The Feeling of Sound

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Introduction

In today's world, there are many ways of experiencing multimedia such as three-dimensional video, motion sensor technology, and audio visualization.

By reproducing the essence of sound into the sense of sight, the experience is intensified. By also reproducing the essence of sound into something that can be felt, the experience would be brought into an entirely new dimension.

This research explored the effectiveness and feasibility of turning audio into something that can be felt, not just heard.

Objectives

This project set out to create a wrist band containing motors that vibrate along with audio, enhancing the listening experience. Specific goals included:

- Using a Bluetooth connection (to keep the wristband wireless)
- A computer program to control the wristband
- Determine the best way to represent sound in a tactile way

Methods

A Fast Fourier Transform (FFT) was used to analyze audio. By giving the volume of the sound at any frequency range, the FFT allowed the computer program to pick a range of frequencies and adjust the vibration of the motors to correspond to the volume of the sound.

A visualization of the FFT is also displayed on the screen so the user can see, hear, and feel the sound.

Components
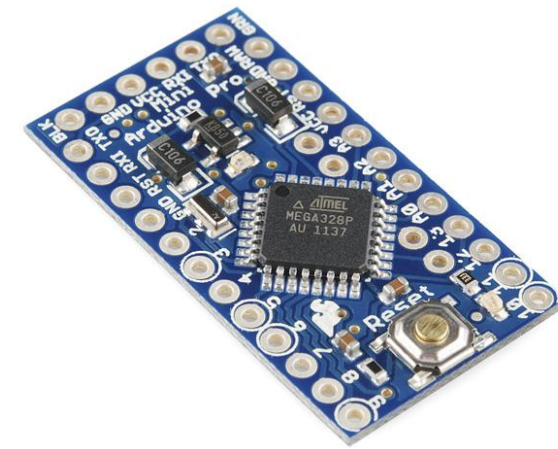
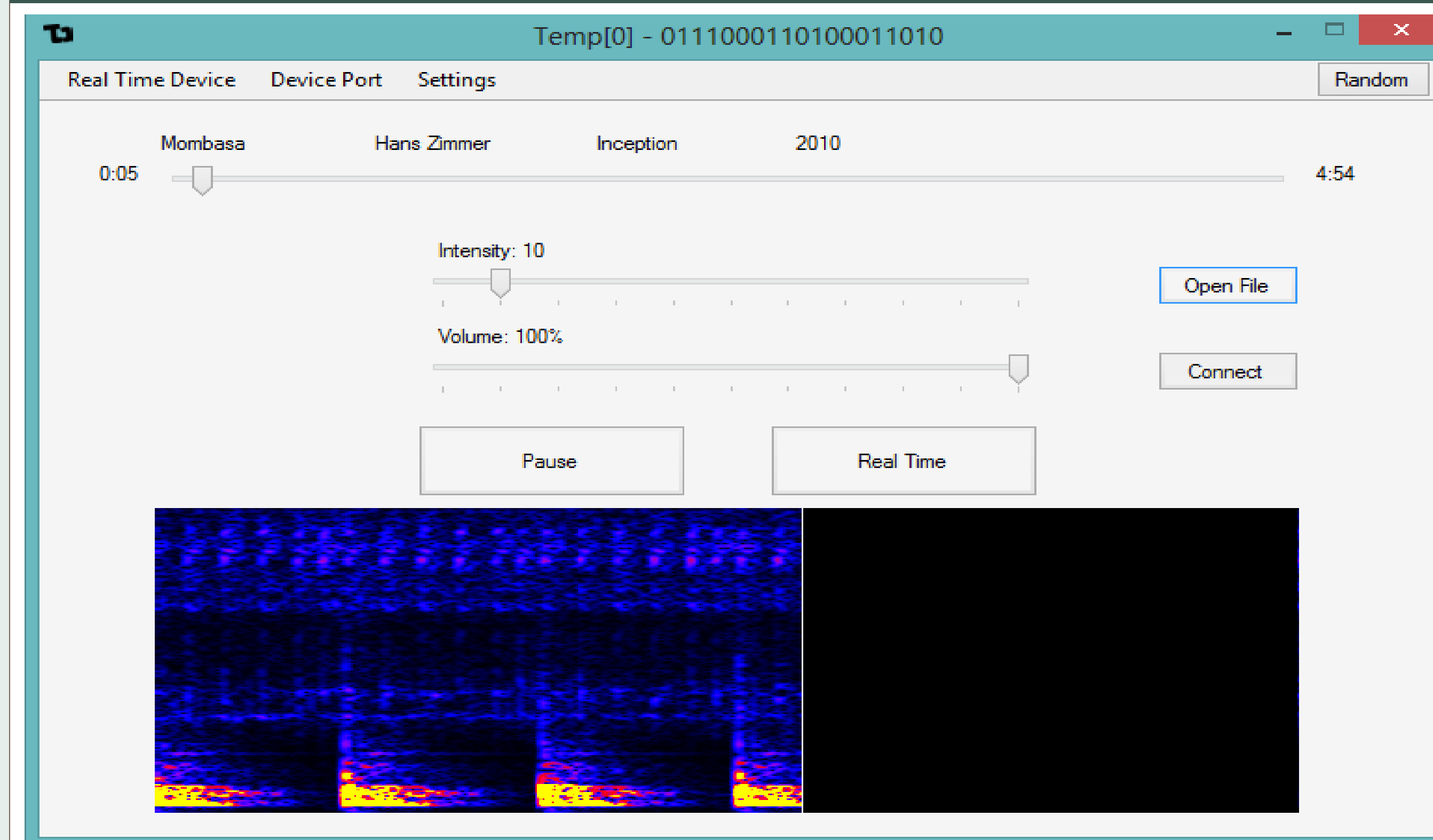Arduino microcontroller   Bluetooth module   Vibrating motor (x4)   Lithium Ion Battery

(component Images from sparkfun.com)

Results

Conclusions

In the end, a wristband was created that could accurately convey the feeling of sound.

Though the prototype is large, if it were to be mass-produced, smaller and less expensive components could be used.

The wristband was found to work best with bass-heavy audio. Still, adjustments can be made to the algorithm to work better with higher-frequency audio.

Though varying types of audio were tested, including normal speech, The wristband proved most effective for music, but it can be used with a microphone to feel speech in real-time.

Future Possibilities

The prototype wristband was a success. Down the road, improvements and modifications can be made to the wristband.

Though the prototype is bulky, smaller components can be researched and used to make it more compact.

In addition, a second wristband can be added, which would further enhance the experience. Also, the algorithm could be improved and made to reproduce stereo sound.