CALIFORNIA STATE UNIVERSITY MONTEREY BAY

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PROJECT

6th sense 360
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6th sense 360

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ABSTRACT

In this paper we will be exploring the fundamental functions of the Arduino platform using the near field sensors to monitor distance between objects. This project is being constructed to assist the seeing impaired to be able the have an improved sense of objects in motion and objects that are static The 6th sense 360 will allow users to experience depth perception along the four axes and more spatial awareness and sensation along with depth perception.

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I. Introduction

Currently, there are few aids for the blind that assist them in maneuvering through obstacles while traveling from place to place. Perhaps most commonly used, the “white cane” not only aids the user, but also alerts surrounding people that the bearer has a visual impairment. An in-ear device that utilizes sonar technology can be used; however this method restricts the person using the device from hearing the surrounding area. Vibrating sunglasses can also be worn, but they are limited to sensing what is in front of the wearer. Youtube features a video where a man developed a baseball cap with sensors mounted to the sides and on the front bill. There are a few problems with this design that we hope to improve upon. The cap had exposed wires that could get caught on, although it was a prototype. People also tend to wear their hats in different manners so the baseball cap requires the bill to be straight to work optimally. Hats with bills also bring the possibility of getting blown off by the wind, which would be extremely hard for the blind to locate. The sixth sense 360 will sense 360 degrees will feature wires hidden from view, no bill or any other object that will catch the wind causing it to blow away, and it will fit snugly on the head so that a hat can be worn over it.

A. REQUIREMENTS

The 6th sense 360 will be used mainly by visually impaired. It is a device worn on the head that utilizes an Arduino, 4 sonar sensors, and 4 small, vibrating disks. The Arduino takes in data from the sensors telling it how close an object is, and based off the data the disks will either be in an idle state or begin to vibrate. The disk will start with an infrequent vibration that speeds up as the object gets closer. The disks will correspond to the direction the 4 sensors are pointing and will be placed on the inside of the cap. The device will be powered by a 9V battery.

II CHANGES

No changes were made to our initial design. The original design featured the four sensors with corresponding vibrating motors. These would be on the main two axes of the cap; front, sides, and back. This design has thus far held up to initial implementation and testing, however it is not fully fabricated yet.

2.1 WHAT WE HAVE LEARNED

During the design phase we became acquainted with the Arduino and setting up simple circuits. We initially started by using the LEDs and following the tutorials given by the booklet. This mapped out the circuits that were set up and the code necessary to get the Arduino to run properly. The code itself is similar to c/c++, which all members of the team are familiar with. This made it a quick process of getting up to speed and eventually branching away from the booklet. At this point, we looked up documentation on the small motors and the sonar sensors so that their implementation would be simple. Those of us who were unfamiliar with soldering then got practice by soldering wires to the sensors so that they could be used more effectively.

2.2 CURRENT STATUS

The current status is, that we have most of the code written for the arduino and just have a few bugs to fix. We have most of the components assembled and just need to solder a few wires and sew the hat together to finish.

III FINAL UPDATE

2.3 FINAL CHANGES

For our final changes, did not fit the second cap over the original because of the wires that were connected to the breadboard were exposed and would have broken off from the force of the second hat. Also, we had to only use three sensors because of the delay between signals. We were unable to multithread with the Arduino. Despite this, all the design worked.

3.1 WHAT WE HAVE LEARNED -- FINAL

After the design phase, the group was still ambitious about the project and its possibilities. In the end, however, the Arduino limited the amount of functionality and cohesion between sending out and receiving pings, and sending signals to the vibrating motors. There were big innovations in the way the code was structured from the design phase to the final phase. The way the pinging was set up before, there was delay between when the front sensor would ping and the left sensor would ping. This added up and created a ripple effect that made everything desynchronous with the vibrations. To work around this, a new library was implemented and the vibrating motor timings were tuned.

3.2 CURRENT STATUS

Currently, we have a working prototype that we successfully presented to the class.

3.3 SUMMARY

Overall, the project provide a good learning experience and taught the relationship between software and hardware. We were able to come up with a project that was both attainable and challenging, while working in a group environment. We made regular updates, reinforced our skills, and were able to strive, collaborating with our peers. Despite the occasional dilemma, our end result met our expectations and our presentation was successful.