

2025

MOHAMMED SAMER ALHAFFAR

MECHANICAL ENGINEERING GRADUATE



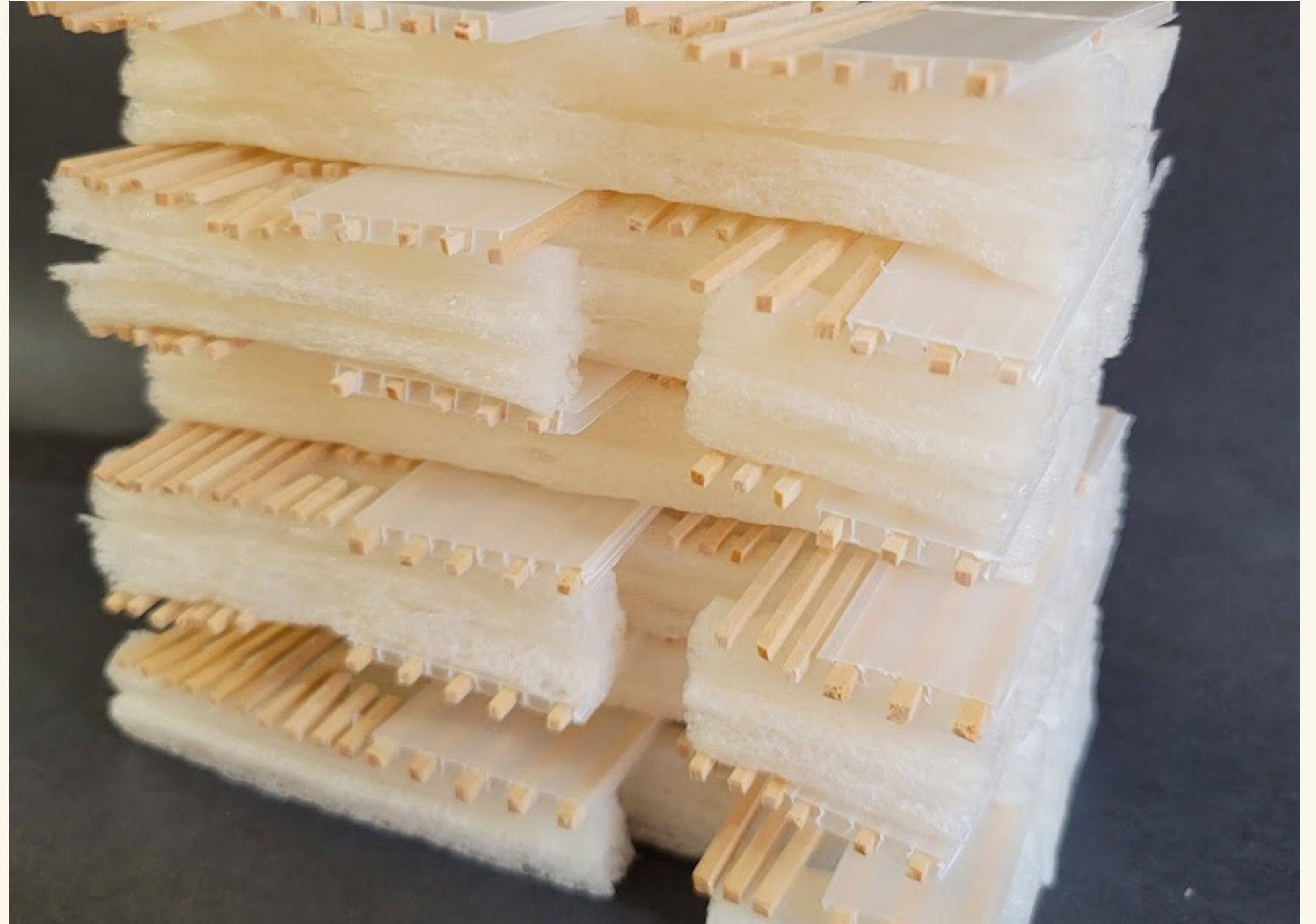
SAMER.HAFFAR93@GMAIL.COM



(647)-466-6495



[HTTPS://MSALHAFFAR.WIXSITE.COM/E-
PORTFOLIO/PROJECT](https://msalhaffar.wixsite.com/e-portfolio/project)



PORTFOLIO

INTRODUCTION

01



I COMPLETED 1-YEAR UNDERGRAD IN PHYSICS & ASTRONOMY BEFORE SWITCHING TO MECHANICAL ENGINEERING

I'M A MECHANICAL ENGINEERING GRADUATE FROM YORK UNIVERSITY (JUNE 2025), DRIVEN BY A PASSION FOR INNOVATION IN MECHANICAL SYSTEMS, ADVANCED MANUFACTURING, & SUSTAINABLE DESIGN.

WITH 24 MONTHS OF HANDS-ON EXPERIENCE IN AEROSPACE & DEFENSE ENGINEERING, I'VE CONTRIBUTED TO PROCESS IMPROVEMENTS, AUTOMATION INITIATIVES, AND TECHNICAL TOOLING DESIGN THAT DELIVERED MEASURABLE COST & TIME SAVINGS.

I BRING A CREATIVE, SOLUTIONS-FOCUSED MINDSET TO EVERY CHALLENGE — BLENDING DESIGN PRECISION WITH REAL-WORLD IMPACT.

I'M EAGER TO CONTINUE BUILDING SYSTEMS THAT ARE NOT ONLY EFFICIENT BUT MEANINGFUL TO THE INDUSTRIES AND COMMUNITIES THEY SERVE.

EDUCATION & CERTIFICATIONS



A photograph from my latest visit to the Central Utilities Building (CUB) -
A fossil fuel power plant that supplies York University with energy and
heat.

YORK UNIVERSITY

2020 - 2025

B.Eng., Spec. Hons. **Mechanical Engineering**

- In progress P.Eng (Professional Engineer), PEO
 - (20 months completed as an intern)
- WHMIS Certified, Standard First Aid
- IPC/WHMA-A-620 Requirements & Acceptance for Cable & Wire Harness Assemblies
- IPC-A-610 Acceptability of Electronics Assemblies Certification
- Lean Six Sigma (White Belt)
 - Working towards Yellow and Green belts



Engineering & Simulation

CAD
CAM
CFD
FEA



SOLIDWORKS



FUSION 360



AUTOCAD



CATIA V5 - V6



Ansys: Fluent

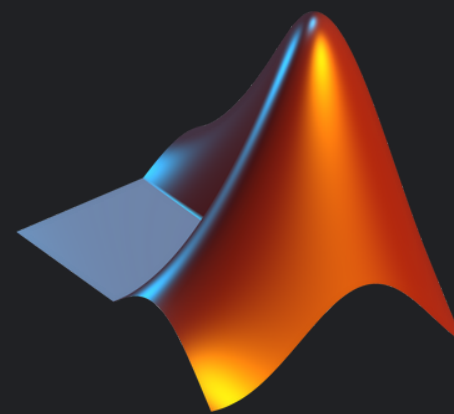


STAR-CCM+



ABAQUS CAE

 Suite



GRAPHICAL PROGRAMMING LANGUAGE & DEVELOPMENT ENVIRONMENT

- MATLAB SIMULINK
- LABVIEW

EVERYDAY USE

- MSO (WORD, EXCEL, POWERPOINT)
- GOOGLE SUITS (DOC, SLIDES, SHEETS)
- APP SHEETS
- LOCKER STUDIO
- MINITAB

PROGRAMMING

- Python
- VBA
- Google Apps Script
- Arduino IDE
- MATLAB

TECHNICAL SKILLS

TOOLS & PROGRAMMING

INTERNSHIP COOP WORK EXPERIENCE



k2i
academy



Manufacturing Process Engineering Intern –

Celestica*

Newmarket, ON

May 2023 - April 2025

During my 24-month internship at Celestica in the Aerospace & Defense division, I worked as a Manufacturing Process Engineering Intern supporting the optimization of high-reliability PCB assembly processes such as **component preparation manual and mechanical assemblies, WAVE and ERSA soldering, PCB depanelization, labels technology, wash and bake.**

I designed and validated over 35 custom tools and fixtures in SolidWorks, applying GD&T and DFM principles to ensure manufacturability and performance, which led to significant reductions in assembly time and contributed to annual savings exceeding \$140,000. I supported process improvement for more than 100 active and NPI products by performing PFMEA, lean analysis, and root cause investigations, and I contributed to automation initiatives that streamlined manual operations, resulting in additional cost savings of \$60,000. My role also involved technical documentation, thermal profiling, and collaboration with multidisciplinary teams to ensure production quality, efficiency, and reliability.



***Non-Disclosure Agreement:** I will only disclose non-proprietary information regarding my work at Celestica. All images are public knowledge.

ALL WORK AT CELESTIC is SUBJECTED TO **CGP** (CANADAIAN CONTROLLED GOODS) AND **ITAR** International Traffic in Arms Regulations.

CELESTICA (INTERNSHIP)

Accreditation & Quality Assurance Assistant – Lassonde School of Engineering • York University*

Newmarket, ON

September 2022 - April 2023

In my role as an Accreditation & Quality Assurance Assistant at the Lassonde School of Engineering, I supported the preparation and organization of program documentation for accreditation by the [Canadian Engineering Accreditation Board \(CEAB\)](#).

I was responsible for collecting, tracking, and maintaining course materials and curriculum data for the [Earth Science and Space Engineering programs](#). My work involved liaising with faculty, course directors, and curriculum committees to ensure timely and accurate information gathering.

