Hear It

Group – 6

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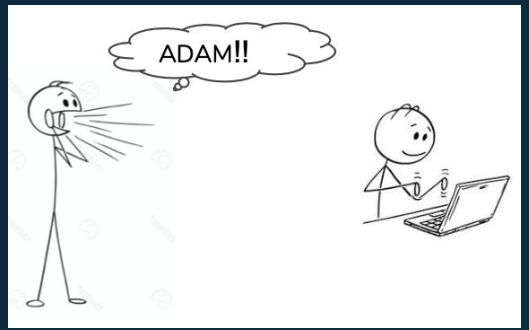
1 Why Hear It?

Motivation

- Hearing Impaired people in many situations fails to get involved socially.
- They need to be physically tapped in order to get their attention which might make them feel alienated from the group.



2 Proposed Approach

SEED Idea

Augmenting awareness for the hearing impaired by inducing naturality with the use of keyword recognition through a mobile application.

- Our idea tries to incorporate social communication aspect for deaf people in the application which many of the current existing models fail to address.

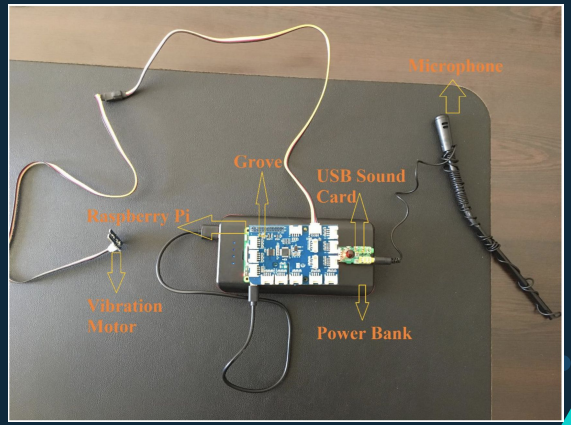
- The purpose of the project is to make deaf people feel more secure and certain of the surroundings and also help them fit better in a social environment.

3 Related Work

Recent Technology

Paper: Real-Time Detection of Important Sounds with a Wearable Vibration Based Device for Hearing-Impaired People

- External hardware that detects the surrounding sounds but not voices.
- The device is heavy and needs to be attached to the body all the time
- Notifies the person through vibration.



Traditional Approach

- Needs to be alerted by physically tapping the hearing impaired person
- The caller needs to go to the Deaf person to notify them.
- Although there are systems that detects surrounding sounds to generate notifications, we cannot compare our system to these since the fundamental idea behind them are different.

Our Approach

- Almost everyone carries a Mobile Phone and a Smartwatch.
- Use the existing audio functionalities of these devices to monitor the surrounding voices.
- Specifically if someone calls the user with their name, it can be identified through speech recognizer available on the phones
- Users can be notified through vibration functionality of these devices.

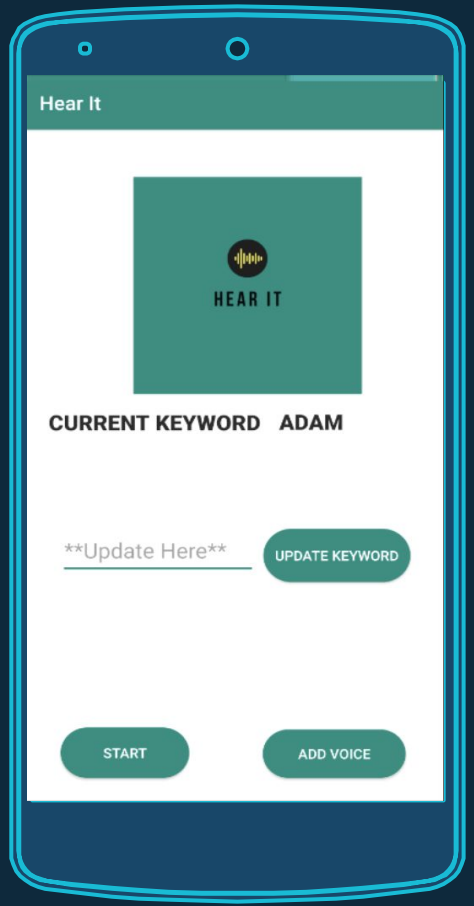
4 System Design

ROD

- Our Project follows the Research-Oriented-Design approach since the focus is on the application design.

