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Research paper

Retina the real time interactive solution for visually impaired

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Abstract

The main objective of the project is to provide an application that acts as an all-in-one tool for disabled people. Most activities are performed digitally, a prime example being online shopping platforms which have replaced the traditional means. In this era of modern technology, people are entirely reliant on electronic gadgets and make use of several features to run their daily lives. To enhance the usability of such features for disabled people, this application has been developed to take care of their basic needs. The dependence of the general public on mobile applications is justified but that is not the case for disabled people. This application has been designed specifically to cater to such people with disabilities. This proposal requires our "Retina App" and breath analyzer module only. The differentiating feature of this appli-cation is the ability to perform various functions such as booking an Uber, reserving tables at restaurants, calling ambulances and fire trucks in addition to the detection of diseases. It can detect the level of alcohol in a person's breath and when it surpasses a certain level, it displays a notification which can help the user to book a cab directly to take him/her back to his/her residence..

Keywords: *API; Breath Analyzer ; GPS; Mobile Application; Online Services; Phone Calls; Uber App*

1. Introduction

In this day and age, Smartphone are a common sight. Almost everyone owns a Smartphone and people use them for a variety of purposes. There are millions of applications available on all the major Smartphone ecosystems such as Android, iOS and Windows Phone. Applications are available for as many use cases imaginable. However, there is a distinct lack of applications that serve the needs of disabled people, especially Blind and Deaf people. While normal people can use any application without any hindrance, there are very few applications that take into account the disabilities of disabled people. Due to the dearth of applications that are geared towards disabled people, such people do not use Smartphone the same way normal folks do. However, these people have the same basic needs but no applications to take care of their needs. This is where RETINA comes in. The main objective of this application is to satisfy basic requirements such as transportation, food, calling emergency services and detection of diseases. Another use case scenario for our application is when people who are drunk can book a cab to take themselves back to their homes safely.

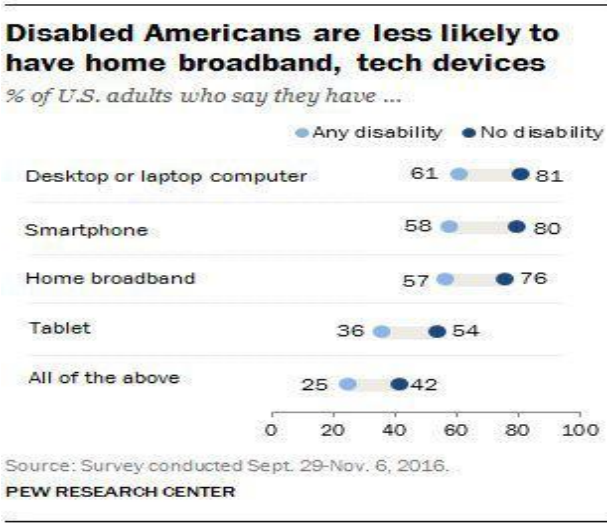


Fig. 1: Facilities Provided by Retina for Blind People.

The above survey was carried out by Pew Research Center in the US between September and November 2016.The survey was conducted on people with no disability and people with any form of disability to check the usage of electronic devices among them. As the data shows, it was found that the percentage of people with some disability that used electronic devices was considerably lower than that of people with no disabilities. Focusing on smart phones and tablets, we find that there are drops of 22% and 18% in the usage of the respective devices when it comes to disabled people. We believe that this is due to the lack of dedicated applications for disabled people and we hope to fill this void in the market with RETINA.

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2. Literature survey

A number of studies have been conducted in the field of assistive technology for elderly and disabled. However, the overall user needs are rarely considered and understood. Assistive technology-based solutions are to help those vulnerable people to live better and safer are researched in this study.

