**SEES PROJECT**

**Spatial Echolocation Enhancement System**

**Progress Report**

University of Victoria

CENG/ELEC/SENG 499 Summer 2015

Design Team 27

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The goal of this project is to design a system to aid visually impaired or blind individuals in navigating the world around them. The project aims to build a device that would act as a natural augmentation to the user’s existing ability to navigate using spatialized audio cues from the world around them. Spatialized audio cues can be generated with a regular pair of in-ear headphones using Binaural Audio Filtering. With Binaural Audio, audio signals are separated into left and right audio channels and are filtered. The Kinect depth sensor by Microsoft for Computer Vision applications will be used to sense the depth and will be able to return images like an ordinary camera, but instead of color, each pixel value represents the distance to the point. In this report, we perform an extensive evaluation of the depth sensor and investigate issues such as 3D resolution and precision, structural noise, multi-cam setups and transient response of the sensor. The purpose is to give the reader a well-founded background to choose whether or not the Kinect sensor is applicable to a specific problem.

It is important to note that this project is following over from the groups previous 399 project. During the course of CENG/ELEC 399 much research was done on is the best method to implement the design. Our group has currently decided on the Kinect design as previously mentioned due the ease of acquiring the hardware. Are secondary design was to use a higher quality hardware component, the Intel RealSense (NAME). Along with this camera we not have to use extra parts like an accelerometer and gyroscope. However the use of this component currently requires a non-disclosure agreement, making the prototype unavailable for public use. During the course of 399 a virtual model was made using an Oculus Rift and a create program, which could be used for public demonstrations along with our Kinect Design.

Our Milestone and tasks for each Milestone are listed below.

Milestone 1: Component Acquisition & Investigation

* Finalize System Model Decision
* Acquire Hardware Components
* Investigate Platform Capabilities

Milestone 2: Develop System

* Build Headset Base Frame
* Salvage Camera Unit
* Get Camera unit working In Software
* Establish Audio Signalling Model

Milestone 3: System Refinement & User Testing

* Iterate on Audio Signalling Model
* Migrate System to Mobile
* Design User Test Protocol
* User Testing

Milestone 4: Website Development & Report

* Design and Implement Website
* Finalize
* Finish Project Report

During the first week of the inception of the team, member that were not original in the 399 project had to familiarize themselves with the project (Ian and John). During the first Milestone our team had to decide on the design of the project, research was done by all but more specifically Jason and Daniel due to their CENG background. Daniel, Jason and John focused on Hardware acquisition, either the Intel RealSense camera or the Kinect and other required parts. Ian concentrated on mobile development for the use of our design on Android products. Jason, Daniel and Ian worked on additional SOFTWARE COMPONENTS (what specifically). Raj and John worked on the progress report.

In the future our group will continue to work to our strengths. Raj and John will be more involved in the hardware components and Daniel, Ian and Jason will focus more heavily in the software side of the project. Any member who does not currently have any designate tasks can additional work on the reports and demonstrations, which will be helpful during period that do not have enough work for either the CENG’s or ELEC’s.