Problem Statement and Goals: SE 4G06, TRON 4TB6

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Revision History

Date	Version	Notes
9/26/2022	1.0	Added Section 1
9/26/2022	1.1	Added Sections 2,3
4/4/2023	1.2	Updated All Sections for Feedback and Consistency

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Symbols, Abbreviations and Acronyms

symbol	description
Age groups	(15-30, 31-50, 51-75, 75+)

1 Problem Statement

1.1 Problem

In this day and age, communication is a very significant part of our day to day lives. ~~So, people who have difficulty in recognizing sounds within their surroundings are not able to live their lives to their fullest. For instance, hard of hearing (HoH) individuals are not able to always respond promptly whenever their loved ones are calling their name or when a doorbell rings out for a package delivery. As a result, this can be rather unfortunate for the HoH individual as inconveniencing loved ones for another appeal or missing a delivery are both not ideal scenarios to be in. This can especially be the case for life-and-death situations where the importance of sound awareness is highlighted. With all this in mind, a device which will monitor your surroundings for you would encourage confidence within the users to complete daily tasks as well as notably improve their quality of life.~~ So, for people who have difficulty hearing sounds in their environment, they are unable to respond appropriately when said sounds require their attention. For example, important alerts/sounds such as your name being called or a doorbell ring could all be missed if the person of interest is unable to notice these sounds when they occur. This can especially be the case for life-and-death situations (such as a fire alarm) where the importance of sound awareness is greatly highlighted. With that being said, such instances could be because the person had headphones plugged in (which diminish noise from their surroundings) or they are deaf/hard of hearing where they may struggle to recognize sounds in their environment. With all this in mind, a wearable device that improves its users' auditory awareness by monitoring their environments for specific sounds would definitely help alleviate the issues stated before. Furthermore, after said specific sounds are detected, the device would then provide the users with an appropriate feedback that helps let them know that their attention is required.

1.2 Inputs and Outputs

1.2.1 Inputs

- Environment Sounds
- App Settings/Configurations

1.2.2 Outputs

- Haptic Feedback (Vibrations)

1.3 Stakeholders

- Individuals who are hard of hearing, deaf or that are in an environment where hearing can be obstructed
- Dr. Martin Von Mohrenschildt (Project Supervisor)
- STRONE Developers (Creators of the project)

1.4 Environment

1.4.1 Hardware

- Device can be configured through the use of a personal computer, laptop or phone.

1.4.2 Software

- The application will be supported on both Mac and Windows operating systems.
- The application will be supported on IOS and Andrioid mobile devices.

2 Goals

2.1 ~~Finished device can withstand above moderate environmental conditions such as moisture and heat~~ Device can withstand normal environmental conditions

- ~~The device will be a wearable technology which makes it a necessity that the user does not need to worry about damage in average daily conditions.~~ The device should not be damaged from daily conditions such as rain, heat, moisture, etc.

2.2 ~~Device can collect and process data in real time while filtering out noise~~ The device will be able to identify key sounds in the environment

- ~~A core functional aspect of the device is to process a continuous stream of data and react once a key data point is found.~~ Fire Alarm
- ~~This permits our device to provide the necessary sensory outputs to the user.~~ Doorbell Ring
- Names

2.3 ~~Finished product can communicate with an external device~~ User can customize their experience

- ~~Having the ability to directly communicate with external devices will allow the device to be uniquely programmable by different users.~~ Product will communicate with external devices so that users can customize their keywords

2.4 ~~Data collected will be processed and then deleted in real time~~ Real-Time Data Processing

- ~~This allows the product to be used in multiple environments without the risk of privacy concerns for the user.~~ No delays in results and data storage is not needed.

2.5 Finished product ~~will retain all functionalities in a form factor that~~ is wearable

- Device will need to be appropriately small such that it can be worn comfortably and non-intrusively by the user.

2.6 Finished product will be rechargeable and reusable

- This will expand the usability of the device and help market growth.
- This will also contribute to reducing e-waste since the finished product will have a longer lifespan.

2.7 The finished product will have ~~sufficient distinct sensory outputs such that the user can distinguish between them~~ numerous distinct feedbacks

- This allows the device to have multiple programmable key data points that the user can choose to be notified by.
- This will also act to expand the usability ~~of the product~~ and programmability of the device by the user.

3 Stretch Goals

3.1 Finished product will have ~~a~~ water resistance ~~rating of IPX5~~

- This will increase usability of the product.
- This will also avoid the possibility that the device will become malfunctional under ~~certain~~ wet weather conditions.

3.2 Finished product can actively filter out noise in particularly loud environments

- This will expand the environments where the product can function as intended. This will also lead to more reliable outputs from the device in situations where hearing is more obstructed by noises in the surroundings. These environments can be places like a construction site, at a concert, or at the gym.

3.3 Finished product will support ~~over the air~~ firmware updates

- As the product develops and is used in real world applications we predict that the noise detection algorithm we use will keep improving. Having the option to upgrade prior devices with better signal processing through software will aid in extending the usability of older products.