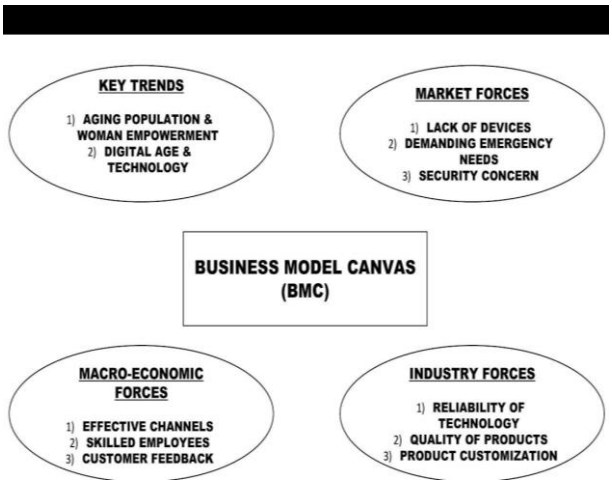


Fig. 2: Environmental Map (EM).

Globally, more than 285 million people are visually impaired; for them, tasks that are deemed trivial by those with normal sight—such as picking up a dropped object—are a major undertaking. In recent years, breakthroughs in visual sensing technology have stimulated efforts to help persons with visual impairment (PVIs) become more independent. In this study, they have taken the system through multiple evaluations and refinements based on actual PVI use, which provided insights into what constitutes an effective communication interface. Participants in our experiments commented favorably on the system, saying that, relative to barcode scanning, it felt more like "real shopping."



Fig. 3: How Third Eye Works. In This Illustrative Scenario, Cameras in Smart Glasses.

Research has been conducted on the usage of Uber by disabled people to take care of their transportation needs. It has also been found that using ride sharing applications can help to avoid drunk driving and potentially prevent accidents and save lives.

Breath analysis serves a lot of applications and research has been done on how to use sensors to perform breath analysis. Breath analysis systems contain arrays of correlated chemical sensors. For such systems, sensor selection is needed. These sensors are applied to the breath analysis system and some useful discoveries about the sensors in the system are made accordingly.

In addition to the above studies, tests have been done on speech to text conversion. A real time speech to text conversion system converts the spoken words into text form exactly in the similar way that the user pronounces. We created a real time speech recognition system that was tested in real time noiseous environment. They used the design of a bidirectional non-stationary Kalman filter to enhance the ability of this Real time speech recognition system.

3. Proposed system

The system makes use of the RETINA application and a breath analyser module attached to the back of a smartphone.The application provides the user with various functionalities. These features include listing out nearby restaurants by voice and the ability to call these restaurants directly, calling an Uber directly through voice command or by using the breath analyser module, calling emergency services such as nearby police stations and hospitals directly through voice.

4. Implementation

4.1. Delivery services

When blind people are hungry, they usually have to depend on other people to get their food. But using RETINA, they can get food from nearby restaurants using just their voices. Once they enable the TALKBACK feature on Android OS, they can easily open the RETINA application, then, they can tap the display anywhere which would open a prompt which tells them to give a voice command.

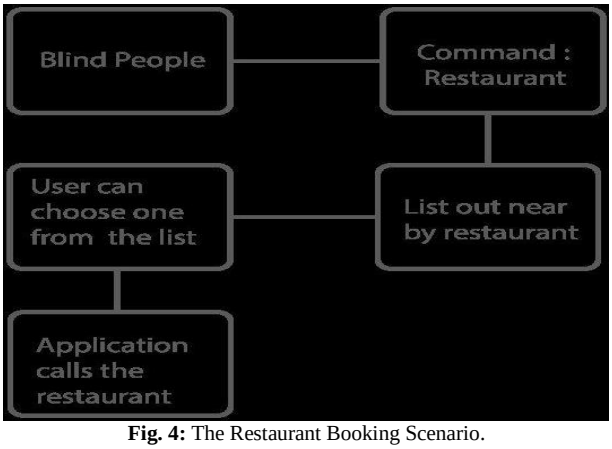


Fig. 4: The Restaurant Booking Scenario.

Once they say "restaurant", the nearest restaurants are listed to the user by voice, one by one. Then the user can say a number, say one and a call will be placed to the corresponding restaurant and the user can order food directly.

4.2. Transportation and cab booking

To take care of their transportation needs, Uber, the ride hailing service is used. After opening the RETINA application using the TALKBACK feature, the user has to tap the screen only once. Now a prompt indicates that the user can give a voice command and all the user has to say is "Call Uber".