I also helped coordinate workshops, circulated materials, and contributed to the development of a centralized private portal for Lassonde's engineering programs — streamlining future accreditation processes and enhancing internal documentation systems.

Blocked - NDA

*[Non-Disclosure Agreement](#): I will only disclose non-proprietary information regarding my work at York University.

YORK UNIVERSITY

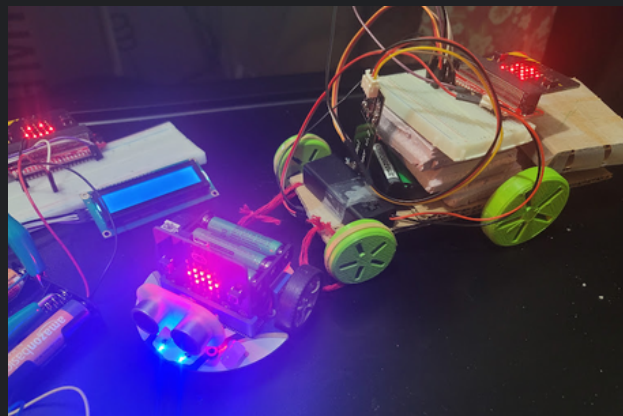
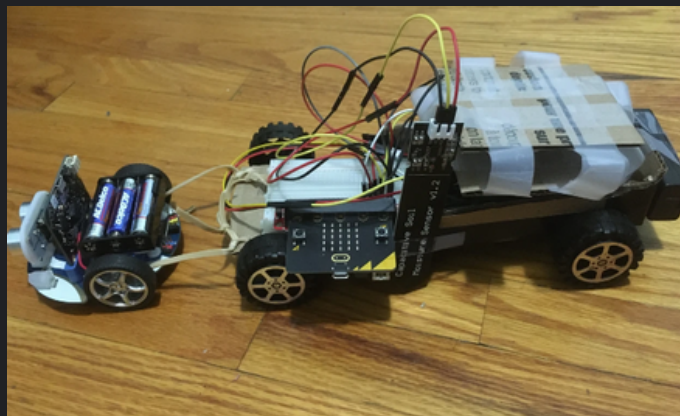
Research Mentor - Co-op Student – k2i Academy at Lassonde School of Engineering

Toronto, ON

May 2022 - August 2022

As a Research Mentor at the k2i Academy within the Lassonde School of Engineering, I led a team of eight high school students through a hands-on research project focused on real-world problem-solving and sustainable engineering.

Our work centered on designing an **automated salt-dispensing device** to safely remove ice accumulation in residential backyards. I supported the team in conceptual development, mechanical prototyping, and coding using Micro:Bit, while also teaching foundational skills in CAD design, electric circuits, and scientific research. This role strengthened my leadership, communication, and mentorship abilities while allowing me to apply technical knowledge in an educational and community-driven setting.



K2I ACADEMY (CO-OP)

Analysis of ASAD: A Solution to Reduce Slips on Ice

A. Mohamed, A. Sivaraman, B. Ansari, D. Grewal, E. Mallari, K. Li, S. Huynh, T. Roper, D. Koudounakis, M. Althoffar.



Introduction

During the winter, many people are subject to serious injuries due to slipping on ice. According to Bayshore Healthcare, around 20,000 people are rushed to the emergency room annually as a result of slipping on ice in Ontario. This issue is what raised the question, "How might we reduce slips and falls on ice?"

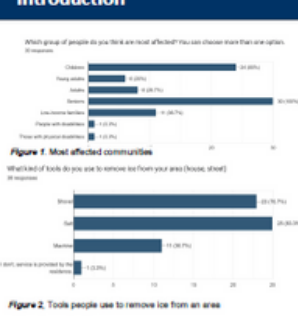


Figure 1. Most affected communities



Figure 2. People preference of solution

To answer this question, the ASAD (Automated Salt Allocating Device) was designed for the purpose of aiding those who rely on themselves and are incapable of spreading salt such as the elderly. The ASAD was created to help the user distribute salt on their property or nearby sidewalks, minimizing the need for them to go out and spread it themselves.

To achieve this, the device consists of three sub-systems:

- The monitoring system.
- The locomotive system.
- The automated salt dispensing system.



Figure 4. Fully assembled ASAD Prototype

Methods & Materials

Design

To design ASAD (Automated Salt Allocating Device), the design process was divided into 3 parts, each made with different materials with each part having different functions.



Figure 3. a) dispensing system, b) locomotive system, c) monitoring system

Automated Salt dispensing System	Locomotive System	Monitoring System
Salt, breadboard (mini), breakout board, microbit, cardboard, wheels, moisture sensor, temperature/humidity sensor, servo motor, batteries.	Cutebot, microbit, rope, batteries.	LCD display, microbit, breadboard, battery, breakout board, batteries.

Operation Conditions

The ASAD system functions by utilizing its humidity and temperature sensors that share data to other parts using radio signals, and acting accordingly. When the temperature is below 0 degree, the ASAD starts moving and scans the area. Where the moisture sensor is the main detector of ice, in any spot, due to a thin layer of water on top of ice. When proper ice forming conditions are met:

- The Cutebot, which was at a constant velocity, slows down.
- The servo motor spins around the salt storage.
- Holes on the side of the salt storage let ice out.

Programming

There are 3 programs of code used, a simple code for the cutebot to move and change speed, a simple code to receive and display the sensors' values for the monitor, and the salt dispenser code. After a radio group is set up for the radio signals, it then:

- Sets up how it will detect and send information from the sensors & checks ice formation conditions.
- If the values are right for ice to form, it signals the Cutebot slow down and then starts spinning its own servo.
- If not however, it simply signals the Cutebot to continue going at its normal speed.

Results

The ASAD was tested in a controlled environment foregoing the influence of the locomotive and monitoring systems. These were the average stationary testing results from ASAD:

- 6 centimeter radius of salt spread
- 0.73 grams of salt
- 3.72 second reaction time



Figure 5. Results from the 3 trials testing the ASAD.

Adjustments were made in different areas, such as the code and conditions, material substitutes, instruments, and more to facilitate the trials in the current environment and circumstances with ease. These changes differed from a tests in a desired atmosphere:

- Location
 - Indoors in summer instead of outdoors in winter
- Ice
 - Numerous ice cubes instead of one strip of flat ice
- Temperature
 - Room temperature instead of 0 °C or below
- Sensor
 - Inaccurate moisture sensor instead of a precise sensor

The obtained data may not be exact, and carried an outlier, which could be explained by the flaws of this experiment that led to systematic error. With more improvements made to the ASAD within a larger time frame and upgraded resources, this prototyped solution would undoubtedly be more effective and show enhanced results.

Acknowledgements

Instruments provided by k2i academy. This work is supported by the Lassonde School of Engineering, York University, Toronto District School Board and the Ontario Ministry of Education. Thank you to our mentors and our research faculty supervisor Dr. Reza Rizvi and Ph.D. candidate, Sara Zahmatkesh for giving us this opportunity and providing guidance throughout the project.

References

1. Reduce your risk of falling on ice and snow. (2021, November 18). Bayshore HealthCare. <https://www.bayshore.com/resources/prepare-yourself-for-falling-on-ice-and-snow/>
2. Rosenberg & Quick LLP. (2022, February 10). Rosenberg & Quick LLP. <https://www.rosberg.com/press/robb-at-the-top-of-the-most-legendary-olympic-downhill-ski-race-on-ice/>

Improvements

- Create a tracker to put on the device to know where it is at all times. You could track the device using a GPS.
- Tilt the salt dispenser downwards near the end so more salt comes out and does not gather on the extension + making larger holes.
- Install more powerful servo motor with higher RPM.
- Create borders on the salt dispenser for better stability.
- Using a more accurate moisture sensor.
- Install controlling units to all users to control ASAD's motion and salt dispensing manually.

