ECE 1000 Final Report: Robotic Arm

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In this project, we sought to create a mechanical robot arm with as little materials as possible. Our project has a 3D printed arm, several jumper wires, 2 servo motors, a joystick controller, and a raspberry pi.

Keywords—Raspberry Pi, Servo motors, Joystick

I. Introduction

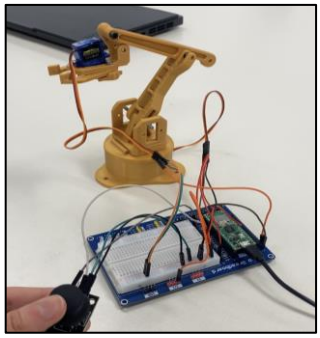
We chose this project because we are both mechatronics concentrations, so a robot arm linked the closest with our future careers. It also helped to expand our understanding of the integration between code and physical objects. We faced some challenges along the way, but in the end, we confirmed that this really is what we love to do.

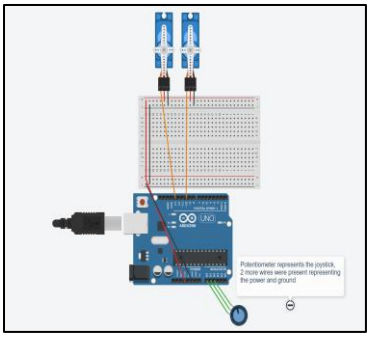
II. Background

We took our major inspirations from Thingiverse, where we saw the "EEZYbotARM" made by Carlo Fransiscone. We used the files provided on the page and the instructables linked to assist in assembly. Due to a mix-up with the 3D printing. Some pieces were missing which prevented us from being able to fully follow the blueprints. We innovated and created the result, which is missing some parts that create the arm.

III. Project Description and Formulation

Using the program "Thonny", we coded a raspberry pi to control 2 servo motors. Our raspberry pi is connected to our laptop, which is acting as our power source and our internal clock. The joystick has 4 wires connected. The x-direction of the joystick is connected to pin GP26 and the switch of the joystick (pressing down) to pin GP16. The servo motor controlling the rotation of the arm via the base, has 3 connections, one to the 3.3V power source, one to the ground, and the final to pin GP0. The servo controlling the arm's opening and closing is also connected to the 3.3V power source as well as the ground, and the final pin to GP1. All of the servo motors as well as the joystick are connected via a breadboard to the 3.3V power source and ground.





IV. Discussion and results

In this project, we were able to achieve a mostly functional robotic arm after some trial and error. Due to errors with the 3D printing of pieces and a lack of some assembly parts, we were made to improvise with what we had, resulting in the outcome of the project as seen above. We learned how to connect servo motors to a raspberry pi microcontroller, connect a joystick to servo motors, and do some basic python coding. Jonathan Hilvers took the lead on assembly of the arm, while Sulehi Jhaveri Torres took care of the wiring. The code ended up being a collective effort.

V. Conclusion

This project was a splendid example of what it looks like to improvise and finish a project although it had to take a different direction than anticipated. We learned the basics of micro python coding as well as receiving the introduction to 3D printing. We learned some valuable skills and will be able to implement them in the rest of our future projects.

References

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