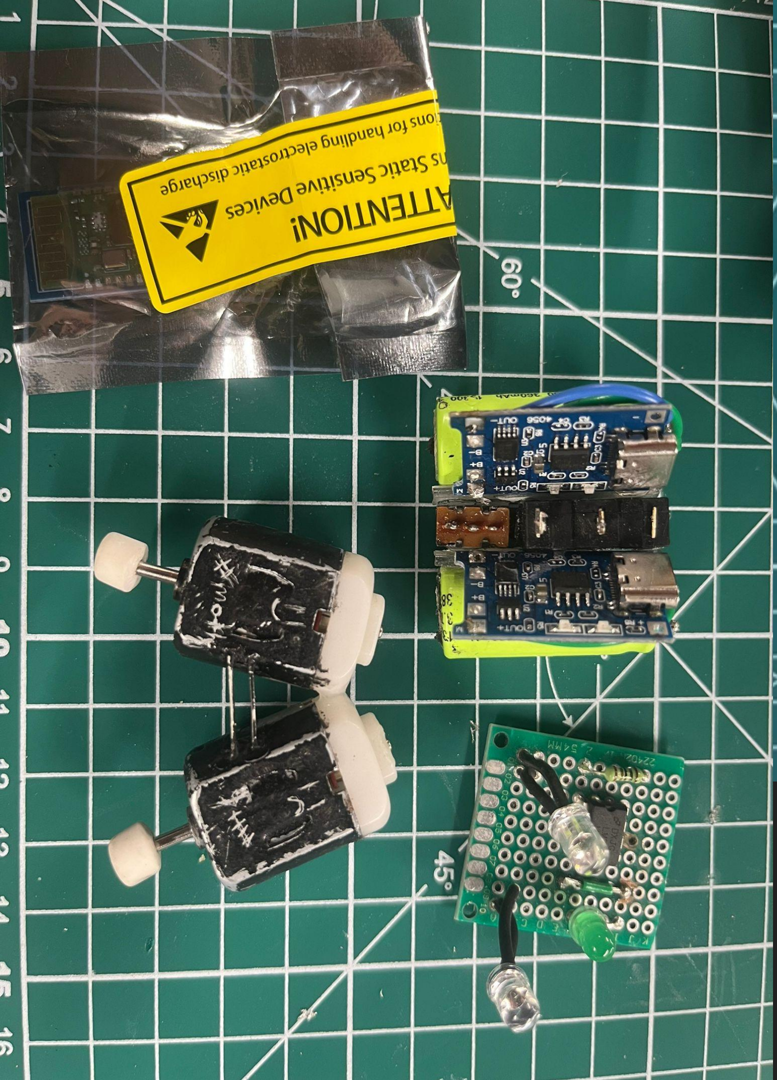
# Background

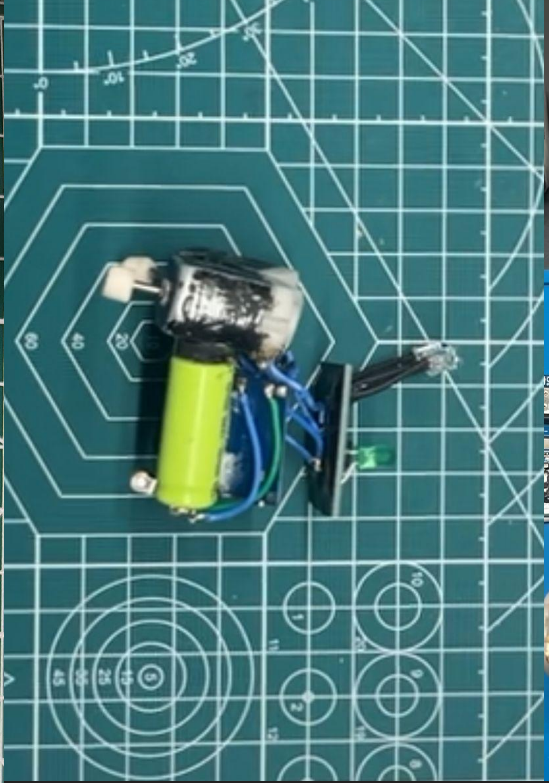
The main logic of the Sunbeam Seeker Bot is to detect the direction with the most infrared light (sunlight) and move toward it. It uses two light sensors (snail eyes) to compare light intensity; when one side detects more light than the other, the bot adjusts its direction to move toward the brighter side. This process repeats, allowing the bot to "seek" and follow the brightest light source. Using simple sensor-circuit-motor loops, the robot demonstrates emergent behavior, a core principle of BEAM robotics.