Conclusion

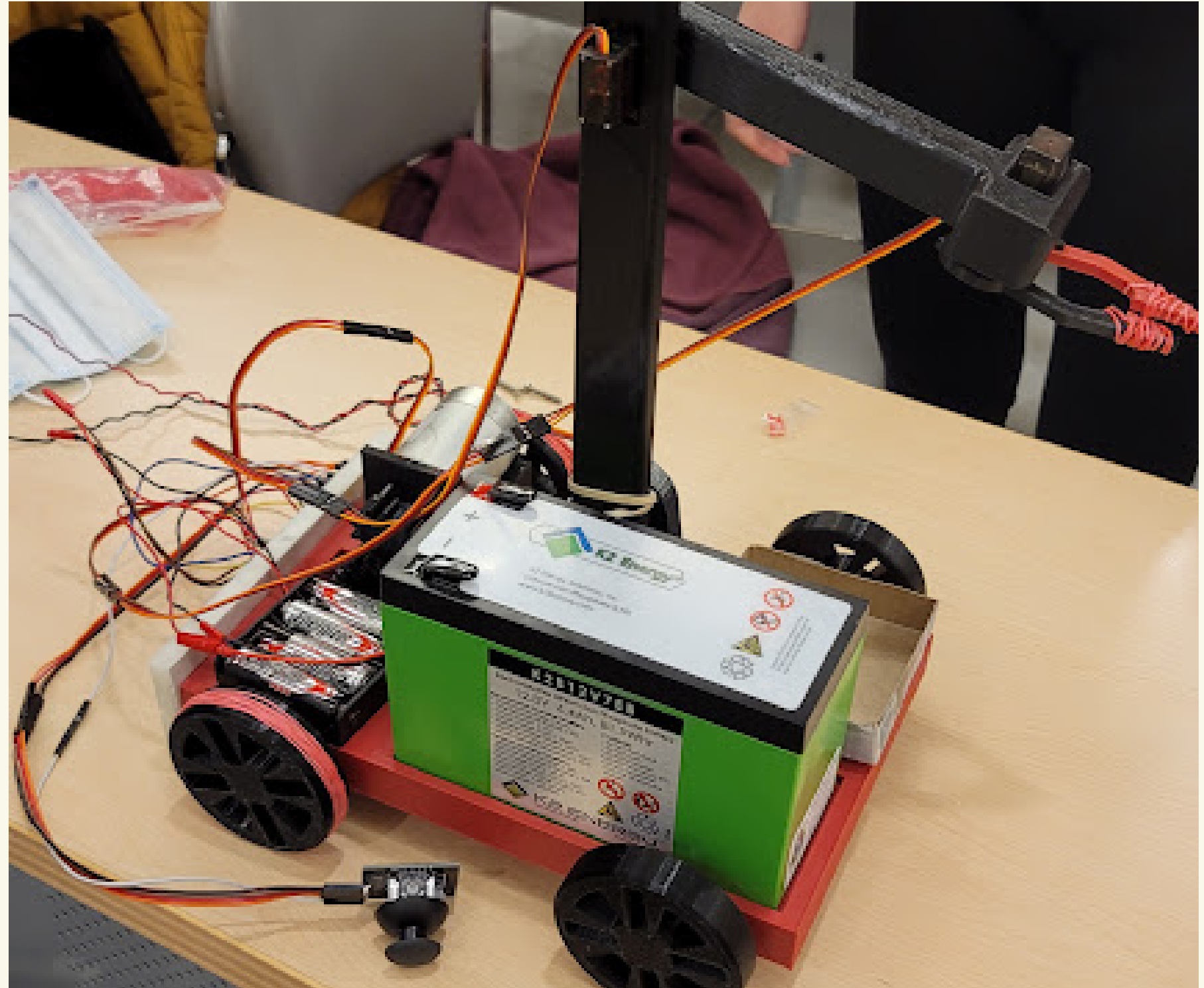
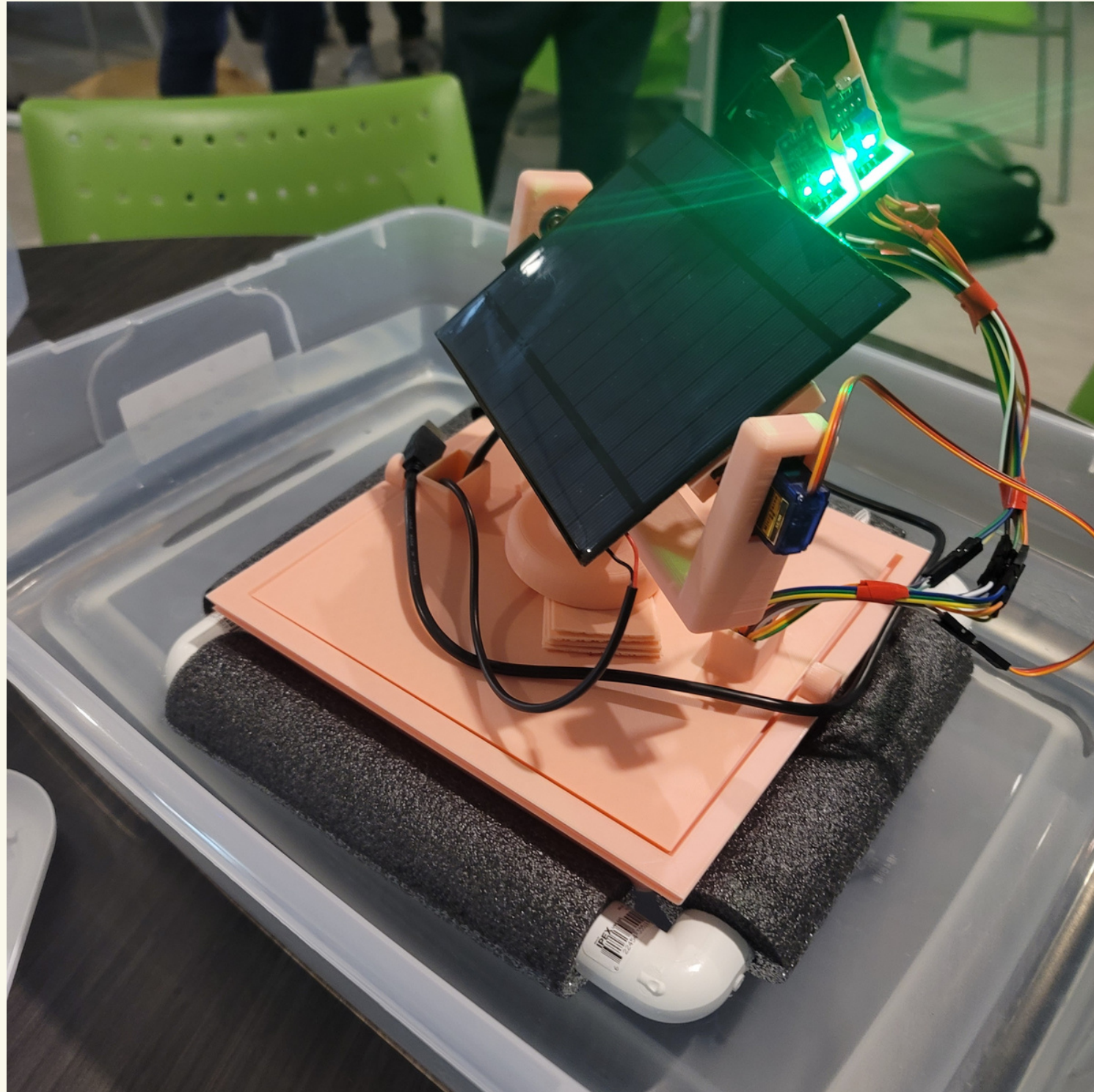
If we create an automatic device that dispenses salt to melt ice, then slipping and falling on ice will be dramatically reduced.

The ASAD has been designed to combat this issue. Throughout the various tests we have performed, it has proven to be a noteworthy and effective solution to this problem by being able to spread salt automatically on areas that are slippery by detecting the moisture, temperature, and humidity of the surroundings and displaying the results on the LCD screen. This device would be helpful for people that are unable to go outside and spread salt themselves, such as the elderly. Since it is an automatic device, it will result in minimal accidents.

Project ASAD strives to accomplish the United Nations goals categorically speaking: climate action, life on land, and well being.

ASAD aims to have a minimal environmental impact while improving people's lives for the greater benefit. Some things that did not go well with the ASAD was the moisture sensor that occasionally had problems accurately reading and delivering the data, and the ice used to test the sensors was noticeably different from the ones made environmentally, thus the results weren't the most accurate.

