An Audio Based Application to Aid Visually Impaired Users

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Abstract*: In the 21st century communication through smart phones has become a major necessity for daily life but there are a variety of people who are still not able to enjoy the benefits of this helpful technology. These people could include anyone with different physical disabilities like blindness, deafness, paralysis of hands or legs etc. "An Audio Based Application for Visually Impaired Users" is an application that basically provides communication facility for blind users. This application is a completely audio based application. In this application a blind user is able to interact with family and friends using the Google text-to-speech APIs to provide speech-to-text conversion and text-to-speech for sending and receiving messages respectively. A blind user can also call his family and friends using audio commands. A danger alert facility is also provided in case the blind user senses any danger and wants any help. This is done by sending the GPS Location and the images of the surroundings for additional accuracy to family and friends. An audio notification is sent to the blind user after recognizing the person who is at a door by capturing the image of the person at the door with the help of the door camera and comparing with the existing images of the database using Eigen Face algorithm. Navigation mechanism is also provided which guides the route to the blind user to reach the destination using latitude, longitude and cardinal direction. A nearby event notification facility notifies the blind user about the nearby priority (music, sports, hotels, etc) events taking place in that area when the blind user passes that area.*

Key words*: Google Text-to-speech API, Eigen Face algorithm, Audio based application.*

I.   INTRODUCTION

With the embracing of android mobile phones by the people of all genders, ages and countries, there is a constant need for interactions between friends and family. However, it is usually impossible for the visually impaired people to communicate with friends and family through mobile phones. A visually impaired person or a blind person with complete or partial blindness finds it immensely difficult to use their smart phones. As these smart phones are ruling the world right now, the application provides adequate means for a blind person to use it. The application is completely audio based. This audio based application enables a visually impaired person to give voice commands for various purposes.

The application acquires messages to gauge the relevant aspects of an event and to create alerts. It captures the parameters required for querying and reasoning an event-of-interest, such as what, where, who, when etc. The navigation problem for the blind is carried out by combining the advantages of our real-time localization technologies so that the user is being made aware of the world, a necessity for independent travel. It is challenging for visually impaired people to interact and access unfamiliar environments, hence the application acts as a guidance to help them during these circumstances.

II.   LITERATURE SURVEY
A.   PULSE: An Auditory Display to Provide a Social Vibe.

David McGookin, Stephen Brewster Introduce PULSE: An Auditory Display to Provide a Social Vibe. An increasing amount of social media is being tagged with the location of its creation. However, little investigation of how these tagged media can be used has been undertaken. This paper seeks to exploit their auditory presentation in a system called PULSE. PULSE attempts to provide an understanding of the people, places and activities that are happening in the user's current locale. This paper outlines the design of PULSE and how both message and meta-data can be implicitly and explicitly incorporated into an auditory display. This paper outlines the plans for future evaluations to further consider how social geo-data can be aurally presented to users.

B. *Being Aware of the World: Toward Using Social Media to Support the Blind With Navigation.*

Samleo L. Joseph, Jizhong Xiao, Senior Member, IEEE, Xiaochen Zhang, Bhupesh Chawda, Kanika Narang, Nitendra Rajput, Senior Member, IEEE, Sameep Mehta, and L. Venkata Subramaniam propose Being Aware of the World: Toward Using Social Media to Support the Blind with Navigation. This paper lays the ground work for assistive navigation using wearable sensors and social sensors to foster situational awareness for the blind. Our system acquires social media messages to gauge the relevant aspects of an event and to create alerts. We propose social semantics that captures the parameters required for querying and reasoning an event of- interest, such as what, where, who, when, severity, and action from the Internet of things, using an event summarization algorithm. Our approach integrates wearable sensors in the physical world to estimate user location based on metric and landmark localization. Streaming data from the cyber world are employed to provide awareness by summarizing the events around the user based on the situation awareness factor. It is illustrated using disaster and socialization event scenarios. Discovered local events are fed back using sound localization so that the user can actively participate in a social event or get early warning of any hazardous events. A feasibility evaluation of our proposed algorithm included comparing the output of the algorithm to ground truth, a survey with sighted participants about the algorithm output, and a sound localization user interface study with blind-folded sighted participants. Thus, our framework supports the navigation problem for the blind by combining the advantages of our real-time localization technologies so that the user is being made aware of the world, a necessity for independent travel.

III.   CURRENT PRACTICES

Existing technologies are not accessible to the blind users, unless they are built to accommodate perceptions of the blind. Braille mobile displays are provided for the blind users to use the smart phones. This Braille display is replaced with the mobile displays and by touching these Braille displays a blind person can effectively use the smart phones.

