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## PROGRESS REPORT

for **NOW I SEE**  
**A Travel Aid for the Visually Impaired**

by **VisuAid**  
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### INTRODUCTION

**Now I See** is a travel aid designed for the visually impaired to assist in navigation by detecting obstacles in the user's surroundings and alerting them through a vibratory user interface worn on the user's forehead. This document reports the current status in development of our proof-of-concept device (POC) and provides planned remediation to meet the schedule deadline for the demonstration of the POC device.

### SCHEDULE

#### Hardware

The hardware device was scheduled to have been finished by this point. This schedule has been slightly compromised due to some considerable issues that were encountered during the development. Currently, all hardware implementation have been completed, and all assembly except the user interface module have been completed. This leaves us about a week behind schedule for the hardware implementation.

#### Software

The software components were also scheduled to have been finished by this point. To accommodate the delays in hardware, the implementation of software components had been significantly postponed. Currently, software design at all level has been completed, and implementation of the user interface and the software framework has been achieved. This leaves the actual implementation of image processing remaining to be implemented, putting us about two weeks behind schedule.

### FINANCIAL

We are currently well under our initial budget of \$500 and on par with the granted budget, \$350. We received this funding via the ESSEF, and after the first round of purchase, we concluded that this amount was enough for our project, and therefore no further funding was sought. We do not expect any further costs to incur from this point on.

A need to purchase significantly more electronic components arose due to the change in hardware design, which would have set us about \$50 over budget. In the meantime, due to a compatibility issue with the Kinect sensor, the Raspberry PI board, which had been already

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purchased, had to be excluded from our design. With a decision to write this cost off out of our own pocket, we were able to re-allocate the remainder in place for the extra costs that incurred due to the enlarged hardware bill.

## PROGRESS

### Core Electronic Hardware (CEHW)

All CEHW have been purchased and incorporated into our POC device. The Kinect sensor and its power connector have been modified to be placed on the device mount and to run on a battery, and all of its functions have been confirmed working under the software environment we chose. Arduino UNO board has been confirmed working on battery and in interfacing with the central processor using our UI protocol.

We faced some issues with the central processor. The Raspberry PI board we purchased had issues with the Kinect sensor due to its CPU's architecture, so we had to replace it with a laptop and write off its cost. There were some difficulties in finding a suitable laptop, but one has been found and prepared for our POC device.

### Device Mount

All aspects of the device mount have been implemented. The depth camera has been modified and mounted on a suitable bicycle helmet chosen, and all of user interface control circuit (UICC), power supply unit (PSU), and the microcontroller have been implemented, encased in a plastic enclosure, and secured on the mount as well.

### User Interface

The user interface has been designed and is currently being implemented. The hardware components, including the UICC, have been completed and tested based on our design specification. UI control software and its protocol are close to completion with minor adjustments left. The motors have been prepared, and they will be fastened onto the headband to complete the UI module.

During the implementation of UICC, we encountered manual circuitry work (circuit planning, soldering etc.) at a much higher volume than we initially expected. Construction of this circuit has been completed but it set us back schedule for a few days.

### Power Supply Unit (PSU)

Construction of PSU has been completed and its functionality has been confirmed. A rechargeable lead acid battery has been purchased and the PSU circuitry has been constructed as detailed in the design specification. A full testing has not yet been done, but we confirmed the battery life time of at least 15 minutes with full load, and 1 hour with camera only.

### Operating System and SW Environment

A laptop with all required software environment has been prepared. Ubuntu OS and Robot Operation System (ROS) have been installed as outlined in the design specification as well as all the libraries and ROS packages to handle the Kinect and Arduino.

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A laptop was initially prepared for our POC device, but it had broken down for an unknown reason. This forced us to look for another laptop to replace it, but it was unfruitful, and the broken laptop was recovered before we could locate a replacement. As a result, this diverged our efforts, delaying the software implementation.

#### Image Processing Software

All high level design has been completed for the image processing portion for our POC. Mainly owing to setbacks in other aspects of our project, implementation in this portion of our project has been delayed. However, this is the last item on our list and we are currently putting all of our efforts into finishing this portion.

#### **REMEDIATION**

We are currently about two weeks behind our original schedule. Fortunately, our demo has been scheduled on a date that is 3 weeks after our planned finish date, and we have resolved all of the obstacles we have faced so far. This allows us to focus our efforts to work towards completion without outstanding issues. The current plan is to push through for the next two weeks to catch up with postponed subjects. This will give us an extra week to deal with any unforeseen problems that may arise.

#### **CONCLUSION**

We are working hard towards the completion and there still is a considerable amount of work left. In consideration of our initial schedule proposed in the project proposal document, we are about two weeks behind. However, now with our demo schedule known to us, we believe we will meet our goals.

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