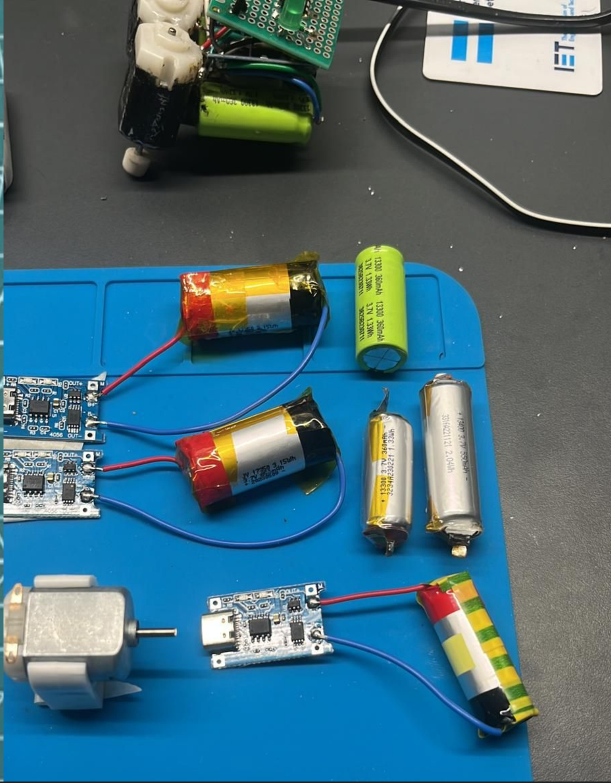
Version 1 was built as a weekend project in 2021 using instructions from: https://makezine.com/projects/sunbeam-seeker-bot/ . When I built it I adapted it to be smaller and use LiPo batteries in series with Type-C charging instead of four AA batteries.



In 2023, I revisited this robot, which held significance as the first I ever built and the project that solidified my decision to pursue engineering over architecture. This time, I applied skills learned in my first year at university, including PCB design, CNC milling, CAD, 3D printing, and more.