Another existing technology is to use a screen reader. A screen reader reads all the text that is present on the mobile screens. The disadvantages are that the lifetime of the Braille display is small since it gets easily broken when it falls down. The screen reader only reads out what is on the screen and there are no features through which the blind

person can respond to the information on the screen. Another is that the screen reader as well as the Braille display cannot be used together. Do not provide visually impaired people with a global perception of the surrounding environment and nearby events and an intelligent way-finding capability.

IV.   SYSTEM DESIGN

An audio based Application that helps the blind people to be in touch with the real world and friends. Text-to-Speech and Speech-to-Text helps the blind person to interact with his own people and the world. Face recognition (Eigen Face) facility that helps the blind person in recognising who is at their door using the door camera and notify them using the smart phone. Sending and receiving message that helps the blind people to send and receive message through their smart phone. Around event information that notify the blind person about the nearby events through the smart phone. Asking for help facility which sends the surrounding images, GPS location and map to the registered family and friends when the blind user is in need of any help.
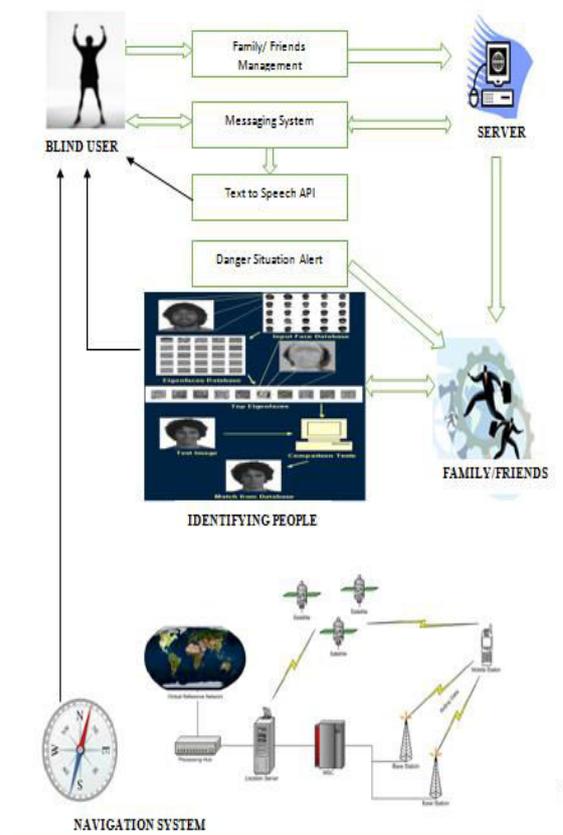

Fig.1: System Architecture

A. Registration: User can download the Apps and register from his android based smart phone. While registration user provides his name, mobile number, blood group, priority (events) etc. User can later log in and the app remains always logged in. On pressing the power button of the phone, there is an audio notification which says welcome so that the user knows that the app is on.

B. Message system: User can exchange messages among themselves. For blind user, text message is converted into speech using Google Text to Speech API. If the blind user wants to send message or reply then he/she can tell the message and using Google API, speech is converted into text and transferred to the recipient.

C. Ask for help: If the user is in danger, then he/she can say "Help" and the app can recognize the speech and the app starts clicking the picture of the surrounding and updates to the friends or family with GPS location.

D. Identifying People: Camera at the door clicks the picture when anyone comes, sends the image to the server. Server recognizes the face using Eigen face recognition and sends an audio alert to the blind people's phone saying the known person name or as unknown person.

E. Nearby Events: The nearby events are stored into the server. When there is an event which is favourable to the blind user, the blind user receives an audio alert and tells the distance between the current location and the event.

F. Navigation: On saying the keyword destination followed by the actual destination, the app guides the route to the destination based on cardinal direction, latitude and longitude.

V. CONCLUSION

The application enables the blind user to successfully carry out the social interaction. The messaging and calling facility provided to the blind user is user friendly and makes communications between family and friends very simple. The asking for help supports the blind user during any type of crisis and provides family and friends assistance to the blind user instantly. The navigation facility helps the blind user to travel easily in unknown places. The face recognition facility provides additional security to the blind user and makes the blind user more self-dependent. The nearby events information helps the blind user to pursue his interests by keeping him informed about the surrounding events.

VI. FUTURE WORK

The application can be enhanced in many different ways in order to help the blind users. An Obstacle detection stick can be designed to help the blind person while travelling. The stick consists of ultrasonic sensors which detect the obstacles in the path of the blind person and notify the blind person about the location of these obstacles with the help of audio commands. It also provides measures to tackle the obstacles by instructing the blind person through audio in order to move away from the obstacles.

It is impossible for the blind person to read the menus in hotels, magazines, books, newspaper etc. The application can be enhanced to include the means for the blind person to read these things. The camera is placed on the text and with the help of the camera all the content which is written in the document is been converted to audio by the application and is said out aloud

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