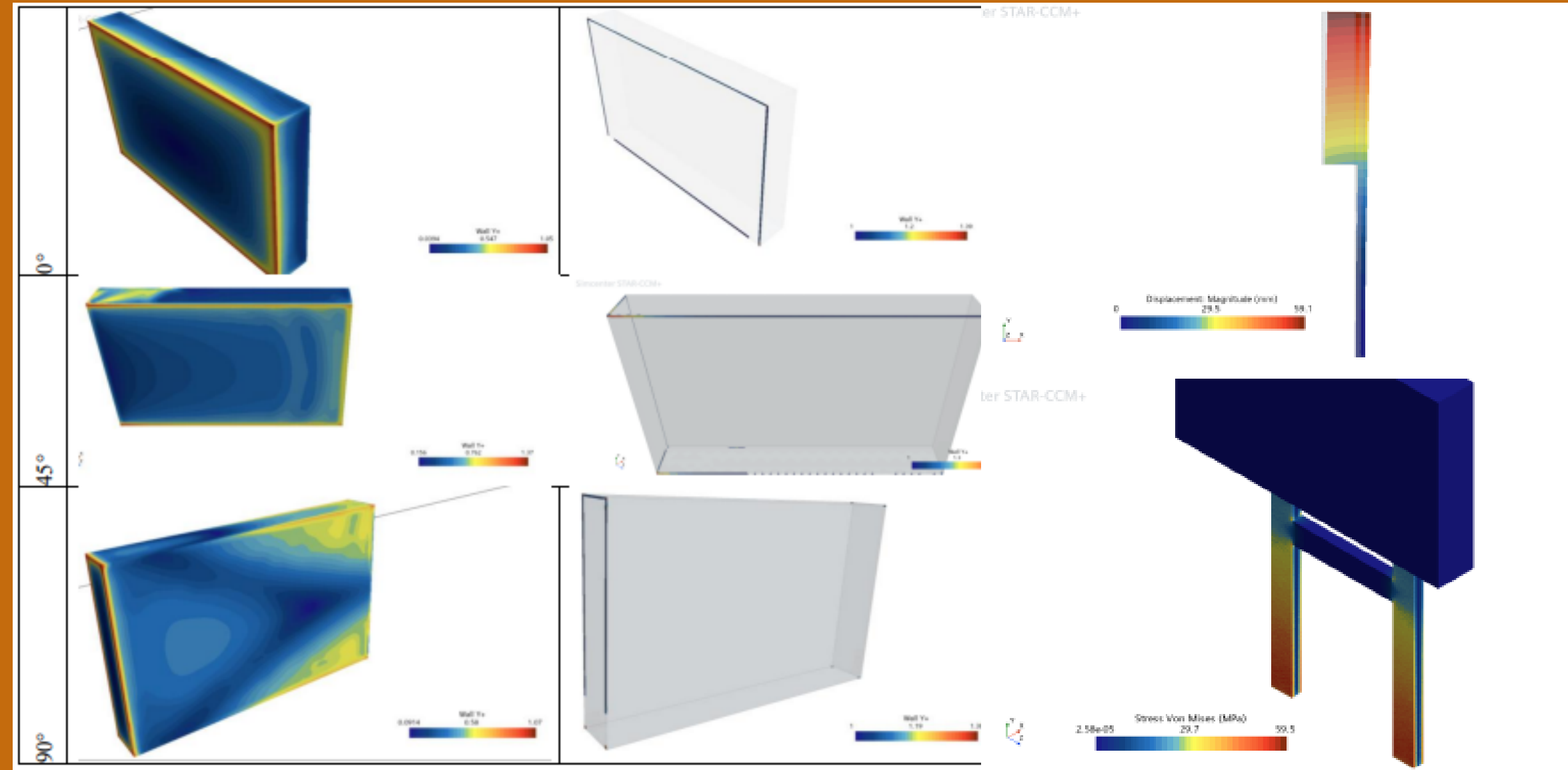
SCHOOL PROJECTS



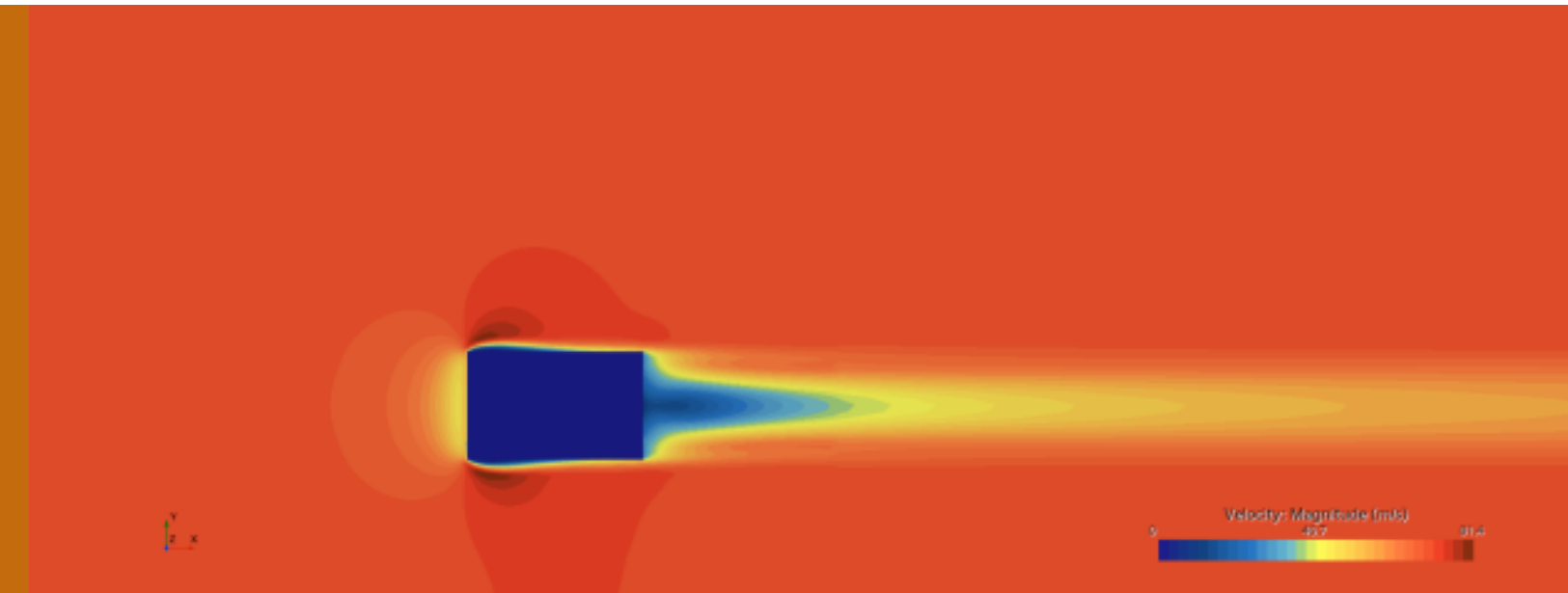
CFD & FEA Analysis of a Hurricane Evacuation Information Sign

This project involved the structural and aerodynamic analysis of a hurricane evacuation sign intended for use in high-wind environments. Using Star-CCM+, I performed detailed CFD simulations to evaluate the drag force acting on the sign structure under various wind speeds, including hurricane-level conditions. The results were used to determine critical pressure zones and assess structural loading.

I then conducted FEA to analyze stress distribution, deformation, and safety factors across the frame and base. Based on the findings, design modifications were proposed to improve aerodynamic stability and structural integrity, ensuring the sign could withstand extreme weather while maintaining visibility and reliability in emergency scenarios.