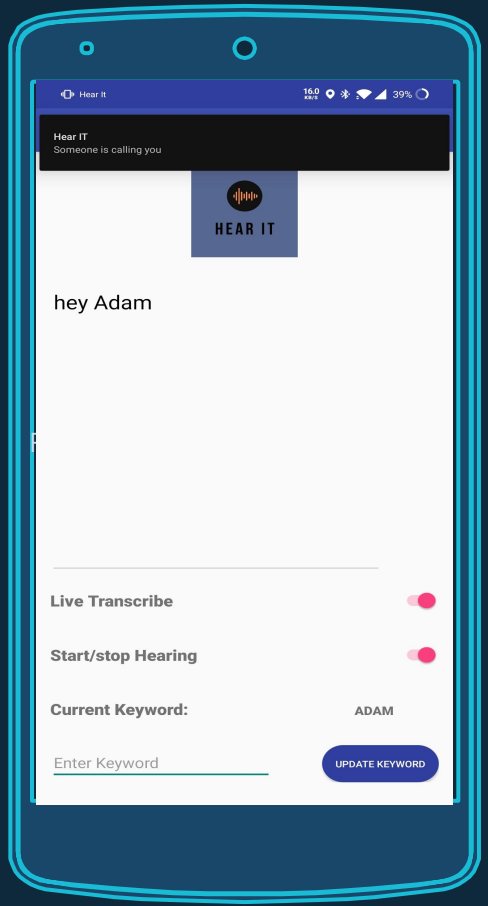
Initial Prototype

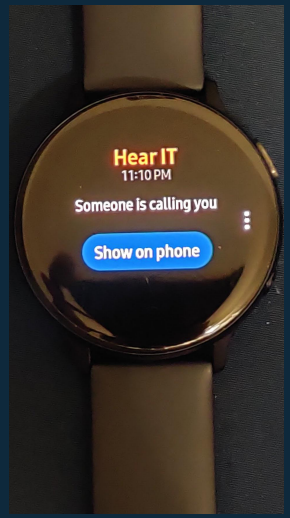
Initially we created a simple Android application that had a button to activate listening and with a single customizable keyword to trigger a notification.



The Final Application

Then, we removed the requirement of the button and incorporated a continuous listening feature that has an option of customizing keywords into the application to trigger notification. We also added live transcribe feature to our application.





Functionalities

Keyword Recognition

With the continuous monitoring of the surrounding sound the hearing impaired person will be notified when someone tries to contact them.

Notification and Vibration

With notification and vibration on both the devices (phone and smartwatch) it will be hard to miss any name call.

Easy Communication

With the functionality of live transcribe, the user can have conversation in more natural way with individual or in group.

5 Study Methodology

Variables

Independent Variable

- Mode of Communication. (Physical Tap or Calling out name)
- Distance (between user and caller)
- Environment (silent/noisy)

Dependent Variable

- Response Time
- Accuracy

Study

No. of Participants: 2 participant in each group for a total of 16 groups.

Data Collection Methodology (Quick & Dirty):

- Observing the user in their natural environment.
- Collecting the response through questionnaire.

Process Followed

Two approaches that were followed-

1. Traditional Approach (Physical Touch)
2. Using Hear It Application

Note:
User-1 : Hearing Impaired Person
User-2 : Caller

Traditional Approach

1. User-1 will put on a noise-canceling headphones and will continue his/her tasks as usual.
2. Wait for 10-15 minutes before starting the actual procedure.
3. User-2 has to get the attention of the user-1 from the specified distances.
4. Whenever user-2 has to call user-1 we note the following parameters
    a. The distance of user-2 from user-1.
    b. Response time.

When using the application

1. User-1 will put on noise-canceling headphones and will continue his/her tasks as usual.
2. Wait for 10-15 minutes before starting the actual procedure.
3. User-1 has to Install the application on the mobile phone and provide the app voice permissions.
4. Start the Speech Recognition Service by toggling the listening button.
5. User-2 has to get the attention of the user-1 from the specified distances.
6. Whenever user-2 has to call user-1 we note the following parameters
    a. The distance of user-2 from user-1.
    b. Response Time.
    c. No. of time the name has to be repeated.
    d. Was the environment silent or noisy?

