Review of Design and Implementation of Smart Eye Navigation by using GPS and RFID Technology

[1] Sohan M Mane

[1] P.G Student
[1] Dept of Electronics Communication Engineering,
[1] TGPCET, NAGPUR, INDIA

Abstract— **According to the visual impaired and blindness statistical report released by the World Health Organization, new estimates has been made in the few years back, year 2010, the visual impaired and blindness in the globe, where overall population involved in prevalence of visual impaired is 285 million,246 million having low vision whereas, 39 million are blind. The data of eye prevalence stated above shows that the large amount of eye disease patient throughout the world cannot be just ignored. In Malaysia, there is a number of visual impaired or the blind in the nationwide which cannot be abandoned yet needed to support in terms of assistive facilities and etc. Navigation is a very basic need of every individual. Every single person wants a way from the source to the destination that is safe, short, correct and free from obstacles. A person suffering from different disabilities such as visually impaired people have similar demands. Visually impaired people have to memorize each and every path, which is a very tedious task.**

Index Terms— **Visually impaired Person, RFID, Navigation, GPS.**

_____

I. INTRODUCTION

Many systems are available in the market that supports outdoor navigation. These systems can interact with the visually impaired people by providing them with an output in form of audio and by taking input in the form of speech. The main technologies used in such systems are GIS, GPS, radar, ultrasonic, speech and RFID (Radio- Frequency Identification) technology. However, indoor navigation is restricted because of concrete walls as the GPS signals are blocked. Thus, GPS– based navigation system is no longer effective inside a building for the purpose of navigation. RFID technology was taken into consideration to provide a solution for the problem associated with indoor navigation assistance. Meaningful placement of RFID tags in the indoor environment is very necessary to provide efficient navigation to the blind. RFID technology is a method for remotely storing and retrieving data using devices called RFID tags and RFID Readers. There are two different types of tags namely, passive and active. Passive RFID tags lacks built in power supply and the active one has its own power supply. RFID tags can be deployed in locations that are important to the user.

II. LITERATURE REVIEW

A.M. Kassim [1] in this paper the author use following technology to help blind people for outdoor activities. RFID technology is introduced in this project to support the visual disable people more efficiently in outdoor activities. The system has been developed based on the integration of RFID wireless technology and voice system which assembled on the traditional white cane in order to help the visual impairment to identify the surrounding landmark via verbal notification. The tactile detection by RFID system composed by RFID system integrated on traditional white cane and RFID TAG which installed on the tactile paving where the TAG stored unique information uses to navigate/notify the user once they scan/tap the tactile paving by the designed white cane. The proposed RFID integrated white cane is successfully designed and evaluated the range of RFID tag which can be detected. In this project, RFID reader is use to read the RFID TAG and in order to play voice file to the user, voice module is needed. The purpose of combination of RFID system and voice module is to play a particular voice file to user under a particular condition. The main hardware/module used in this project are Arduino Uno R3 Microcontroller, MiFare High Frequency 13.56MHz RFID reader module and WTV020 voice module.

Richard F. Joseph [2] this paper focuses on a navigation system that will guide the blind and the visually impaired pedestrian with ease. The system will adapt to the user's behavior and will also provide the user with shortest path from the source to the user's chosen destination in the building. RFID technology is used to track the user's current location. The user carries his own PDA with the application installed in it and a RFID reader with him. RFID tags are deployed in the building. On detection of the RFID tag by the RFID reader as the reader comes in vicinity of the tag, the reader sends the tag information to the PDA using Bluetooth Technology. The PDA based user device provides the user navigation instructions in an audio form and the user can also select the preferences provides by giving input in form of speech. The system will be a blend of Optimal Routing and Users Preference. The PDA consist of the ACO algorithm that will help in the optimization of A* algorithm which will work as the prediction algorithm.

A. M. Kassim [3] this paper discussed on design and development of electronic device by using warning system for visually impaired person usage which is called 'MY 2nd EYE'. This electronic device is designed to support and help the visually impaired person around this world to have their own confident in order to travel from one place to another place. This project is about developing of warning system by using a vibration motor as a warning device via microcontroller that received input from distance measurement sensor when detecting obstacle. The vibration motor is a best solution to warn the blind person because it uses touch sense of human when the system is run. In this system, there are four pieces of vibration motor are mounted to the

gloves at different locations. Each location will have its own function that show different direction such as front, left, right and down. In this project, the effectiveness of the system gives command the direction of obstacle existence is very important and have been confirmed through simulation and experiment.