PROJECT 01

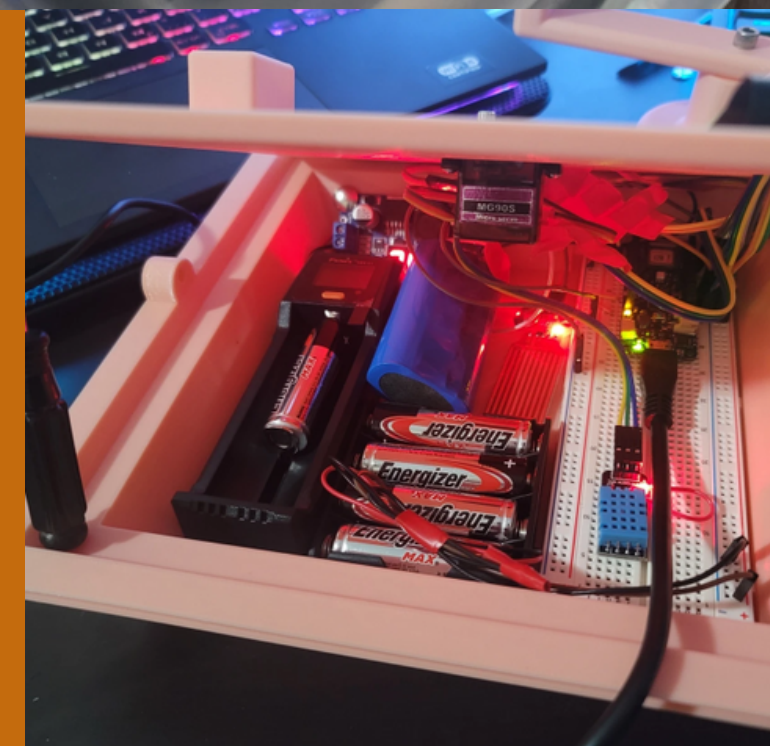
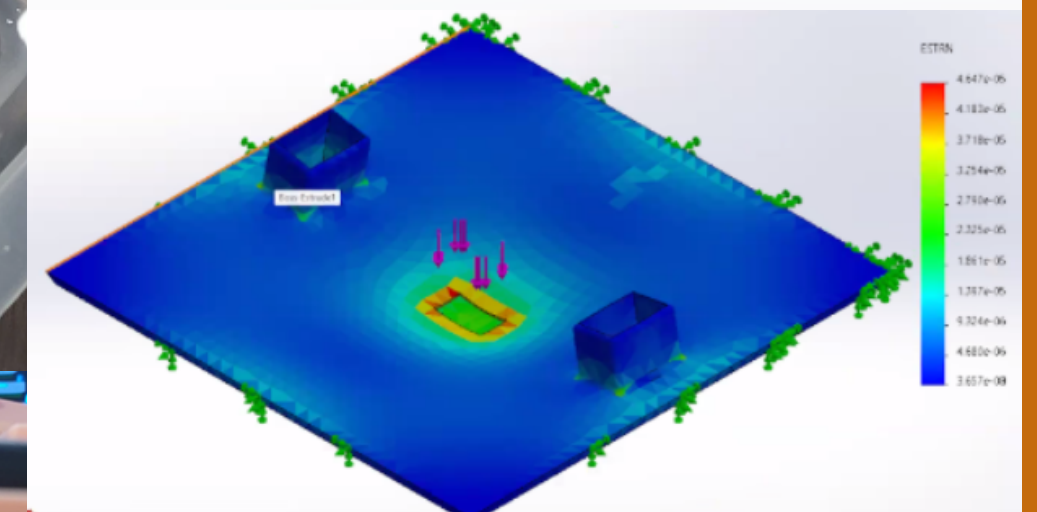
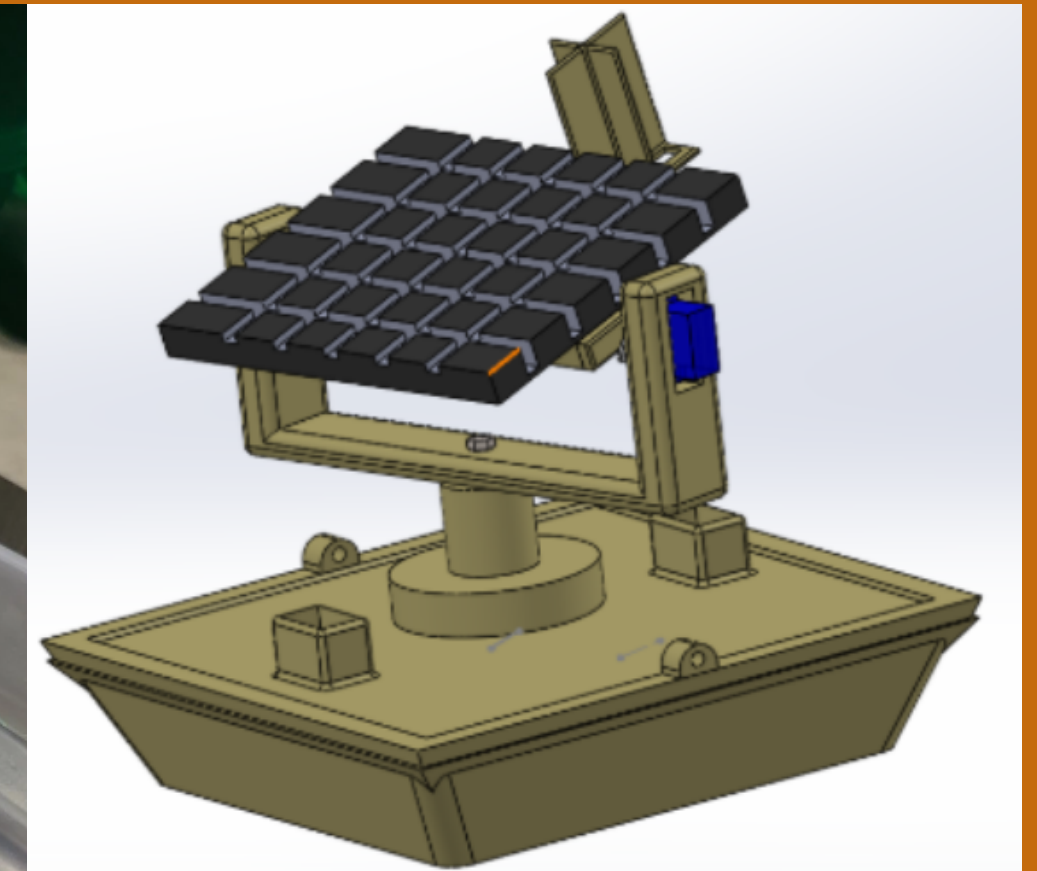
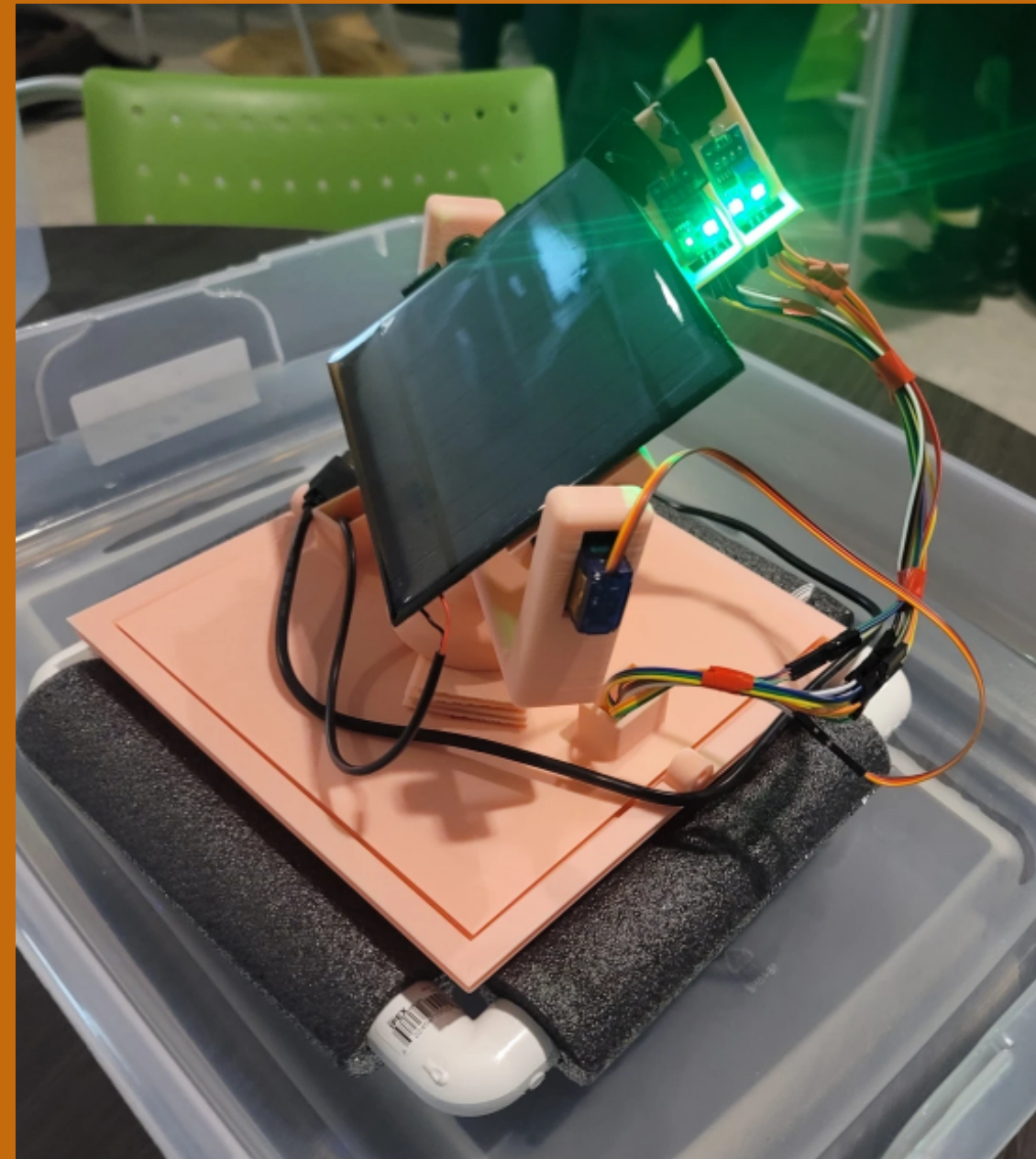


Floating Sun-Tracking Solar Panel Model

This project focused on designing a floating solar panel platform with an integrated sun-tracking mechanism to maximize solar energy capture on water surfaces. The system was developed to rotate along a single axis, allowing the panel to follow the sun's path throughout the day.

I applied mechanical design principles to create a stable, buoyant structure and integrated sensors and a microcontroller (Arduino) to control the tracking system.

The project emphasized energy efficiency, sustainability, and remote deployment potential for lakes or reservoirs. Special attention was given to balancing structural integrity, solar exposure, and system responsiveness under varying environmental conditions.



PROJECT 02

Lunar Rover Prototype

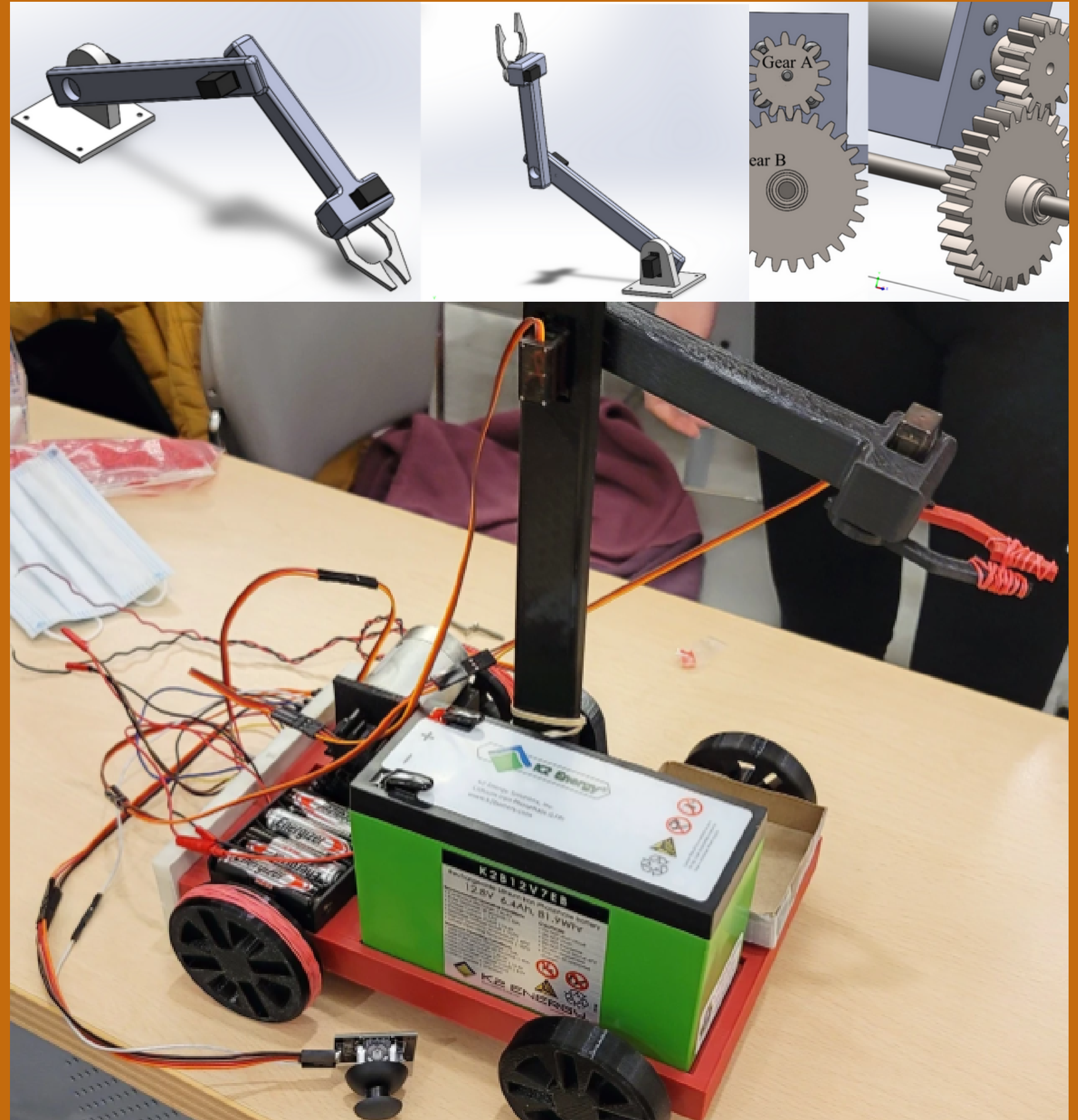
This team-based project involved designing and prototyping a functional lunar rover with three key subsystems: locomotion, chassis, and a robotic arm for material collection.

