**Proposal - Audio Based Ranged Navigation System for Blind Individuals**

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 using a Head Related Transfer Function (HRTF). Depending on how well the HRTF matches the user’s head profile, Binaurally filtered audio can sound as if the audio cue is coming from the world around the listener as opposed to from the headphones in their ears.

The technology employed by the device would be as follows: 1. a sensing device that uses either structured infrared light, ultrasonic rangefinding, or some other technology to determine characteristics of objects in the world around the user; 2. a processing unit - possibly a smartphone - that can determine the orientation of detected objects in regards to the user’s head in addition to creating spatialized audio cues with regards to that positioning info; and 3. a set of regular in-ear headphones to provide natural sounding audio cues to the user of the device.

With the exception of the sensing system, the technologies used by this device are both readily available and inexpensive to develop. In terms of design, care must be taken in determining various aspects about the system ranging from which audio cues would be most comfortable to the user, to which hardware or software solutions should be used to transform the audio in real time. Particular consideration must be taken in determining which sensing system would work best for the various environments the user would be expected to use the device in. Finally, development of this project would mark the second UVIC design project focused on Binaural Audio (*Spring 2013, Group 10 being the first*). This means that research into this project can be used to build upon an existing body of work done here at the university.

**Potential Supervisors:**

* *Peter Driessen, peter@ece.uvic.ca (May. 2011)*

I am willing to supervise projects related to Sound Recording, Audio Signal Processing, Computer Music, Amateur Radio, Software Defined Radio, Example projects can be found at<http://www.ece.uvic.ca/~peter/499/499index.html>

* *Kin F. Li, kinli@uvic.ca (April 28, 2014)*
* *Michael Adams mdadams@ece.uvic.ca*

**Potential Assisting Organizations:**

* *CanAssist*

<http://www.canassist.ca/>