*ECE 1000 Final Report: Robot Arm*

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*Abstract*— For our final project, we decided to create a robot arm with a claw. We chose a robot arm because we thought that it would be the most fun to build/code. We designed it to move up/down and open/close using servo motors. We controlled it with a joystick that was connected to a Raspberry Pi Pico.

Keywords— Raspberry Pi Pico, Servo Motors,

# Introduction

Our team for this project consisted of two members, Alexander Bussell and Maddux Stone. We are both going to Tennessee Tech to be electrical engineers. The purpose for us choosing a robot arm for our final project is that we wanted to choose a project that had the perfect balance of challenge and enjoyment. We also wanted to have a lot of freedom with whatever we chose, and building a robot arm comes with a lot of it. Our project is important because it demonstrates our ability to create a functioning piece of machinery.

# Background

The first thing that we needed to do for our project was find a design that we liked. We had a design that we liked on Thingiverse [1] and had the parts 3D printed. The code is a modified version of code created by JC Williams [2] to move one servo motor with a joystick and move a servo motor with a button. We modified the code by reading a second axis from a joystick to control another servo motor.

# Project Description and formulation

Our project takes the input from a joystick and uses it to control three servo motors to move an arm with a claw. The joystick connects to the Raspberry Pi Pico on pins 26 and 27 for the x and y inputs and pin 16 for a button which opens and closes the claw of the arm. The code based on code by JC Williams [2] takes the input from the joystick and converts it to a position for the servo to rotate too. The button was programmed to move 180 degrees (the max rotation of the servo) when the button was pressed to close the claw.

A circuit board with wires connected to it

Description automatically generated

# IV. Discussion and results

A person holding a blue robotic arm

Description automatically generatedOur project ended up turning out very well. If we were to try and improve it, we would definitely add another servo motor to the bottom, which would allow it to move left/right. We would also change the resting position of our gears for our claw, that way it would operate smoothly. Our favorite part about this project was being able to see our creation come to life. It was an exceptional experience when all of the pieces finally came together. Alexander coded each of the servo motors, and Maddux built the actual robot arm.

# V. Conclusion

Overall, we were very pleased with how our robot arm turned out, it was fully functional. Our arm was able to move up/down and open/close using servo motors and a joystick. This project taught us how to research properly and how to problem-solve.

##### References

1. T. Verhaegh, <https://www.thingiverse.com/thing:3614519>, 2019
2. John-Caleb (JC) Williams, <https://github.com/JCWilliams1003/ECE-1000-Spring-2024-Final-Project-Insert-Project-Name/blob/main/Example%20Micropython%20Codes/ECE_1000_Joystick_Servo_Example.py>, 2024