I led the mechanical design phase using SolidWorks to model the chassis, gear system, gripping mechanism, and robotic arm.

The rover was equipped with DC motors, ultrasonic sensors, and servo motors to enable autonomous obstacle detection and object retrieval.

I also developed the control logic using Arduino Nano and implemented a joystick-based interface for manual operation. The rover was prototyped using 3D printing and assembled in-house, emphasizing modularity, lightweight design, and terrain adaptability for extraterrestrial exploration.

PROJECT 03

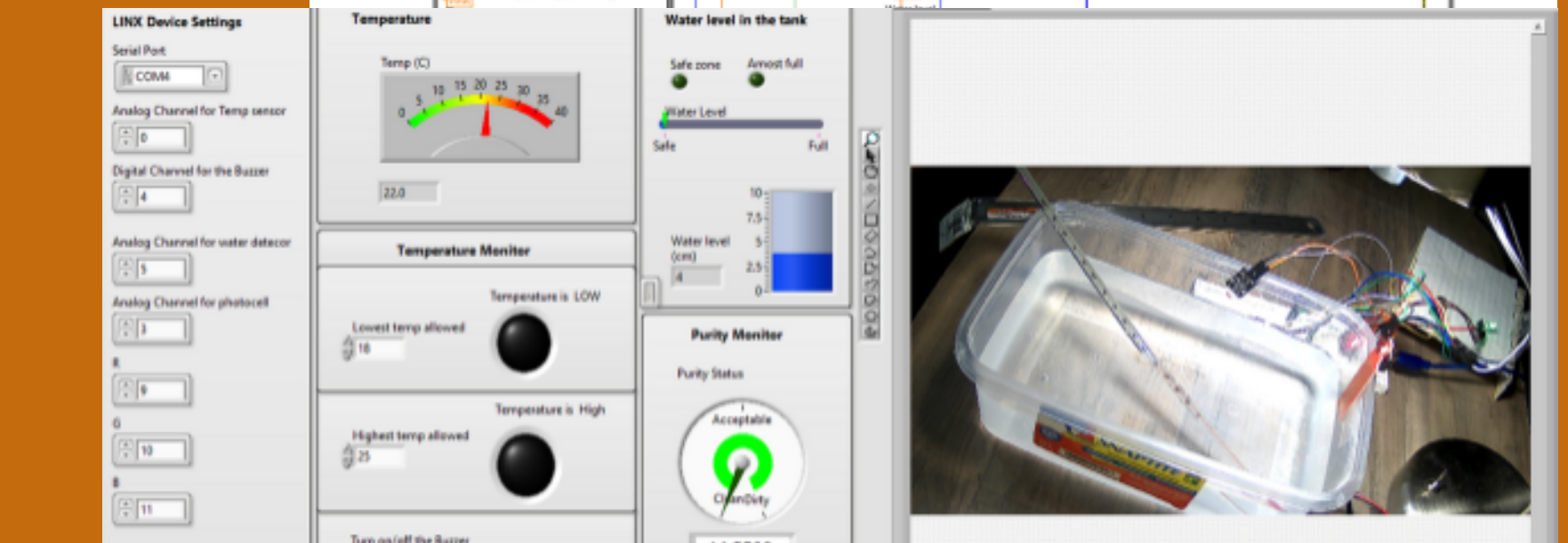
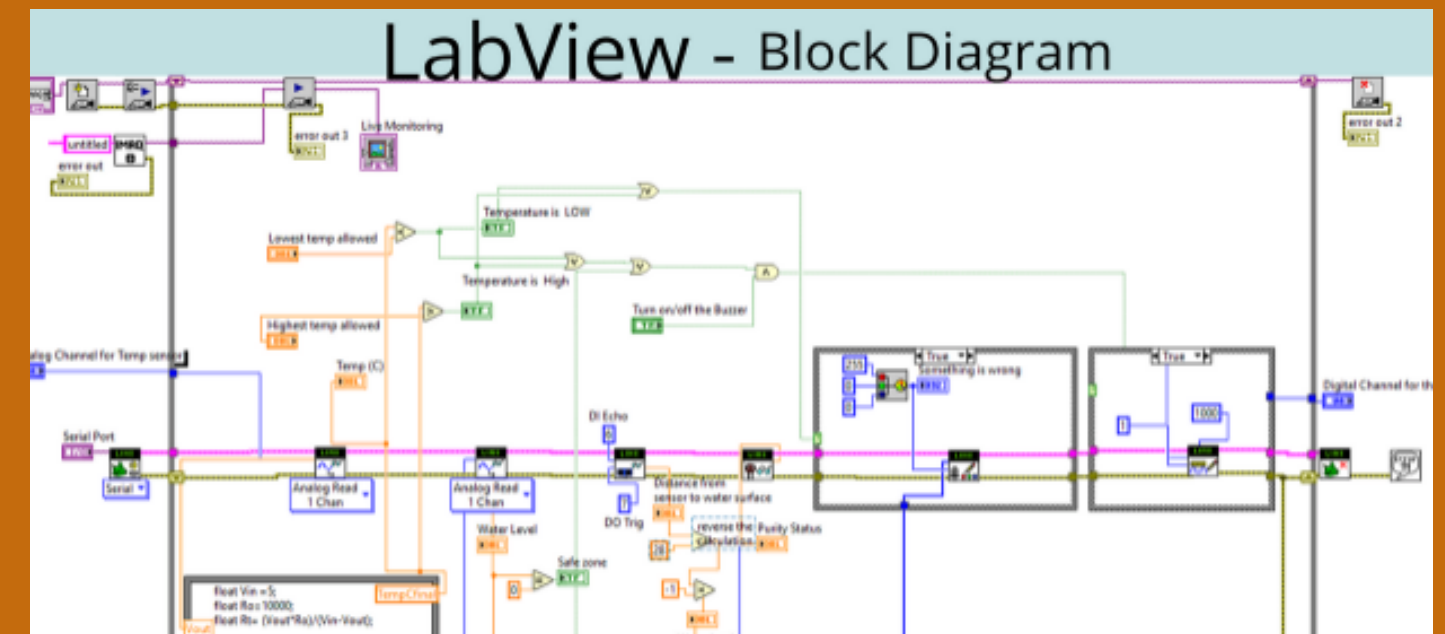


Fish Tank Monitoring System

This project involved designing a real-time monitoring system for fish tanks to track water temperature, purity, and level using a combination of analog and digital sensors.

I collaborated with a team to develop the circuit architecture using Arduino as the central control unit and programmed the interface in LabVIEW to visualize sensor data.

The system featured automated alerts for out-of-range parameters and was built to support both freshwater and saltwater applications. Emphasis was placed on sensor calibration, data acquisition, and system responsiveness to ensure a reliable and user-friendly solution for aquarium management.



PROJECT 04

Design of a Drone Airframe Using Natural Fibers & Bio-Based Resin Materials

This project explored sustainable alternatives to conventional drone frame materials by designing a lightweight airframe using a PLA/jute composite.

