*ECE 1000 Final Report: Guitar Buddy*

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Abstract- The project we designed is called “The Guitar Buddy.” We made this project with the intention of allowing those who do not know how to play guitar to be able to use joysticks to enable servo motors to press down a chord so then the user may strum, and the chord will be played. Overall, the results were not the exact outcome due to some error in design and part limitations with time restrictions.

# Introduction

With our Raspberry Pi Pico, 3D Design, Python Code, and use of the Engineering Department’s resources for students, we designed the ‘Guitar Buddy’ to play the chords (G, C, and D). As a group we collaborated on ideas as far as 3D designs, coding models in python, and mounting ideas to the guitar for the most suitable design. Thanks to the sources we came across it made making the project an easier process with our current standings in Python coding and wiring components.

# Background

Within this project the resources used assisting and making up for our lack of expertise are listed as (Original 3D Print Design) <https://www.thingiverse.com/thing:4544167> and (JC Williams python code for moving servo motors with joysticks) <https://github.com/JCWilliams1003/ECE-1000-Spring-2024-Final-Project-Insert-Project-Name/blob/2d2f07f00d5e50eaa687a12897fc042d79ecc809/Example%20Micropython%20Codes/ECE_1000_Joystick_Servo_Example.py>. With the use of each resource we were able to make a functioning project with minimal errors.

# Project Description and formulation

In this project, we developed a "Guitar Buddy" system using a Raspberry Pi Pico with GPIO pins to control a servo motor that presses down on guitar chords based on joystick inputs. The joystick, connected to the Pico’s GPIO pins (GP26 for the X-axis), allows users to move the servo in the X direction, while the servo, controlled via PWM on GP16, presses the guitar buddy. The code, written in Python using Thonny, reads the joystick’s analog signals and adjusts the servo’s position accordingly. We used the Raspberry Pi Pico which allows versatility and Python which is known for its simplicity in controlling hardware. The full system includes the Pico, joystick, servo, and guitar, helping users play guitar chords with little to no experience.

# IV. Discussion and results

The "Guitar Buddy" project successfully automated guitar chord pressing using a joystick and servo motor controlled by a Raspberry Pi Pico. Future improvements could include adding multiple servos for complex chords, pressure sensors for accuracy, and a user interface for chord display. The team enjoyed the hands-on work, particularly seeing the joystick control the servo. Parker handled the hardware setup, I(Brandon) worked with the Python code, and Brady focused on testing, debugging, and integration.

# V. Conclusion

The "Guitar Buddy" project aimed to automate guitar chord pressing using a joystick and servo motor controlled by a Raspberry Pi Pico. Through this project, we gained skills in hardware integration, Python programming, and controlling servos. The system successfully allowed users to practice guitar chords by pressing strings based on joystick inputs. Overall, the project met its goals with minor flaws and provided valuable hands-on experience in coding and electronics.

##### References

1. JCWilliams. (n.d.). ECE-1000-Spring-2024-Final-Project-Insert-Project-Name/ExampleMicropythonCodes/ECE\_1000\_Joystick\_Servo\_Example.py at JCWilliams1003/ECE-1000-Spring-2024-Final-Project-Insert-Project-Name. GitHub. <https://github.com/JCWilliams1003/ECE-1000-Spring-2024-Final-Project-Insert-Project-Name/blob/2d2f07f00d5e50eaa687a12897fc042d79ecc809/Example%20Micropython%20Codes/ECE_1000_Joystick_Servo_Example.pyM>.

[2] Thingiverse.com., Guitar Simplifier by Gkitt. Thingiverse. <https://www.thingiverse.com/thing:45441>

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