Abstract
The purpose of this project was to help make learning the piano easier. The Piano Trainer is a simple bar of lights that sits above the keys on any piano. It lights up the lights to help you know which key you should play next. You can plug in a USB drive and play any song you like.

Goals
The goals of this project were as follows:
1. Use of standard MIDI files
2. Can be used on whatever piano, digital or analog
3. Listens and advances according to the user’s pace

System Overview
The Raspberry Pi Zero W was used as the main computer. Sound was fed in via an i²s microphone. Shift registers were used to control the LEDs. Buttons and a USB hub were used to get the user input. Data was displayed to the user via an LCD module screen.

Note Recognition
The sound is sampled via the microphone. Then a Discrete Fourier Transform is applied to the data. Finally, the Goertzel algorithm is applied to identify different notes and chords.

Results
Any standard MIDI can be used and loaded via a standard USB drive. Sound is correctly pulled from the microphone, and the frequency can be obtained with reasonable accuracy. Applying the Goertzel algorithm to correctly identify chords however, is still a work in progress.

Conclusion
The Piano Trainer system met most expectations with the exception of the note recognition feature. Regardless, the Piano Trainer offers a new and unique approach to learning the piano.

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