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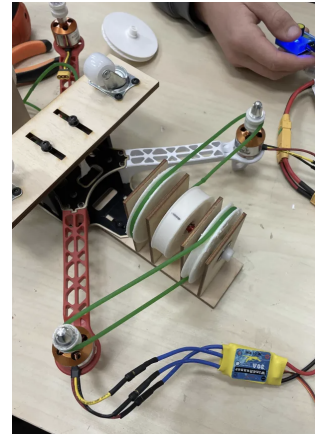
WORK PORTFOLIO

Multi-Modal Delivery Robot: Master of Engineering CAPSTONE Project (Fall 2023 - Spring 2024)

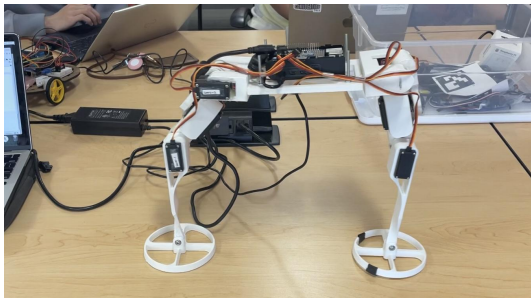
For my CAPSTONE project, I've been working with a team of engineers to design a delivery robot that can achieve the following:

- Fly and operate like a quadcopter during aerial mode.
- Carry a package with a 3kg payload, drive as fast as possible on ground and navigate like a delivery robot.
- Implement a power transmission between brushless motors, propellers and wheels such that no additional motors are implemented for such design.
- Balance on two wheels of the robot during ground travel and potentially land similar to an airplane during aerial to ground mode transition.

Currently prototype one is done (on the right) as a proof of concept.



Introduction to Robotics: Bipedal Robot as Final Project (ME 439 - Spring 2023 Semester)



As a final project, I chose to design and implement control on a bipedal robot. The following techniques were used:

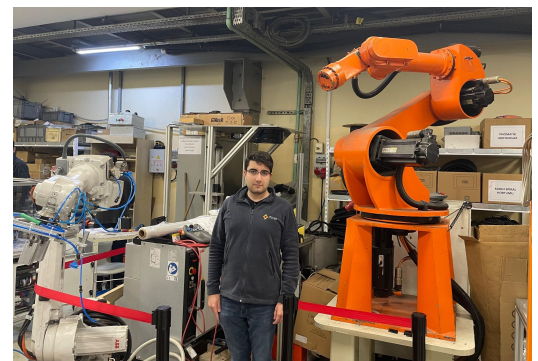
- ROS architecture and hardware integration with RaspberryPi.
- CAD of the parts to be 3D printed using Solidworks.
- Inverse kinematics to calculate joint angles according to desired center orientation. Non-linear graphical solution method was used to solve inverse kinematics.
- Python simulation of robot motion and pose angles. Checking for illegal moves considering joint constraints.

Video Demonstration: <https://www.youtube.com/watch?v=OzjbS6ZvuW8>

Ozler Plastic LLC., Robotics and Automation Engineer Intern (Winter 2023)

I was tasked with designing a new packaging section to the factory as an attempt to automate the process with a decommissioned ABB robot.

- Used an BnR PLC and Automation Studio to test the functionality of the proposed control algorithm. Created a simulation video that illustrates the workflow of the packaging process.



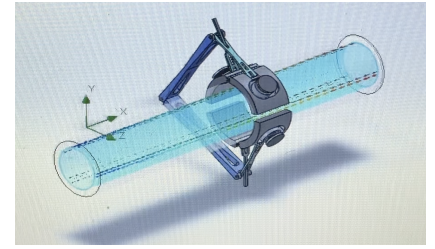
RobotStudio animation: <https://www.youtube.com/watch?v=WvIBUiTyIro>

Arcelik LLC., A Ticket For Your Future Program (Summer 2022)

I was selected to be a part of A Ticket For Your Future Program which included various presentations and a final project.

- Designed a smart flow sensor for changing user's water consumption habits and to improve sustainability at homes.
- Attended presentations and panels on Agile methodology, Design Thinking, Sustainability Consumer Insights and Trends, C-level Mentoring Interview.

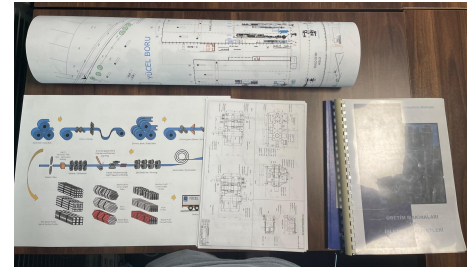




Yucel Industrial Pipes and Profiles (Summer 2022)

I was trained to be a factory maintenance engineer in the Yucel Industrial Pipes and Profiles internship program.

