

Division of Engineering Programs EGG409 – Senior Design II Group 13 Spring 2021

MUSIC PRACTICE TIMER

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PROJECT DESCRIPTION

The purpose of this device is to display the productivity of their child's musical instrument practice sessions by tracking and reporting actual time practiced versus idle time.



SYSTEM ARCHITECTURE

Hardware:

- Nucleo-64 Microcontroller
- 16x2 I2C Liquid Crystal Display
- Digital Infrared Motion Sensor
- Analog Sound Sensor
- Li-Po Charger Type-C
- 1100mAh Li-Po Battery

DEVICE FUNCTIONALITY

A sound sensor is used to measure amplitudes and peak frequencies in order to distinguish between the sound of a musical instrument versus background noise. An IR motion sensor detects body heat from the musician as they are practicing. Menu options are displayed on the LCD and selected with push-buttons, with the option to use a Count-Up Timer or a Count-Down Timer.

GROUP & ADVISORS

MANUFACTURED MODEL

All parts were fastened together in a 3D printed case designed on Inventor, making the device portable, sturdy, organized, and aesthetically pleasing.

DESIGN CONSTRAINTS

Engineering design constraints for this device included:

- Easy user-interaction for both parents and children.
- Long-lasting components to prevent repeat purchases, while retaining low-cost to remain affordable for consumers.
- A design durable enough to withstand falls/damage.
- Processor powerful enough to handle repeated signal processing at high rates.

FUTURE IMPROVEMENTS

Additional updates to improve the functionality:

- Free software updates can provide options for various instruments.
- Increased range for signal capture.
- A phone app to track practice time.
- Additional language options on the menu, or a Bluetooth compatible App.