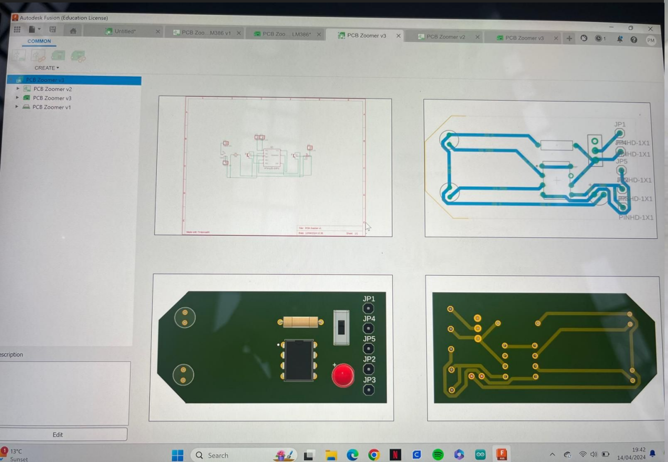


# Reverse Engineer

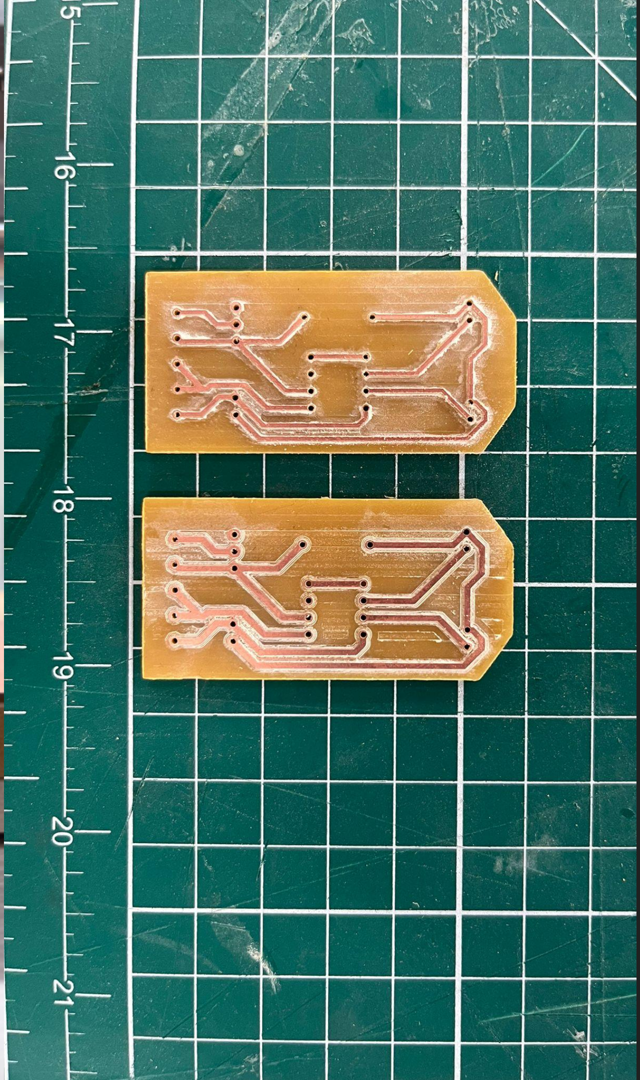
+experiment with alternative recycled LiPo batteries

# Design & Manufacture

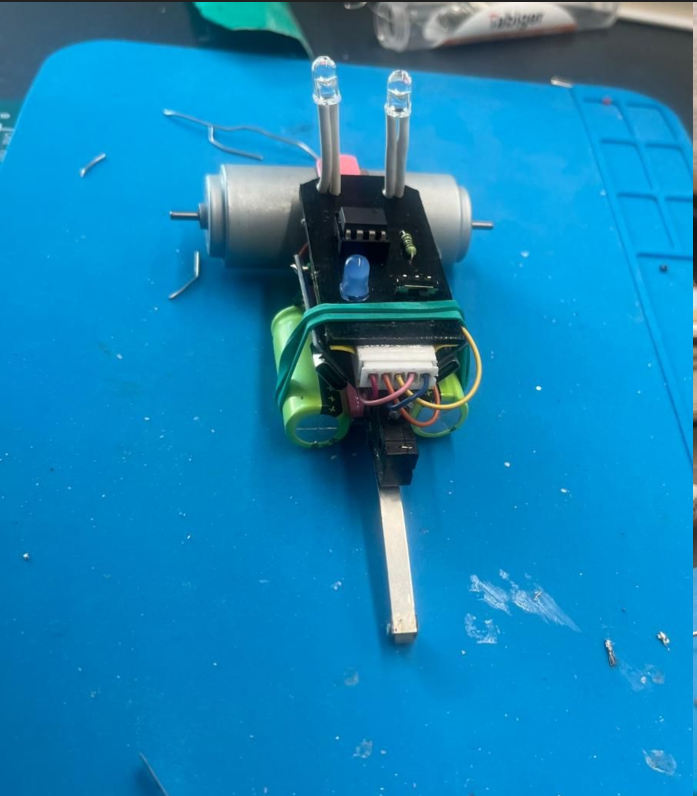
Using Fusion 360, Carbide Create, & a desktop 3 axis CNC.