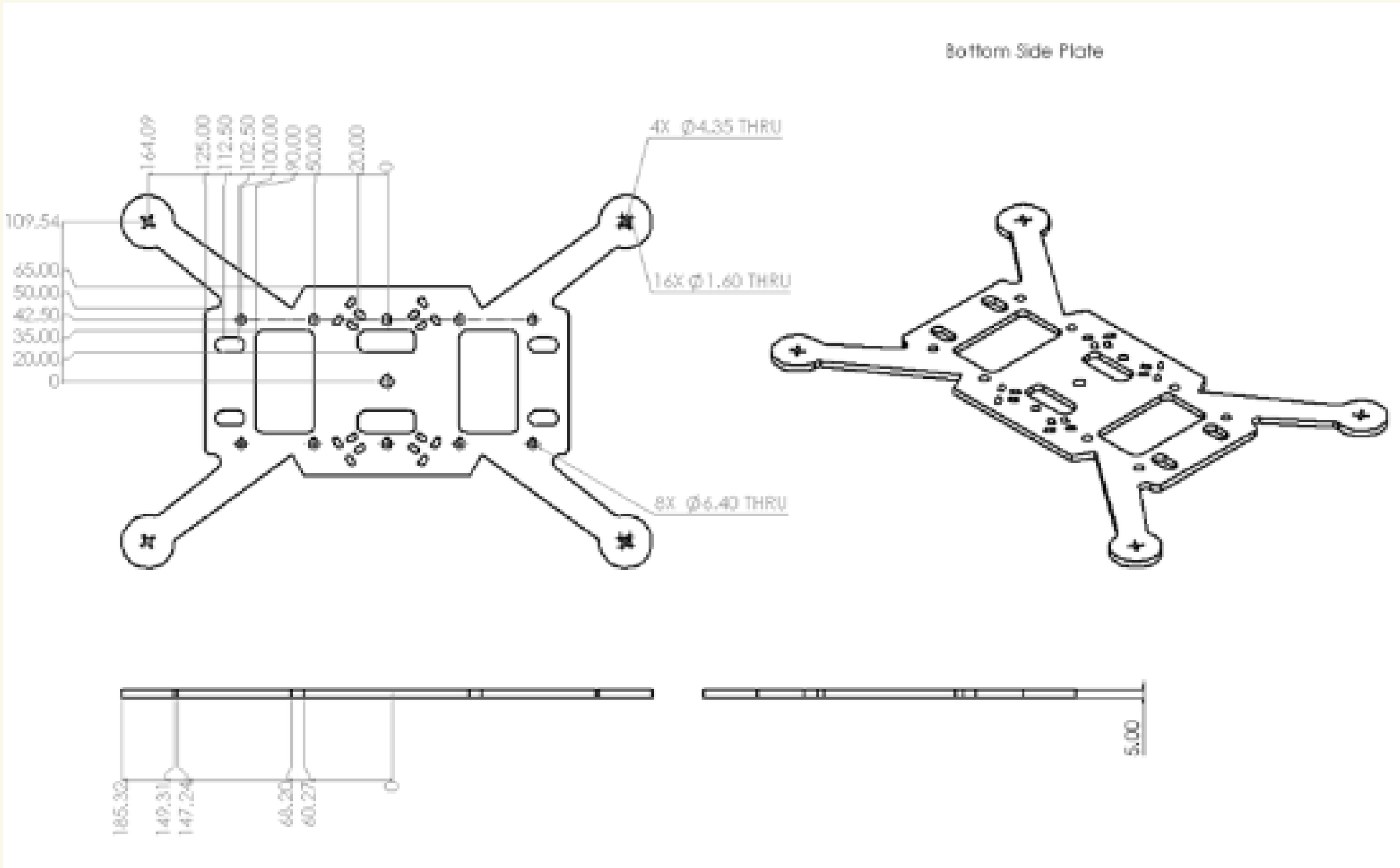
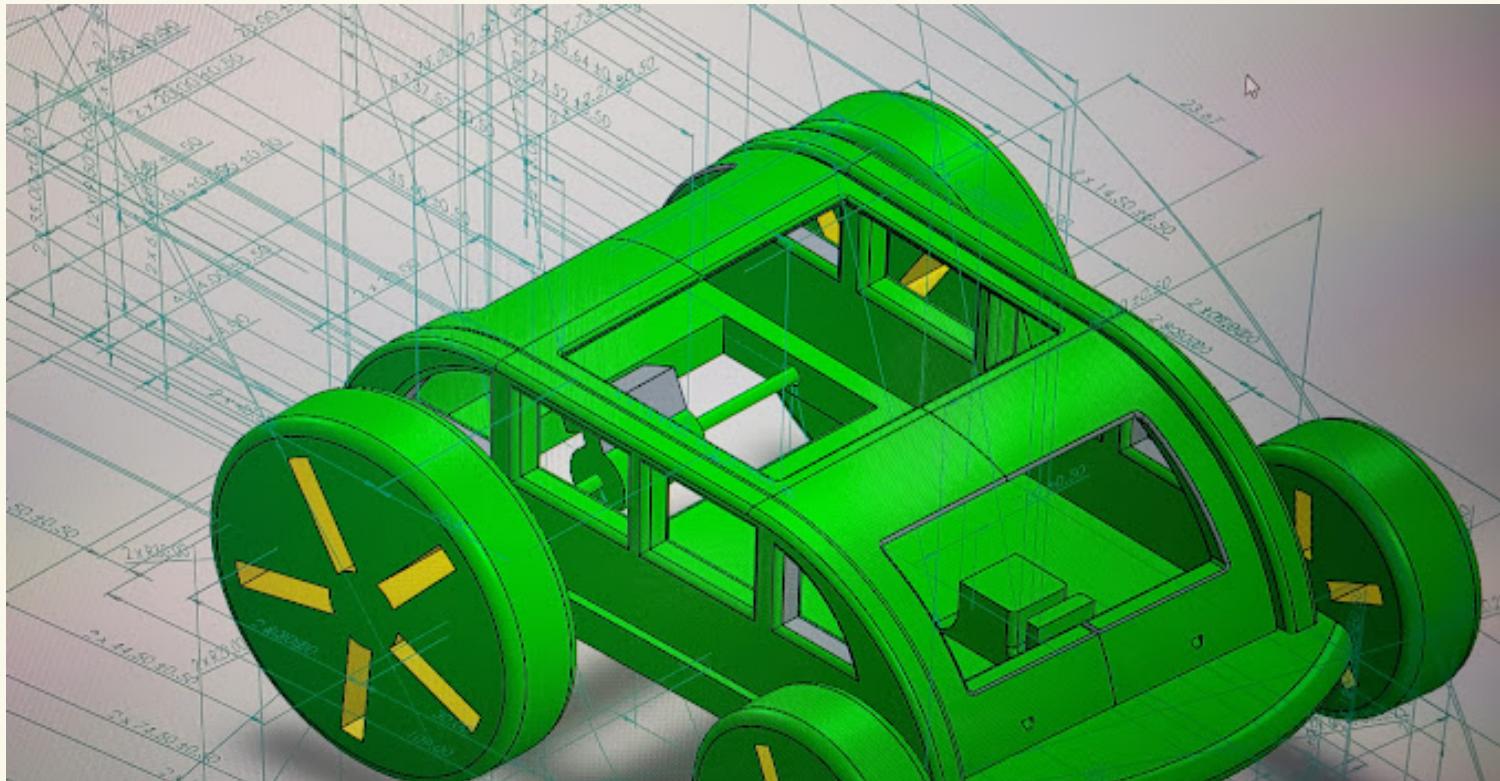
The goal was to minimize environmental impact without compromising mechanical performance. I designed the airframe in SolidWorks and selected compression molding as the manufacturing method to ensure strong fiber-matrix bonding and reduce moisture absorption.

The structure was evaluated for stiffness, weight, and durability under flight-relevant conditions. This project combined material science, eco-conscious engineering, and practical design to demonstrate how biodegradable materials can be applied in modern aerial systems.

PROJECT 05



THANKS TO GREAT TEAMMATES, MENTORS, PROFESSORS, ALL ENGINEERS I WORKED WITH, AND VENDORS WHO USED TO MACHINE AND BUILD MY TOOLS AND FIXTURES, I HAVE IMPROVED FROM **POINT A** TO **POINT B**, EAGER TO REACH POINT ZZZX!

