*ECE 1000 Final Report: Guitar Buddy*

Brady Harkelroad, Brandon Price, Parker Branson  
Tenessee Tech  
ECE 1000Cookeville, USA  
[bharklero42@tntech.edu](mailto:bharklero42@tntech.edu)

[Pbranson42@tntech.edu](mailto:Pbranson42@tntech.edu)

[Bprice44@tntech.edu](mailto:Bprice44@tntech.edu)

***Abstract*—The name of our project is The Guitar Buddy, and what the Guitar Buddy does is that it helps a person play three cords on the guitar (G, C, and D). Our group decided to do this project because it involved a musical instrument, servo motors, and coding with a Raspberry Pi Pico Board. Helping a person who struggles with playing the cords correctly or physically cannot play the guitar is also part of the main reason we decided to start this project. The project works as we intended it to, and the Guitar Buddy almost sounds just as perfect as a guitar player would.**

Introduction

Our group decided to build the Guitar Buddy because it was different than building a regular robot arm that many people have done in the past. All three of us like music, and two out of three of us play an instrument, so we all thought using servo motors to play cords on a guitar was a very interesting idea. The idea of helping a person play the guitar and fall in love with playing the instrument despite lacking certain skills or abilities is a key motivator in starting the project. The Guitar Buddy is not an original design though.

Background

We found the main design of the Guitar Buddy from this website on the internet,

<https://www.thingiverse.com/thing:4544167>.

The person who designed the original model name is “gkitt” and made the model on July 16, 2020. Also, we were given Python code by JC Williams, one of the teacher assistants from ECE 1000 this semester, allowing us to use the joystick with the servo motors. Here is the link to the code,

<https://github.com/JCWilliams1003/ECE-1000-Spring-2024-Final-Project-Insert-Project-Name/blob/main/Example%20Micropython%20Codes/ECE_1000_Joystick_Servo_Example.py>

Project Description and formulation

We wired up the joystick to the Raspberry Pi Pico Board by hooking up the yellow wire (ground wire) to ground, the red wire (power) to 3 volts, the orange wire to pin GPIO26 (this is the VRx, and it allows the code to detect the joystick along the x-axis), and the green wire (the switch detection for the joystick) to GPIO 16. The servo motors are hooked up to the 5-volt power supply (yellow wire), one of the other grounds (red wire), and the switch detector in GPIO 0 (the orange wire) for the code to detect the servo motors. With all of these wires plugged into the Board, this allows us to adjust the joystick’s position and have the servo motors attached with a wooden dowel press down on the chords outlined by the 3D model to play one of the three given chords. The first figure below is our block diagram that shows the connections of each component, and the second figure is our full system.

A diagram of a computer program

Description automatically generated

A machine with wires and wires

Description automatically generated

IV. Discussion and results

As I stated before, the project worked as it was intended to: the wood dowel connected to the servo motors pressed down on the laid-out platforms of each cord, and with the rubber stoppers on the pegs that press against the cords, it played almost near to what it would sound like if a real guitar player was playing. Since we were a little strict on the time of completing our project with delays in getting our 3D models printed, we didn’t have a perfect model of the servo motors being mounted to it. If we had more time and were able to make multiple 3D models, we wouldn’t have had to alter our final model as much. Our team enjoyed the task of using Python and figuring out the coding to make the servo motors rotate a certain amount of degree by using a joystick. Me and Parker were tasked with making the 3D. models for the servo motors to sit in place so that they could anchor in the model and play the correct cords on the Guitar Buddy. Brandon was tasked with figuring out how to

code a joystick to rotate the servo motors in Python from the code that was given to us by one of the ECE 1000 teacher assistants, JC Williams. We then implemented it onto the Raspberry Pi Pico board, connected the joystick to the motors, and ran the code.

V. Conclusion

In conclusion, The Guitar Buddy is a 3D model design that sits on the fretboard of a guitar, and when pressed down with servo motors, it plays one of the three desired cords by the user. From this project, we learned the importance of problem-solving and figuring out how to implement a design into action. We also dabbled in Python and learned how to wire up a Raspberry Pi Pico Board. The result of our project was a success however, with future improvements, we can further improve the model’s design.

References

Gkitt, July 16th, 2020, Guitar Simplifier, Thingverse,

<https://www.thingiverse.com/thing:4544167>

JCWilliams1003, April 15th, 2024, ECE\_1000\_Joystick\_Servo\_Example.py,

<https://github.com/JCWilliams1003/ECE-1000-Spring-2024-Final-Project-Insert-Project-Name/blob/main/Example%20Micropython%20Codes/ECE_1000_Joystick_Servo_Example.py>