CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Anish Seshadri

Project Number
J0917

Project Title
Automated, Wearable Guidance System (AWGS) for the Visually Impaired

Abstract

Objectives/Goals
The problem that is addressed in this project is that, currently, the visually impaired are not very ambulatory since their impaired vision inhibits them from getting around without any aid. The purpose of this project is to build an Automated, Wearable Guidance System (AWGS) to help the visually impaired with navigation and mobility both indoors as well as outdoors.

Methods/Materials
There are several design criteria for building the AWGS. The AWGS should be able to monitor and process key parameters like elevation, obstruction, location and direction. The AWGS needs to be automated in order to continually monitor these parameters as the user walks from Point A to Point B and take necessary action to give appropriate directions to the user to stay on the recommended course. Based on inputs from the leg and vest sensor circuits, the AWGS needs to turn on/off buzzers and Vibe boards and give directions to the user to stop, turn left or right as appropriate. The AWGS needs to be wireless in order to improve usability.
The AWGS has two modules, the Obstacle detection unit and GPS unit. The Obstacle detection unit is made up of a wearable vest and leg obstacle sensor units. The Obstacle Sensor Unit has an Ultrasonic sensor, Lilypad Arduino and buzzers for obstacle detection and warning. The GPS unit has an Arduino Uno that acts as a host for the GPS device. The GPS is connected through a GPS shield with the Arduino Uno. The GPS collects live data from the satellite.
The AWGS was operated as an integrated system indoors and outdoors with the user wearing the vest and the leg units indoors and using the GPS unit outdoors.

Results
For indoor testing, the user was made to stand at the starting point and asked to start walking blindfolded towards the end point. Every time the user was within 12 inches of an obstacle, the buzzer buzzed proving that the Wearable Vest Unit and the Leg Unit functioned as designed. For outdoor testing, when the user reached latitude and longitude values corresponding to pre-programmed turns, the appropriate vibe board vibrated signaling the user to turn right or left.

Conclusions/Discussion
It can be concluded based on the data collected that the AWGS for the visually challenged met all the success criteria. The current prototype can be improved greatly if it were programmed into an app. This app would connect to Google maps and read live data from Google maps.

Summary Statement
This project is aimed at building an automated wearable guidance system (AWGS) to help the visually impaired with navigation and mobility both indoors as well as outdoors.

Help Received
I want to thank all the volunteers who helped me take very valuable data. I want to thank Mrs. Makhijani for her valuable advice. I want to thank my dad for giving me pointers on Arduino programming. I want to thank my mom for helping me with sewing and soldering.