CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

36024

Project Title

Autism Listens! An Attempt to Digitally Simulate a Hearing Aid that Helps Autistic Children with Hyperacusis

Abstract

Objectives/Goals

The objective of this project was to attempt to create a prototype of a special kind of hearing aid that keeps main conversation sounds (foreground noise) at the same level, while minimizing background noise. The aim is to help children with autism, who suffer from hyper sensitivity to sound, function better. After extensive research, it was realized that such a hearing aid cannot exist at the time since the technology to make a hearing aid that reduces noise does not yet exist. So it was decided to digitally simulate what the hearing aid is expected to do, using the software Audacity.

Methods/Materials

Six male subjects between the ages of 13-15 years old, three autistic and three non- autistic, were tested for response time to simple questions and instructions. Four audio files were created using the software audacity with the questions and instructions and background noise present. The background noise included a television, a remote controlled car, and a dishwasher. A stop watch was used to calculate the response time. Headphones were used to listen to the questions. The four different audio files created had the foreground noise at the same level, and each had a manipulated reduction of the decibels of the background noise.

Results

After testing autistic and non-autistic children, the results showed that completely eliminating background noise increased the response time for children with autism when responding to simple questions and instructions. Decreasing background noise by 30dB made the response time better than with background noise at normal recorded level and at 15dB reduction, but not better than when the background noise was completely eliminated.

Conclusions/Discussion

Children with autism find it hard to focus with background noise present, as their hypersensitivity to sound makes them hear everything at the same intensity. The digitally created audio files with decreased background noise allowed the children with autism to have a faster response time to questions and simple instructions, thus giving them the opportunity to function better. It will also help alleviate the pain and discomfort of hypersensitivity to sound.

Summary Statement

An attempt to digitally simulate a hearing aid that helps autistic children with hyperacusis overcome their auditory perception challenges by reducing or eliminating background noise.

Help Received

My mother and adult supervisor, Rula Alshanableh, supervised as I tested my subjects and double checked my data and calculation. While I created the necessary audio files myself, my brother, Abdulkarim Alamad, familiarized me with the software audacity that I used.