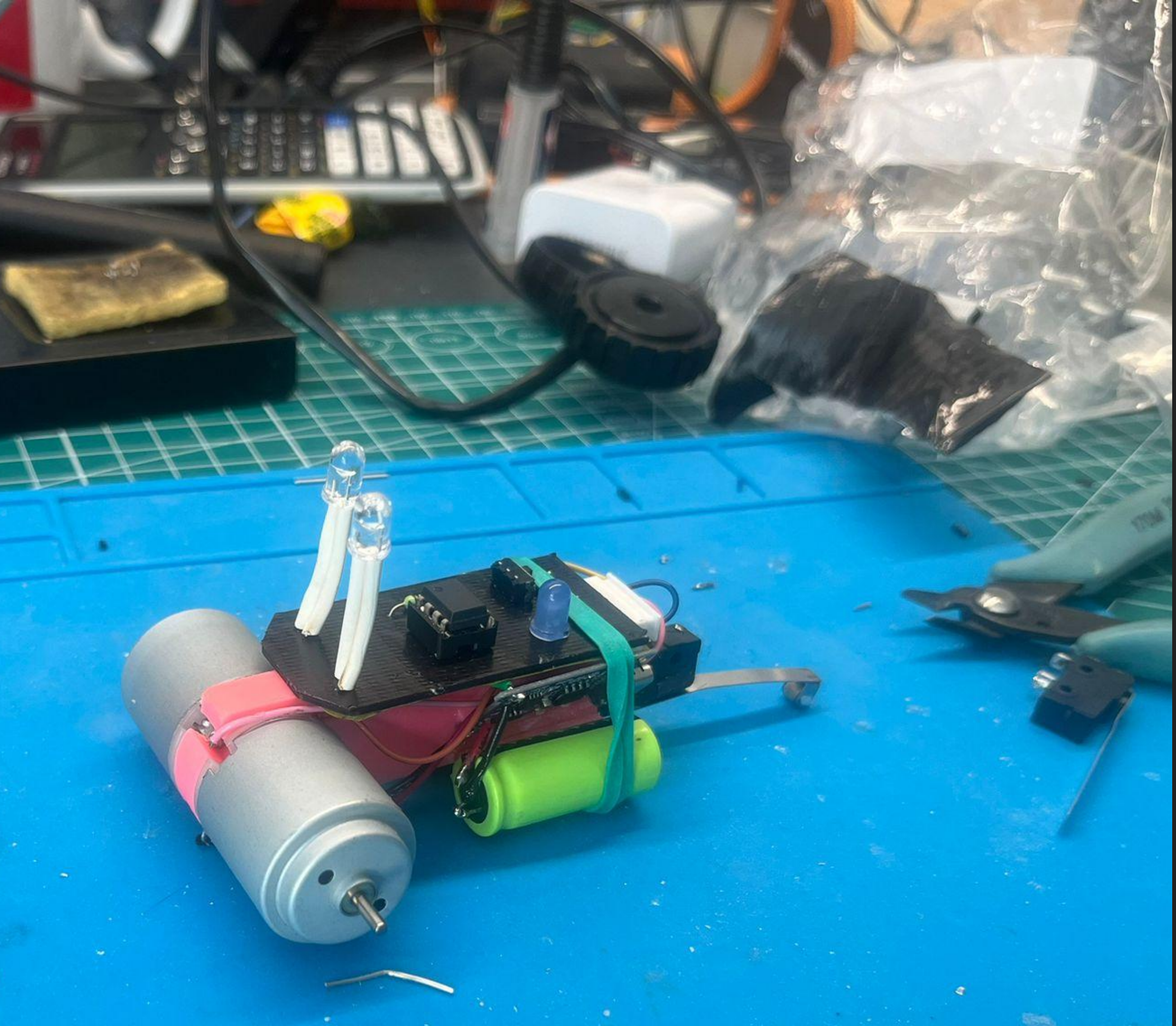






# Soldering & Assembly





After extensive experimentation and peer review, I decided to embed the electronic components as part of an exposed exoskeleton, with a 3D-printed inner chassis for rigidity.

This layout proved to be the most compact and easiest to assemble. The new PCB fit perfectly, and I added a layer of black duct tape on top for protection and aesthetics.

# Condition Testing

Initially, the robot spun in circles due to an improper connection of the left IR receiver.

