ECE 1000 Final Report: Joystick-Controlled Robotic Arm

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***Abstract*— The Joystick-Controlled Robotic Arm was created for real-life applications. In the end, our results produced 3 servos controlled by 1 joystick where the x and y inputs controlled 2 of the 3 servos while the last one was toggled from 0-180 degrees with the joystick's button.**

Keywords—Robot Arm, Joystick, Servo, Raspberry Pi Pico, MicroPython

I. Introduction

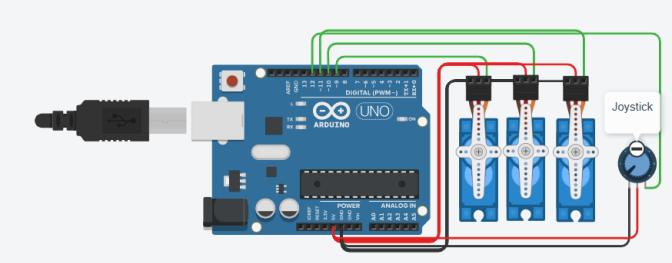
This team chose to create a robotic arm. This project was chosen because it holds many purposes and benefits within the real world. Our team includes Cash Spurgeon, Electrical Engineering Major, and Evan White, Computer Engineering Major. Our knowledge was further expanded by the tools and resources used in this project.

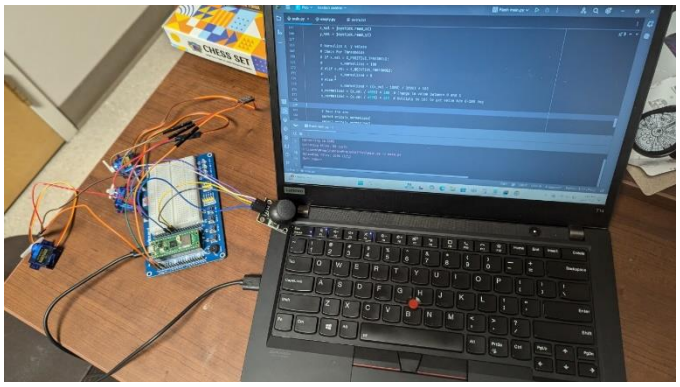
II. Background

First, we acquired a Robot Arm model called *Micro Robot arm* by *bentommye* that we could 3D-Print and put together from a website called *Thingiverse*. Second, we acquired 3 9g servos and 1 joystick from Storm. Third, we found the additional libraries that would assist with the servos, called micropython-servo, and joystick, called DIYables-MicroPython-Joystick, from PyPi. Lastly, we put it all together on a Raspberry Pi Pico.

III. Project Description and Formulation

Now, for the specifics of each component, we had to connect the joystick's ground to ground, voltage to voltage, button to any Pin number on the board, and it's X and Y to a special ADC (Analog to Digital Convertor) supported pin like 26, 27, or 28; however, for the servos, we could just connect each servo's input to any pin 1-28 while it's power and ground go to power and ground, respectively. For the code, we chose to read in the X and Y input of the joystick where X would control one servo and Y would control another as well as if it had been pressed after the last time it was checked which would then act as a toggle for the servo that would close the hand of the arm. We chose to put the grabbing as the least precise control since fluid movement would be more important. Below is a photo of the 3 servos and 1 joystick working with the Raspberry Pi Pico connected to my laptop as well as a blueprint for the whole circuit.





IV. Discussion and Results

In the end, this team found out how we can put together computer, electrical, and mechanical parts to make a robotic arm. Cash Spurgeon found the model, servos, joystick, and created the idea. Evan White created the code that made the servos and joystick work together. While a lot of progress was made, it would be better to actually receive the model the robotic arm which we were unable to due to time restrictions. In the future, the same code, thought processes, and materials could be used in conjunction with a model to finish the project.

V. Conclusion

In this project, we put together the most essential parts of a joystick-controlled robotic arm and show how it can shape the world around us.

References

[1] *Thingiverse*, www.thingiverse.com
[2] *PyPi*, www.pypi.org