CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)

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Project Number

J0917

Project Title

Vibes: A Novel Way to Alert the Deaf

Abstract

Objectives/Goals

The goal of project Vibes is to make a vibrotactile haptic device that can help the deaf to sense audible alerts, such as a car honk or a fire alarm. Such a device can greatly improve the sensory range and general safety of over 90% of the world's 360 million hearing impaired people who are unable to use hearing aids.

Methods/Materials

Our device uses an Arduino to continuously process sound samples and actuate a vibration motor to alert the user when an audible alert is detected. Experiments were conducted using audio recordings representing ambiances and decibel levels of various day to day environments like a library, a busy street and a mall. Another audio source was used to mimic audible alerts, in a similar manner. Observations were made when the device triggered, either falsely or in response to an actual audio alert.

Results

After multiple iterations, we were able to minimize false alerts and make the device function reliably by dynamically varying the vibration threshold based on the loudest sound samples in the prior few seconds. This was a great improvement on our initial implementation that simply compared the sound samples against a running average of amplitude of all sound samples.

Conclusions/Discussion

Our project successfully demonstrates that devices like Vibes can be made effectively and at an affordable price. Our device depends on a sudden increase in amplitude of sound to differentiate an audible alert from ambient noise. The device is also limited by the frequency response of the mic used. Further work is planned to consider frequency in addition to amplitude for detecting alerts and more closely match the response of a human ear.

Summary Statement

Our project improves the general safety of the hearing-impaired by creating a vibrotactile haptic device to alert them to audible alerts in the environment.

Help Received

Project advisor guided us in programming process.