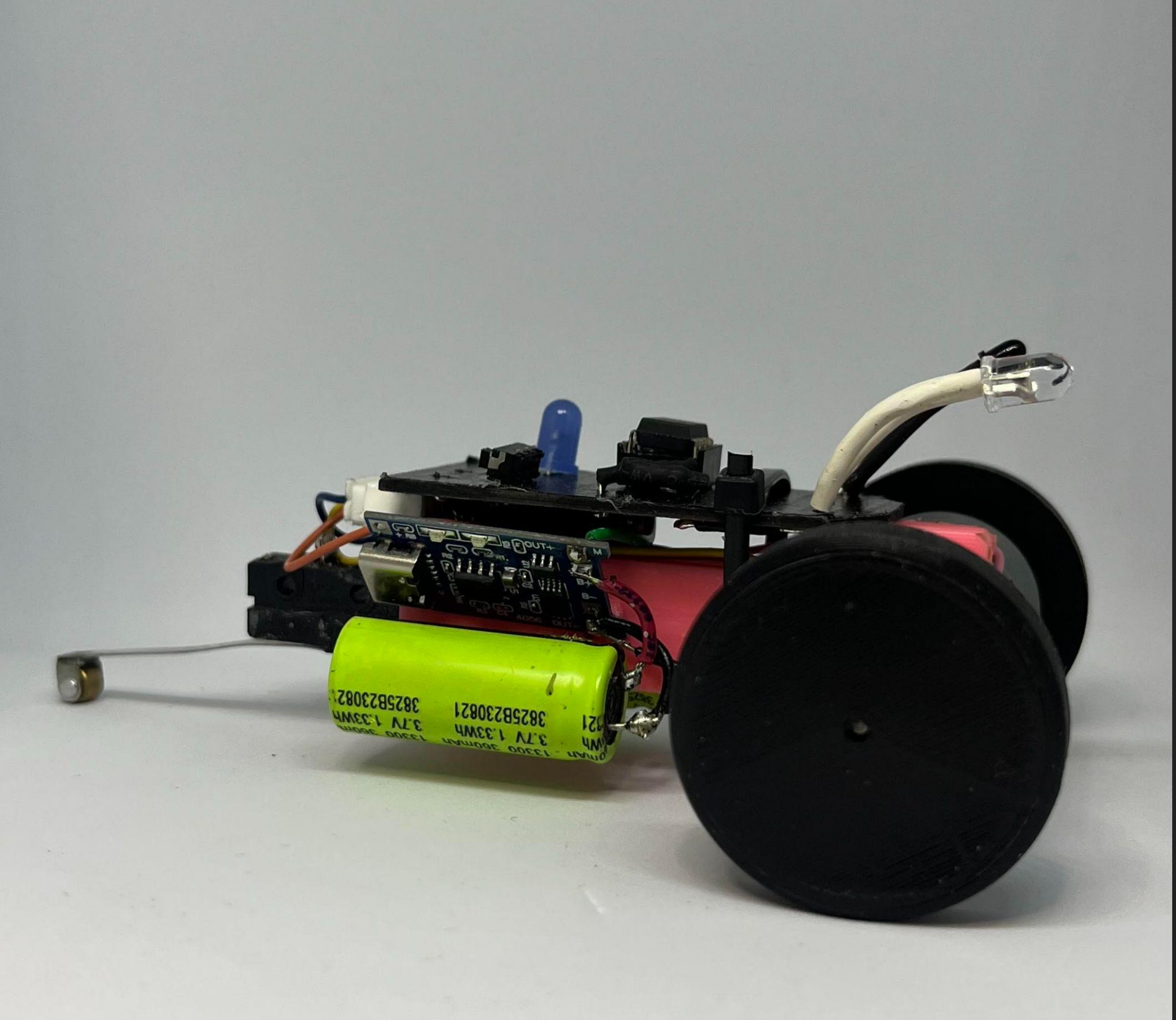
After addressing the issue, the robot performed well indoors, accurately detecting patches of infrared intensity. Outdoors, it consistently drove straight in constant infrared conditions, demonstrating its ability to meet performance requirements.