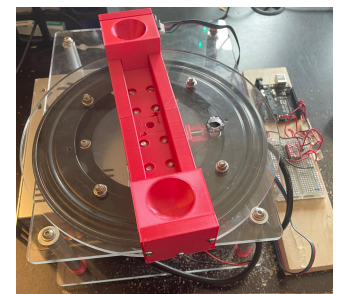
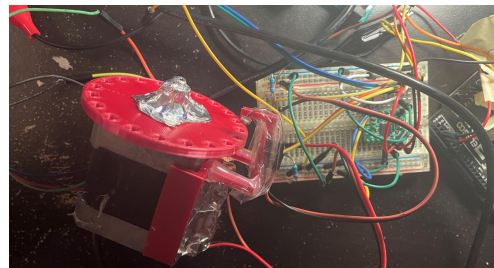
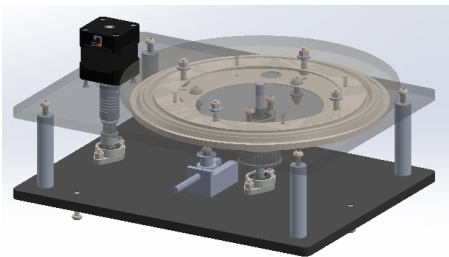
- Went over technical drawings of machine components
- Read documentation about machines such as electrical generators and air compressors and helped the chief maintenance engineer during mechanical problems of some machines.



Senior Design Project: Smart Flow Sensor (ME 351/352 - Spring 2022/Fall 2023 Semester)

For this course, our group was tasked to design a device that calibrates a smart flow sensor our product owner has. We 3D modeled and manufactured the structure during the spring 2022 semester then started implementing electronics and software during the fall 2023 semester.

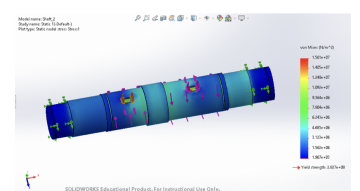
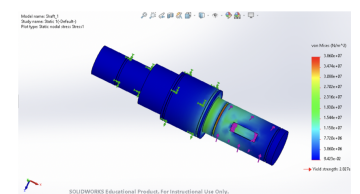
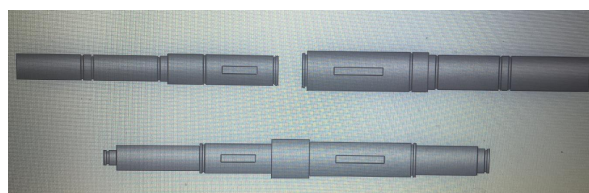
- I was responsible for designing the electrical circuit and the control algorithm during the spring 2022 semester and user-interface during the 2023 semester.



Machine Element Design: Speed Reducer Group Project (ME 342 - Spring 2022 Semester)

For this course, part of our final grade was given on how our group performed on designing a speed reducer. We were given parameters of a go-cart car and asked to create a gear box according to the design requirements.

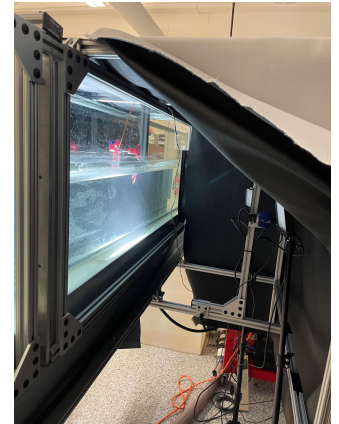
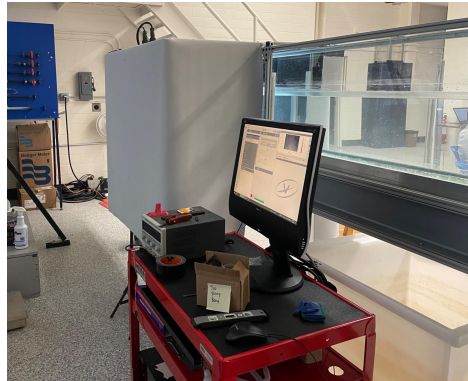
- Submitted four documents: Static Force Analysis, Static Stress and Strength Analysis, Gear Teeth Fatigue and Face Width Analysis, Shaft Design and Fatigue Analysis.
- Coded the calculations using Engineering Equation Solver (EES) and optimized the design according to weight, cost and manufacturing processes.
- 3D modeled the gearbox with the optimized design parameters and submitted the technical drawings as if it was going to be manufactured.



Measuring Microplastic Sinking Velocities (2021 - 2023)

I helped provide data to a graduate student by measuring the sinking velocities of microplastics in still water and started on writing a paper on the topic

- I designed and built a particle dropping mechanism and integrated an Arduino for image capture control.
- After earning a Research Fellowship and meeting with Chancellor Rebecca Blank, I started conducting my own research project on surface waves and sinking velocities of microplastic particles. I will present my findings in the Undergraduate Symposium in April of 2023.



Tarim Heating and Cooling (Summer 2021)

I assisted in the design and installation of HVAC (Heating Ventilating Air Conditioning) systems at residential buildings.

- Replaced old R22 units to R410a.
- Gave estimates to the customers and maintenance on commercial buildings' units.



Teknofest Underwater Drone Competition (2020 - 2021)

I mentored a team that joined Turkish national technology competition, Teknofest and was involved in:

- 3D Modeling the drone
- Designing an optimal propeller according to the drone speed
- Stress analysis of the components under expected loads
- Flow analysis for determining the thrust and drag of the drone
- Helping out writing the documentation for each phase of the competition

