**Project Proposal**

“RaspberryPi Enabled Navigation for the Visually Impaired”

Group 7

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*Abstract/Description:*

Visually impaired individuals face a number of challenges navigating obstacles, even in familiar environs, through the course of normal daily life. Our work proposes to alleviate some of these problems through the implementation of a tactile feedback system which is able to provide both indoor object detection, and outdoor navigational guidance. Our intended system is belt mounted, lightweight, robust, and easy to use. This system utilizes the ASUS Xtion motion-sensing device to provide IR object detection, and gives haptic feedback to the user via embedded vibrating motors. The outdoor navigational component is achieved through the integration of an on-system GPS module. These components are supported and regulated via a RaspberryPi microcontroller.

*Project Objectives:*

The objectives of this work include:

* Implementation of basic model (ability to sense objects indoors, provide haptic feedback)
  + Setup OpenNI on RaspberryPi, connect with Asus Xtion
  + Implement object recognition
  + Determine hardware components for haptic feedback
  + Connect haptic transducers with object recognition module
* Integration of GPS module (outdoor navigation)
  + Research into compact GPS systems and integration into embedded systems
  + Integrate GPS module with existing project system
  + Set up local maps on hardware system
  + Implement navigation capabilities
* Design/implementation streamlining and refinement
  + Convenience considerations
    - Size: Compact system and streamlined build.
    - Weight: System should be lightweight enough to provide reasonable portability.
    - Aesthetics: Visually unobtrusive and comfortable for individual use.
    - Lifetime: Should be able to provide sufficient battery life to maintain operation across a day of average use.
* Inclusion of level changes and user speed of travel
  + Research (in OpenNI) and design of how to implement level change detection capability
  + Select hardware to detect user speed and method (algorithm) for system response
  + Integrate with existing project
* Integrate user friendly interface
  + Audio input/output

*Project Workflow:*

Project Component Leads

* Raspberry Pi (Indoor Obstacle Detection): *Nitish Malhotra*
* GPS Integration (Outdoor Navigation): *Paul Inglis*
* Design Considerations: *Aashish Chaddha*

*Project Timeline:*

* Start Date Oct 8
* Project Proposal Oct 31
* In-Lab Update Nov 9
* Working Prototype Nov 14
* Metric Tests Complete Nov 21
* Demo Rehearsal Nov 27
* Demo and Presentation Dec 4
* Webpage, Project report Dec 9

*Project Deliverables:*

* System capable of indoor object detection
  + Demonstration of new user succeeding in Obstacle Course
* System capable of outdoor navigation
  + Demonstration of new user successfully navigating between two city waypoints
* System design meets project objective constraints
  + Weight: ≤ 5 lbs
  + Battery Life: ≥ 3 hrs