# Artificial IR Source

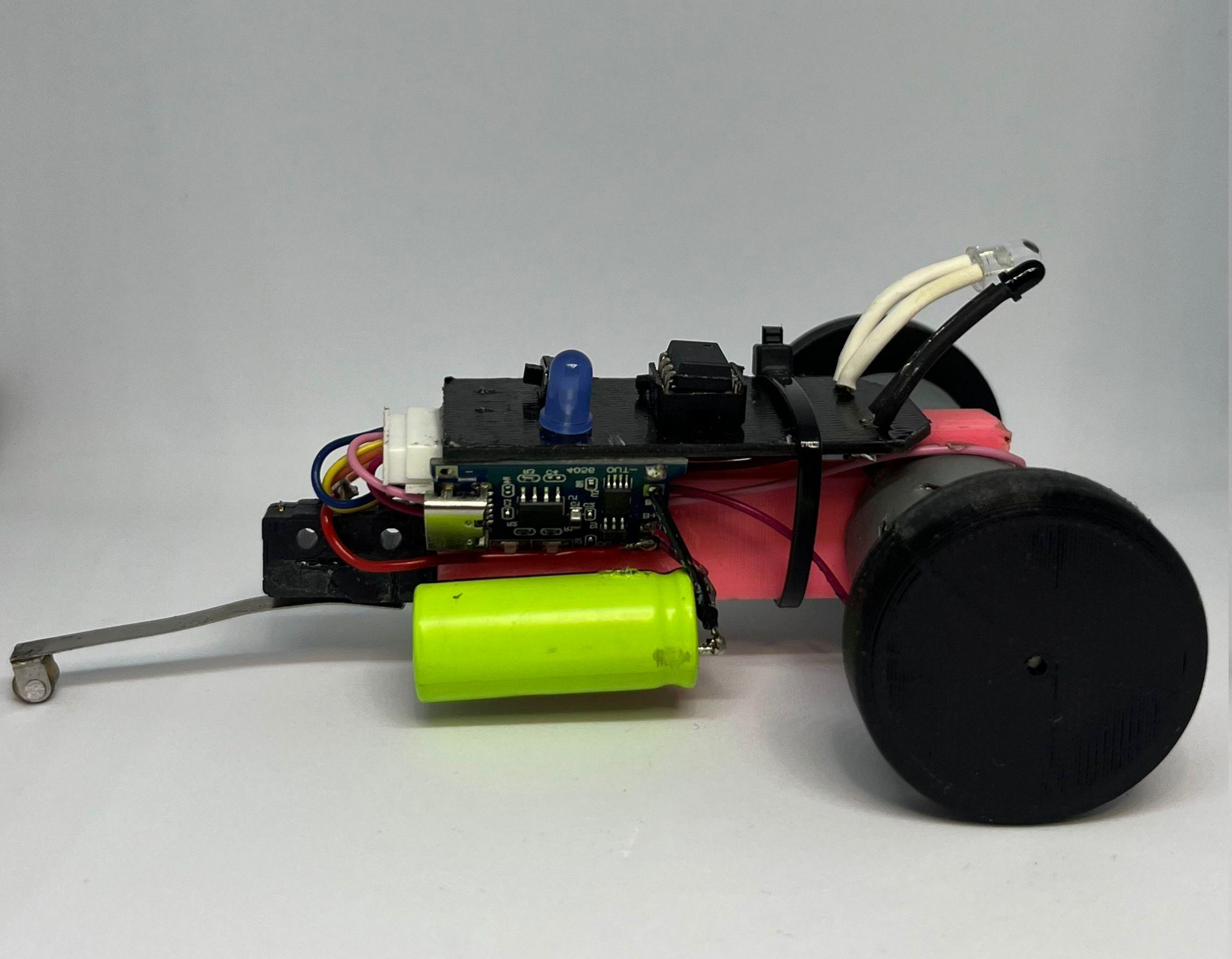
I 3D printed an open-source robotic arm model (https://www.thingiverse.com/thing:3416143#google_vignette) that matched the hardware I had available. Including three servos, three bearings, jumper wires, an Arduino, recycled batteries, and various screws.