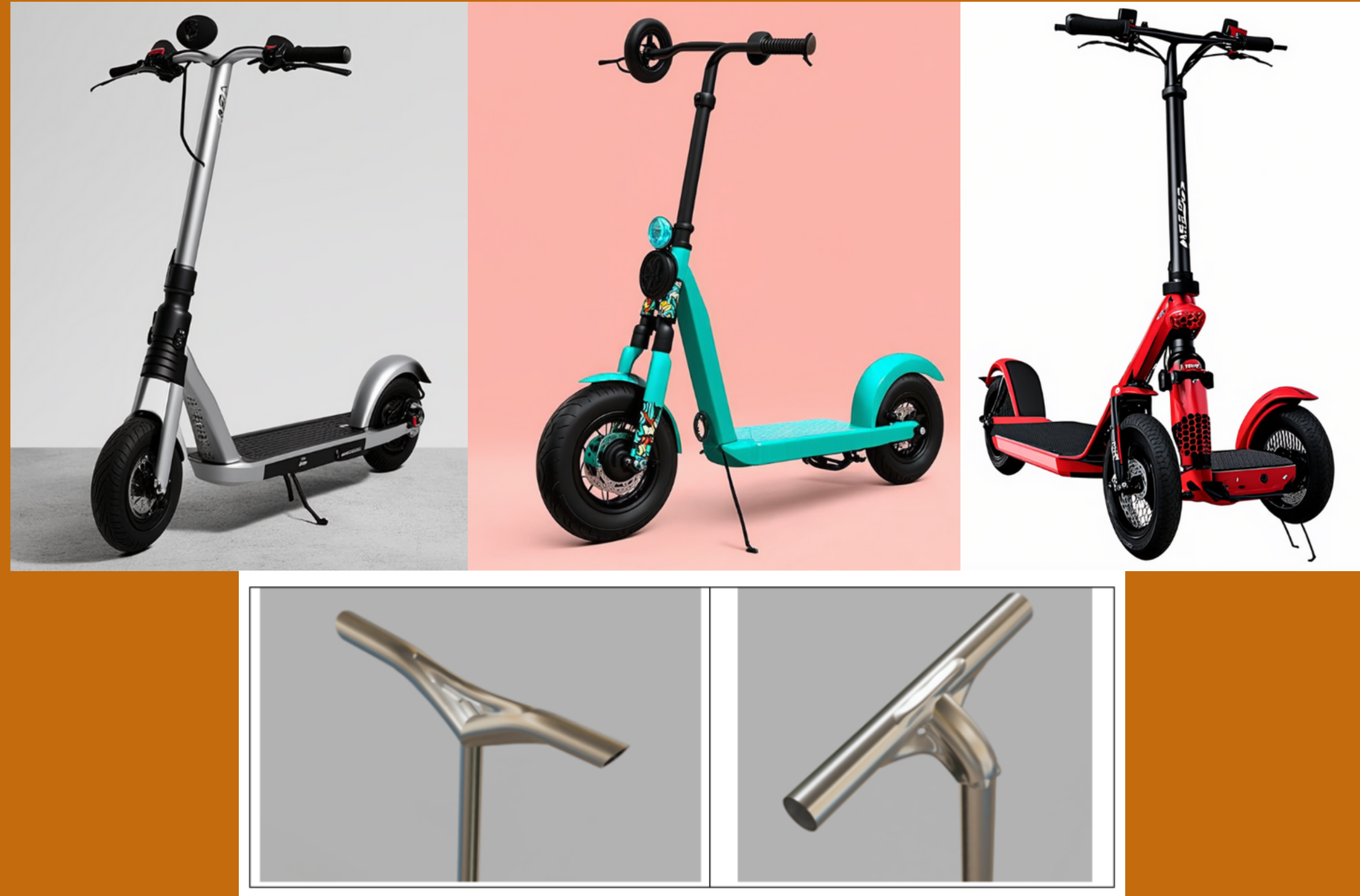


AI & Generative Designs

Used Python to create an LLM (Large Language Model) and AI diffusion models to generate new design concepts for a Sustainable Scooter.

In this exploratory project, I utilized Autodesk Fusion 360's Generative Design feature to investigate how artificial intelligence can enhance mechanical design innovation. The objective was to create optimized structural forms based on defined constraints such as material type, load conditions, and manufacturing method.

I compared the AI-generated outputs that I developed a special AI diffusion model and an LLM for, to traditional CAD designs in terms of weight reduction, stress distribution, and material efficiency. This project highlighted the potential of AI-driven tools in accelerating the design process and producing high-performance, lightweight components that would be difficult to conceptualize manually.



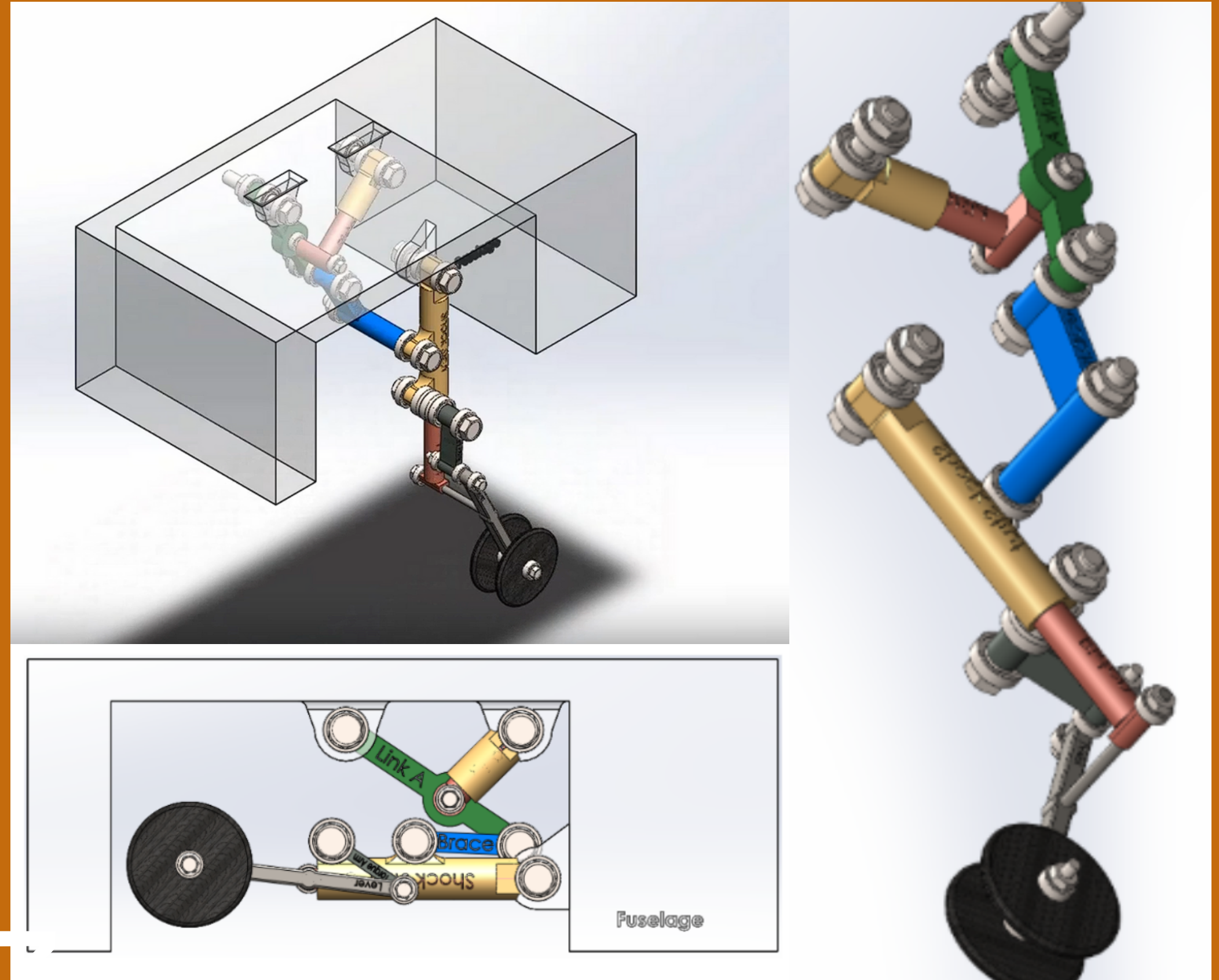
PROJECT 06

Mechanism of a Landing Gear System

This project focused on analyzing and modeling the mechanical operation of an aircraft landing gear retraction and extension system.

Using SolidWorks, I created a detailed 3D assembly that simulates the movement of a four-bar linkage mechanism used to retract the gear into the fuselage.

The design considered the spatial constraints, mechanical advantage, and synchronization of motion required for reliable operation. Through this project, I gained deeper insights into kinematic analysis, actuator integration, and motion simulation within aerospace mechanical systems.



PROJECT 07

Academic Peer Support Assistant

As an Academic Peer Support Assistant at the Lassonde School of Engineering, I mentored over 50 first-year engineering students enrolled in the Renaissance Engineer 1 (ENG 1101) course.

I provided academic guidance through one-on-one tutoring and helped students build individualized study plans tailored to their learning goals.

I also delivered weekly presentations on essential topics such as course enrollment, time management, and available academic resources. This role strengthened my communication and leadership skills, while allowing me to foster a collaborative learning environment for new engineering students.



EXTRACURRICULAR

Students Refugee Program Coordinator

As a Program Coordinator for the World University Service of Canada (WUSC) at York University, I supported newly sponsored refugee students with their transition to life in Canada, assisting with academic, housing, and personal well-being needs.

I also organized and led weekly on-campus tabling events to raise awareness and secured an average of \$80 per week in donations to help offset student expenses.

This experience enhanced my skills in student advocacy, cultural sensitivity, and community leadership.



EXTRACURRICULAR

Mars Rover – Mech Team Member

As part of the Mech Team for York University's Robotics Society over the Summer of 2022, I contributed to the design and prototyping of a Mars Rover that competed in the Canadian International Rover Challenge (CIRC) in Fall 2023.

My responsibilities included producing detailed technical drawings and assembly documentation for the electronic storage components that I 3D prototyped it and integrated within the Rover assembly.



EXTRACURRICULAR

Co-Founder – Move Forward Hiking & Camping Team

As one of the 6 founding members of the Move Forward Hiking Team, I helped establish a non-profit community dedicated to connecting people through nature-based experiences such as hiking, camping, and outdoor exploration. Our team organizes regular recreational events across national parks, forests, and natural reserves to encourage well-being, resilience, and social connection through outdoor activities.

My role included co-leading trip planning, contributing to communication and community outreach coordination, and preparing and facilitating recreational, team-building, and discussion sessions activities during the trips. — to empower individuals to overcome challenges through nature and build a supportive, inclusive community.

The Move Forward Community has since expanded and now is welcoming over +100 hikers and is planning for 2 long trips in the Summer of 2025.



THANK YOU
FOR GOING
OVER MY
PORTFOLIO!



SAMER.HAFFAR93@GMAIL.COM



(647)-466-6495

Read more about me and my work in my e-portfolio



[HTTPS://MSALHAFFAR.WIXSITE.COM/E-
PORTFOLIO/PROJECT](https://msalhaffar.wixsite.com/e-portfolio/project)