Portland State University

Product Specification Document (PDS)

Smart Cane

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1 Introduction

1.1 Project Overview

In order to successfully alert the users of nearby objects through a sensor and use a haptic feedback system of LEDs' and Vibration motors to notify the people around and the user.
The purpose of this project requirement is to provide the technical specification to the contractors who will design, manufacture and test the devices. The user for these devices will be medical and daily cane users.

1.2 Definitions, Acronyms and Abbreviations

- Haptic - Sense of touch. We will use a vibration sensor to physically alert the user.
- Sensor - Ultrasonic Sensor that measures distance.
- Buyer - Third party consumer that will buy the product from stores for personal use.
- Device,Produce,Item - The smart Walking cane

1.3 Communication

The product engineering team can be contacted using the following information:
Email: shadman@pdx.edu, Phone: 9177448589

1.4 Location of Document

The document along with the history of product repository can be located in the following location:
https://github.com/keonkiyoo/groupxx.github.io/wiki/Homework

1.5 Target Audience

This document is intended for buyers, manufacturers, Professor Mark Faust, Professor Andrew Greenberg, Teaching Assistants and project team to agree on requirements for design and production of 'The Smart Cane'.

2 Requirements

This section the requirements for the design process under different criterion and methodology.

2.1 General Requirements

The general requirements includes engineering design, manufacture, test and delivery of final system to the buyer.

Externally imposed Constraints:

- PCB must have 2 layers.
- PCB must have no linear dimension < 2 cm or > 30 cm
- PCB must have more than 25% surface mount components

Operational:

- he cane must have an accurate range of detection of an obstruction within +- 3 cm of indicated distance which is 30cm.
- The power source of the device must last a minimum of six hours before needing to be replaced meaning the number of batteries needed will depend on power consumption during testing. (Ideally a long time due to it being a walking device)
- The device may be water resistant due to the nature of the environment (walking outside)
- All components must be properly secured to the cane to avoid breaking in the event of the cane hitting an object.
- The sensors should be able to record and compute at least 10 sample per second, i.e. The sampling frequency of the range detecting sensor must be at least 10 Hz.
- Cane may not exceed more than 5 pounds in weight.

Environmental:

- The device may be water resistant due to the nature of the environment (walking outside)
- All components must be properly secured to the cane to avoid breaking in the event of the cane hitting an object.

Technical Support:

- The vendor shall support technical support for upto 1 year within the purchase date of the product.
- The vendor shall support device warranty upto 1 year.
- The latest hardware/software should supported in the manufactured hardware/product.

Budget:

- The cost of the device must be no more $100 than in order to be affordable.

Legal:

- The device may comply with US Patent and Copyright Law.
- The device may pass FDA approval as medical device.

2.2 Specific Feature and Function

- A notification should be given to the user via a vibrating motor when an obstruction is detected.
- No extra steps should be needed after turning the Walking Cane on.
- Each device should be fully functional without the need of extra hardware.
- The device should have an ON-OFF switch
- The device must be self-operated, e.g. no additional computer or any kind of computerized system will be required for its operation.

2.3 Required Documents

- One set of user's operation and maintenance manual
- The schematic diagrams.
- The datasheet of main components
- List of recommended spare parts if any.
- Test documents

3 Appendix

The addition, change from previous version. Changes in the PDS is recorded below in a table.