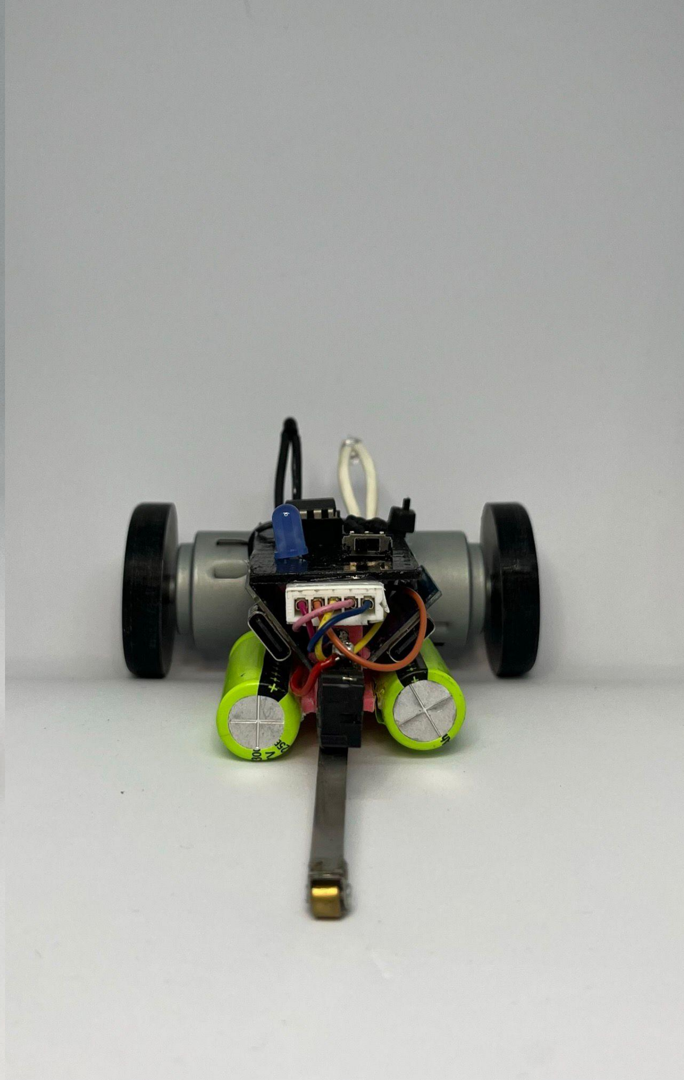
For testing, I brought the model and tools to an open day at Future House London, where I received additional coding and moral support. Since infrared light is invisible, I rigged a basic LED to the tip of the arm for testing purposes.

By the end of the day, everything worked as intended.