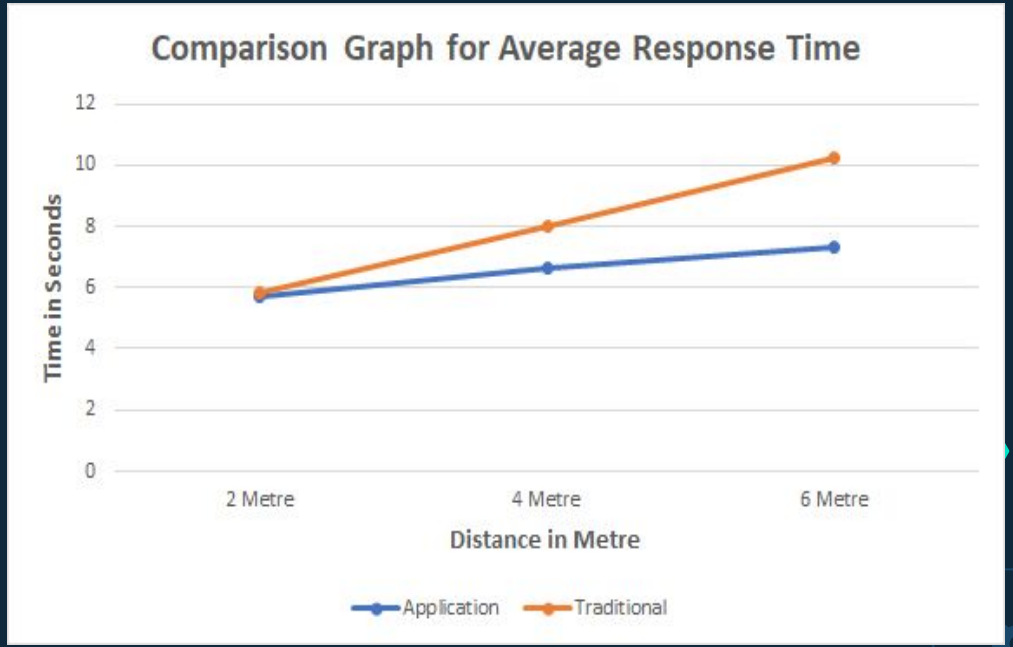
Metrics Collected

1. Response Time
2. Keyword repetition
3. Ease of Use
4. Number of false positive responses

6 Data Analysis and Result

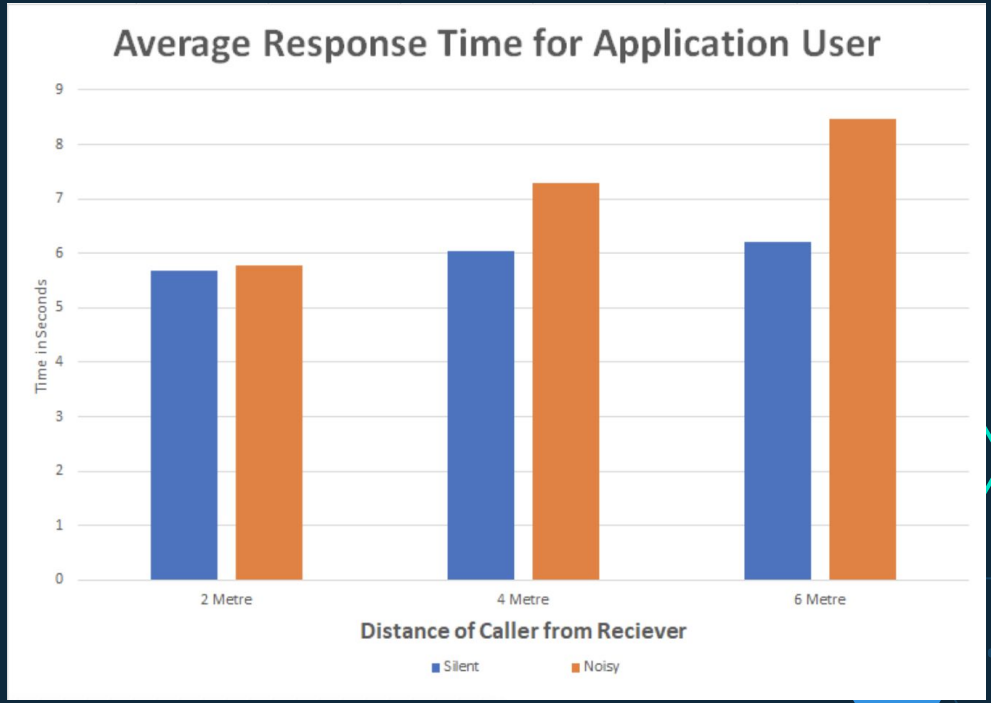
Analysis

It can be observed that average response time when using the application is significantly less than the average response time through traditional approach and the difference increases with the distance.



Analysis

The speech recognizer have some problem when the surrounding environment is noisy as compared to silent environment and as the distance increases, more difference is seen between the two conditions.



7 Discussion and Conclusion

Findings

- When the distance between the 2 participants is less than 2 meters, the response time is more or less similar and when the distance is more than that, we can see a **significant decrease in response time** using our system over traditional method.
- The application is able to detect the name calls with 88.8% accuracy within a conversation range.
- From the survey we found that 81% of the participants find the application is reliable.

Thank You!

Any questions?

Relation to HCI concept

- Assistive Technologies
- Naturalness

Limitations

- For difficult names and unusual accents, the application's accuracy reduces.
- Our app only detects the keywords within the range upto 8 meters in silent environment and upto 7 meters in noisy environment. Beyond that the accuracy reduces.