Abbas M.Ali [4] this paper introduces a new approach of an electronic cane for navigation through the environment, using only vision system to help the blind people. By computing weights between already stored images and the real scene of the environment. The system gives advices for the blind person to select the right direction. This advice depends on a weighted topological map in the form of an appearance graph. Navigation on this graph involves Importance value from one node to other until the goal node is reached. Where a mono camera cane-held gives information in front of the blind person. The system will give a wide range indoor navigation and may be used to outdoor navigation. The identification of different scenes to the blind person has done with in a session. These sessions divide the image database into parts like bedroom, corridor,....etc. The proposed scheme employs SIFT features to represent scene containing many objects in the environment. The author make device in which already stored home images like as bedroom, corridor etc. sensor sense that image and tell user in front of you this devise are present but it will not work on outdoor for that it is required a big database .Also his devise can't guide user also can't tell location of user etc.

Kassim A.M [5] this paper discussed on design and development of obstacle detection and warning device which is used for above abdomen level of human in order to support and guide the visually impaired person. This electronic device is an innovation product to support and help those visually impaired person such to have their own confident to travel independently. In the developed obstacle detection and warning device, the distance measurement sensor is used to detect the obstacles and headphone is used as the warning device to give the obstacle information to the user. The distance measurement sensor's input is processed via main controller and gives the warning signal to the headphone. The power supply is came from battery and also acquire from alternative energy such as solar energy in order to charge the battery. The proposed warning system is to combine the vibration method with audio method. The vibration method is the best solution to the visually impaired person because it uses touch sense of human when the system is run. In this paper, the effectiveness of the system gives command the direction of obstacle existence is very important and have been confirmed through simulation and experiment. In this device doesn't use audio visual system and navigation system. This system Fail when the visually impaired person is at crowded people such as supermarket and obstacle avoidance for high speed movement such as car or ant transport.

Fernandes, H, Vitor Filipe, Paulo Costa, João Barroso[6]This paper proposes a prototype which uses RFID technology to provide location-based services and navigation to the blind, or visually impaired. This paper as led the team to the conclusion that the line/cluster topology, while keeping the user on safe paths, lacked some of the versatility that normally sighted users had while navigating. Moreover, as the geographic location of the points of interest varies over time and the tags are embedded in the floor, the mesh topology has arisen as a natural evolution. Using a mesh infrastructure optimal route can also be calculated, reducing the overall distance that the user must travel to reach the desired destination. Regarding the user interface with the system, audio cues and alerts are used only in specific point or per user request. Blind users rely very much on the hearing sense, and the system mustn't be an obstruction. The inputs made via a small joystick, so the user can naturally navigate through the software menus. Some connections have been made with private and public partners to extend the geographic area covered by this system.

III. CONCLUSION

The assistive navigation device is designed and developed for visually disable or the blind in order to navigate them from one place to another conveniently by verbal direction. The modification of the conventional white cane has been made by implement the assistive navigation device on the white cane which the device composed of RFID Tag Reader and a sound control system embedded in the device. A special tactile paving has been designed where RFID Tag installed underneath the pavement to provide information of location and surrounding environment. The RFID Tag stored current location and direction in order to guide the user move inside the pavement as well as the correct direction.

IV. ACKNOWLEDGMENT

REFERENCES

[1] A.M. Kassim, H. I Jaafar, M.A. Azam, N. Abas, T.Yasuno, "Design and Development of Navigation System by using RFID Technology," IEEE System Engineering and Technology, pp. 258-262, 19 - 20 Aug. 2013.

[2] Richard F. Joseph, Anand A. Godbole, "An Intelligent Traveling Companion for Visually Impaired Pedestrian," 2014 International Conference on Circuits, Systems, Communication and Information Technology Applications (CSCITA), 978-1-4799-2494-3/14,2014

[3] A. M. Kassim, M. H. Jamaluddin, M. R. Yaacob, N. S. N. Anwar, Z. M. Sani and A. Noordin, "Design and Development of MY 2nd EYE for Visually Impaired Person" 2011 IEEE Symposium on Industrial Electronics and Applications (ISIEA2011), Langkawi, Malaysia, 978-1-4577-1417-7/11/ September 25-28, 2011.

[4] Abbas M. Ali, Md Jan Nordin, "Indoor navigation to support the blind person Using weighted topological map", 2009 International Conference on Electrical Engineering and Informatics (IEEE) 5-7 August 2009, Selangor, Malaysia.

[5] Kassim A.M., Jamri, M.S., Aras, M.S.M, Rashid, M.Z.A Yaacob M.R, "DESIGN AND DEVELOPMENT OF OBSTACLE DETECTION AND WARNING DEVICE FOR ABOVE ABDOMEN LEVEL," 2012 12th International Conference on Control, Automation and Systems Oct. 17-21, 2012 in ICC, Jeju Island, Korea.

[6] Fernandes, H, Vitor Filipe, Paulo Costa, João Barroso, "Location based services for the blind supported by RFID technology", 5th International Conference on Software Development and Technologies for Enhancing Accessibility and Fighting Info-exclusion, DSAI 2013.