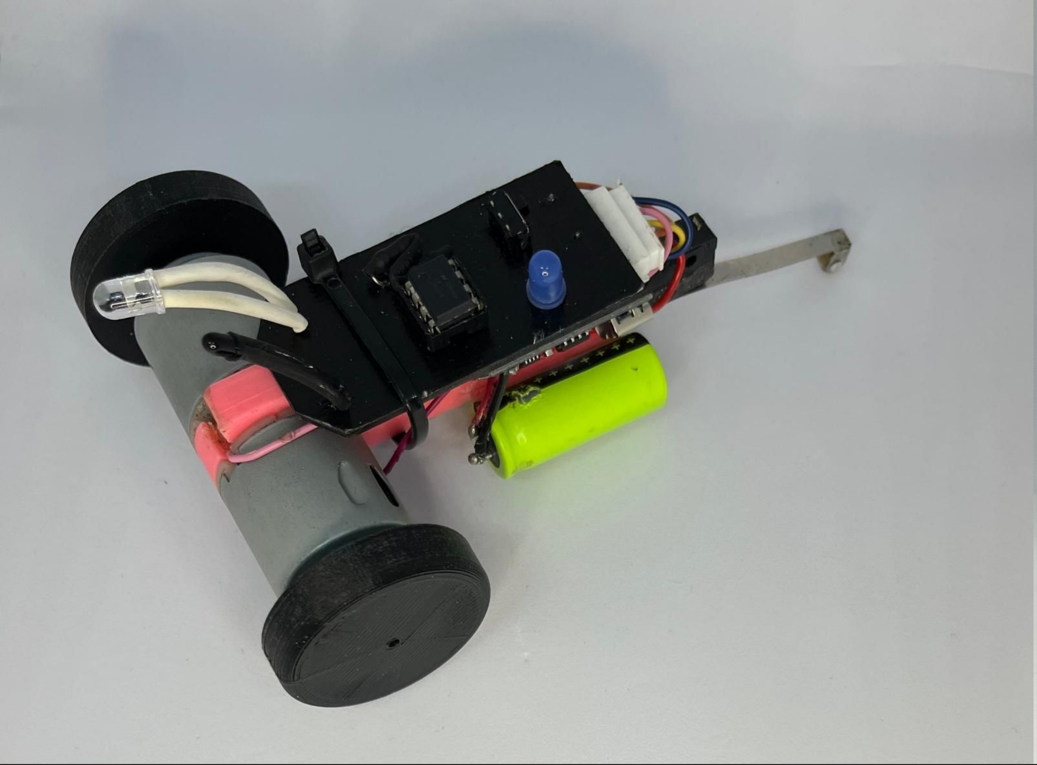


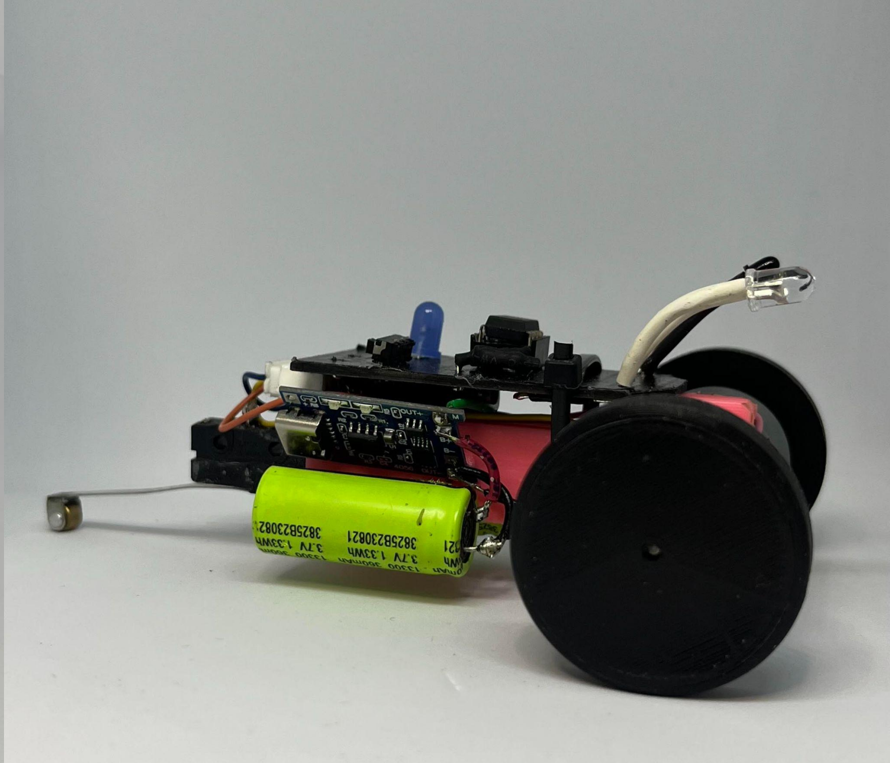

# Photo shoot





Featuring a replacement IR sensor as the original had broken during transport
and zip tie as a longer term resolution to the rubber band.





**Conclusion:** I am happy with my approach to keep the open frame aesthetic as this enhances the indicative nature of BEAM robotics. Future upgrades could include TPU filament tires for extra grip and one print object for the chassis for ease of assembly and better strength.

Unfortunately, I had to repurpose components from the robotic arm for a graded module, and the servos were subsequently misplaced in the makerspace and never recovered. The next version will utilize stepper motors and steel cables to eliminate backlash and reduce noise.