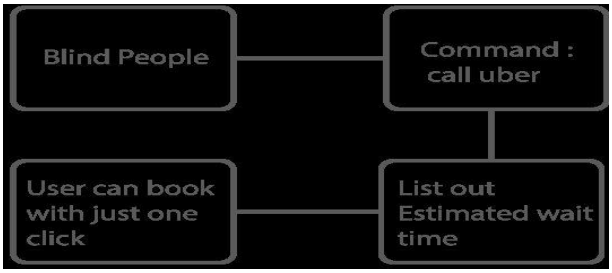


Fig. 5: The Uber Booking Scenario.

The RETINA app automatically calls the Uber API and with just one more tap of the display confirms the cab and books an Uber to the user's already saved drop location(entered separately with details such as longitude and longitude) from the user's current location, using the Smartphone's GPS module. All the necessary

information is displayed such as wait time for Uber, Estimated Time of Arrival(ETA),types of Uber services available(such as UberX, UberGO and so on) and payment options.

4.3. Cab on single tap for drunk people

The use case scenario where the ability to call an Uber would be very handy. The user could go to a party or any social gathering and consume alcohol. In some situations, the user may end up consuming an excessive amount of alcohol and not in a position to drive. Drunk driving is illegal and must be avoided at all cost. In such situations. The RETINA app can easily provide a mode of transportation to take the user home.

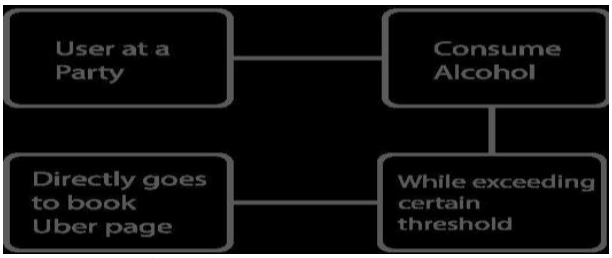


Fig. 6: Uber for Drunk People when They Cross the Threshold.

A breath analyser module is attached to the back of a Smartphone, consisting of a gas sensor. The user breathes into the module and if the sensor detects that the alcohol content in the user's breath exceeds the threshold value, it automatically calls an Uber to the user's current location using the Uber API and GPS. The process works in the same way as the previous use case described above.

4.4. Emergency services

The app also allows users to use emergency services with their voices. Let us consider blind people in this scenario. Now a blind person may find himself/herself in a situation where he/she needs assistance from the police. The user just has to open the app, tap the screen and say "Call Police" and a call will be placed to the nearest police station.

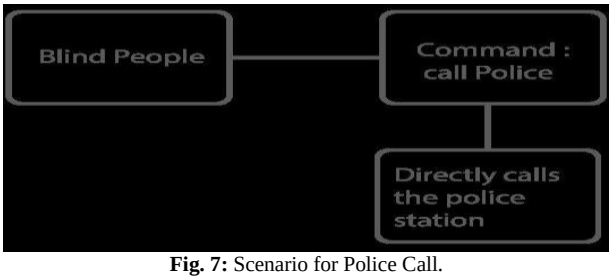


Fig. 7: Scenario for Police Call.

Sometimes an accident may happen or the user may be in a situation where he/she needs immediate assistance in a hospital. The user can use the RETINA app, tap the display and say "Call Ambulance" and a call will be placed to the nearest hospital where the user can ask for an ambulance.

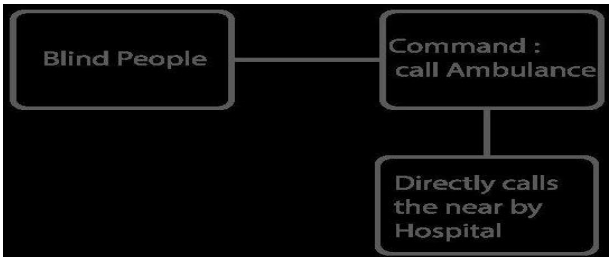


Fig. 8: The Emergency Situations.

5. Conclusion

In this work we developed a simple and effective model for enabling the blind people to make use of the mobile applications in an effortless manner to fulfill their basic needs like food, transportation, emergency situations and other online services. By implementing "Retina" the distinct lack of mobile applications for blind is fulfilled.

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