Review on Smart Navigation System for Visually Impaired

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Abstract— Vision is an important aspect in our life. But there are some people who do not have ability of visualizing these things. They face many problems while they are walking inside or outside the home. The worse problem occurs when they move to an unknown place. Visually impaired people gets many difficulties when moving in unknown public places. The paper represents the architecture and implementation of a system that is used by the visually impaired people for navigation as well as to avoid the obstacle. some systems uses Global Position System (GPS) for outdoor, some are uses RFID for indoor navigation and obstacle avoidance for the purpose of guiding visually impaired.

Key words: GPS navigation, RFID, Obstacle detection, visually impaired person

I. INTRODUCTION

Blindness or visual impairment is a condition that affects many people around the world. Approximately 285 million people worldwide have some level of visual impairment. Most blind people need a smart navigation system to move outside the home. Recent survey source India is now become the world's large number of blind people. There are 37 million blind people across the globe, from them 15 million people are from India.[1-4]

The use of the blind navigation system is very less and not efficiently used by Indian people. The blind person should depend on any other guide like blind cane, people information, trained dogs, etc. there are four types of Visual function normal vision, moderate, severe visual impairment, and complete blindness. Many virtually impaired people (VIP) prefer to use walking sticks, some of people uses guide dogs to move from one place to other. A guide dog is used by giving training so that it avoid accident from obstacles [3]. Other option for VIP is walking stick. By waving walking stick user can get obstacle then he/she can go by avoiding that obstacle. There are many complication produced due to these device. Blind person can face lots of problem when they move on unfamiliar place, they get confused about direction or where to move [7].

II. LITERATURE REVIEW

Karen Duarte et al. [2] proposes an innovative indoor navigation and information system for public places, namely shopping malls, based on existing technologies . this will be a comfortable and helpful aid on blind persons in shopping malls, this proposal system based on users smartphone and wireless sensors.the advantages of this system is (1) it Performs navigation inside the building (2) Constant user positioning where the sensors are placed (3) it is user guidance through calculated routes.(4) it is Based on existing technologies, such as smartphone and Bluetooth emitters. The disadvantages are (1) Does not provide assistance on getting to the building. (2) The environment must be equipped with sensors.(3) this system is not useful for outdoor place.

Nandish M S et al. [3] designed the system to provide information using audio instruction. This system make the blind people confidant and independent. Blind guide is a software application which can be entered into the app after a successful login by the user using speech recognition security. A sound recognition security process is used for the visually impaired person. Voice recognition technology identify and understand the voice signals of users. the users voice are extracted and stored at the time of registration. Then the stored information is compared with the users voice sample. Blind guide gives the guidance and lead them to move from one place to another safely using android base smart phone. TTS (Text to Speech) is used in navigation system to provide navigation through voice for visually impaired people. Also it uses Google map Application programmers interface to apply map information.

Byeong-Seok Shin et al. [4] implemented a wearable system for visually impaired users which allows them to detect and avoid barriers. It relies on ultrasound sensors which can acquire range data from objects in the environment by estimating the time-of-flight of the ultrasound signal. this system detect obstacles and determine which directions should be avoided using a hemispherical sensor array. However, the ultrasound sensors are only used to detect obstacles are and determine unimpeded directions by analyzing patterns of the range values from consecutive frames. Feedback is given to users in the form of voice commands and vibration patterns. this system is based on an ARM9-based embedded processing system, low power ultrasonic sensors in series, an orientation of tracker and a set of vibrating motors with controller.

Scooter Willis et al. [5] describe a navigation and location determination system for the blind using an RFID tagged in grid. Each RFID tagged is programmed after installation with spatial coordinates and information describing the nearby places. This allows for a self-informative, localized information system with none dependency on a centralized database or wireless infrastructure for communications.

J.Ramprabu et al. [6] proposed system smart cane which is used for the smart navigation for visually impaired people in indoor and outdoor environment respectively. The smart cane having camera which is used identify the obstacles. The captured image is send to the pc which is used to analysis the obstacles. The controller is used to find the type of obstacles and their distance through voice. The special classifier is used for the analysis of object in different illumination conditions. In this paper they have used codec to generate the voice signal for purpose of navigation.

Harsha Gawari et al. [7] represents the architecture and implementation of a system which will help to navigate the visually impaired people. This system uses GPS and

voice recognition along with obstacle avoidance for the purpose of guiding blind person. The visually impaired person gives the command and receives the direction response using audio frequency. The longitude and latitude values are received continuously from the GPS receiver. The directions are getting to the user with the help of audio signals. An obstacle detector is used to avoid obstacles by sending an audio clip. GPS receivers use NMEA standard. With the advancement in speech recognition it becomes easier to issue commands regarding directions to the visually impaired.

Dhruv Jain et al. [8] present the design of an omnipresent cellphone based active indoor way finding system for the visually impaired. this system provides step-by-step directions to the destination from any location in the building using minimal additional infrastructure. The carefully adjusted audio, vibrating instructions and the tiny wearable device helps the user to navigate efficiently.

Alshbatat et al. [9] have presented intelligent system for guiding individuals who are visually impaired person, and they have described the system which enable those people to move with the confidence as a sighted people. They have developed another module that consisting different sensing devices and pic16f877 microcontroller to include the properties of the GSM_GPS module. The system has been used to receive the data from the sensing devices and command the GSM module. They have used the ultrasonic, accelerometer sensor data in order to detect obstacles, and to get more detailed regarding the blind's environment.

The paper is organized as follows: Section I gives an Introduction, Section II describes different technologies or systems used for visually impaired person, Section III gives the comparison of the surveyed papers and Section IV give the conclusion.

The comparative analysis of various system used for visually impaired person are described in Table I with respect to features used.

Ref	Topic	Features
Duarte et al [2]	Information and Assisted Navigation System for Blind People	– Based on users smartphone and wireless sensors – Used for indoor navigation
Nandish et al [3]	An Outdoor Navigation With Voice Recognition Security Application For Visually Impaired People	– TTS (Text to Speech) is used in navigation system – Used for outdoor navigation
Shin et al [4]	Obstacle Detection and Avoidance System for Visually Impaired People	– Detect obstacle determine which directions should be avoided using hemispherical sensor array – Based on ARM9
Willis et al [5]	RFID Information Grid for Blind Navigation and Wayfinding	– Uses RFID information grid which provide foundation of exact indoor/outdoor location for the blind user
Ramprabu et al [6]	Smart Cane for Visually Impaired People	– Uses camera for obstacle analysis – Find the type of obstacle and their distance through voice

Table 1: Comparative Analysis of Various Systems

III. CONCLUSION

This paper provides different type of techniques of navigation and obstacle detection system for visually impaired persons. It concluded that there are many navigation and obstacle detection system available for visually impaired people. But each systems has some advantages and disadvantages. The main aim of every system is to help blind person to move independently anywhere.

IV. REFERENCES

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