© 2018 IJSRST | Volume 4 | Issue 8 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
Themed Section: Science and Technology

A Passenger Bus Alert and Accident System for Blind Person Navigational

Swapnil Shingte[1], Rajesh Patil[2]
[1]M. Tech Electronics and Telecommunication VJTI Mumbai, Maharashtra, India
[2]Associate Professor Electrical Engineering Dept. VJTI, Mumbai, Maharashtra, India

ABSTRACT

In today's environment when everything is Travel Bus information is a vital component of many intelligent transportation systems (ITS) applications. In recent years, the number of vehicles in India has increased tremendously, leading to severe traffic congestion and pollution in urban areas, particularly during peak periods. A desirable strategy to deal with such issues is to shift more people from personal vehicles to public transport by providing better service (comfort, convenience and so on). The scope of this proposed system is to use speech recognition system for user selected destination entry, and voice module for making announcements about the arrival details. The performance of the proposed system is found to be promising and expected to be valuable in the development of advanced public transportation systems (APTS) in India. The main advantage of this device is to provide bus alerting system for easy navigation i.e. the user gets the voices which pronounce the bus details along with destination alerts. The system also supports with another protection feature for blind, when any sudden accidents occur which is detected using MEMS accelerometer sensor and sends location global positioning system based alerts to the predefined concern person in the form of SMS messages. As Speech is the primary and most convenient means of communication between humans it aims to provide a review based on the design of a new voice based alerting system for the blind based on Speech recognition system and voice circuit for voice based announcements.

Keywords: GPS, Blind navigation, GSM, Wireless Communication XBee.

I. INTRODUCTION

Each visually impaired faces its own daily challenges. Since they have difficulty to sense what happens around them, this compromises a series of activities such as learning, and especially locomotion. If they need to use public transportation, the challenge becomes even greater. In addition, they depend on the good will of other people around them to locate the public transport vehicle. Most of time they don't even know if they are on a bus stop. To give more comfort and quality of life for these people to use public transportation, it is necessary to research and develop systems that might help them to localize and use the public transport service independently, like ordinary person.

Figure 1

II. BACKGROUND OVERVIEW

A. Existing System

Conventional solutions that can be used by people with visual impairment are the use of cane, personal guide and guide dog. In the public transport, only the last 2 solutions help the blind person to get around more safely. However, both have high costs. The WHO estimates that 90% of people with visual disabilities live in low-income situation. So, the systems and solutions must be low cost, accessible to all people in this group, with easy operation. Several systems have been proposed over the years.

B. Drawbacks of Existing System

- Manual operation
- Monitoring depends on driver
- Less Alert system
- Unsafe for others
- Short range
- Less accuracy

C. Aim & Objective

Many of them involve electronic systems using Wireless Sensor Networks and/or communication via GPS for localization. The main aim of the project is to design a voice based alerting system for the blind based on Speech recognition system and voice circuit for voice based announcements.

D. Proposed System

The proposed system consists of two sections.

(i) Passenger section

(ii) Bus section

This system which is with passenger or physically disabled person consists of PIC microcontroller which is interfaced with speech recognition module, GPS receiver, GSM modem, APR voice circuit, LCD, buzzer and zigbee module, MEMS accelerometer sensor.

Initially the user needs to gives his/her destination details through voice recognition module as input. The microcontroller takes responsibility to display the destination related bus numbers onto the LCD and also announces the bus numbers to the blind person using APR33A3 voice circuit. Secondly the controller also sends the information about the user destination details to the bus section using wireless zigbee module. When the bus reaches the bus stop then the system automatically announces the arrival of bus along with bus number details using voice circuit.

The user section also has another protection feature like usage of MEMS accelerometer sensor. Whenever any accident is detected using the sensor then the system automatically alerts through buzzer alarm and also sends the alerting messages to the concerned person about his location using GSM modem in the form of SMS messages.

The bus section consists of Zigbee module, LCD, buzzer interfaced with ARM-7 LPC2148 microcontroller. When the zigbee module receives the input given from user section it continuously sends the signal about its approach using wireless zigbee communication and when it once reaches the required destination it alerts through buzzer alarm.

The same information is sent to the user section for enabling other units like displaying the bus details on LCD, Voice based bus approach alerts, and also using GSM module it can send the bus details to the concerned person predefined number.

I. BLOCK DIAGRAM

A. Transmitter Unit

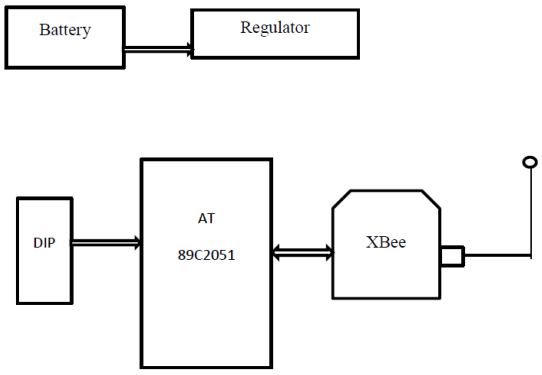

Figure 2

B. Receiver Unit

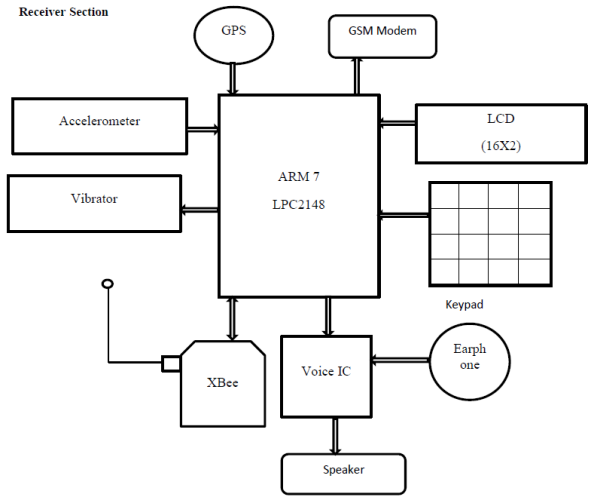

Figure 3

II. THE PROPOSED SYSTEM

A. Introduction

This system is specially designed for blind person, so he/ she can travel easily, safely and independently. This system divided into two parts. One is transmitter and another is receiver. Transmitter side will be placed in the bus and blind person have the receiver side. Transmitter part contains XBee module and DIP. XBee module will continuously transmit its unique ID which is generated by DIP. Receiver part contains XBee module, which receive the ID and have keypad to store destination ID in system. It's also have accelerometer which gives location of system.

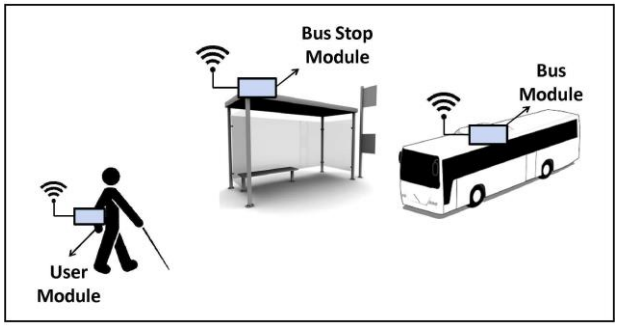

Figure 4

B. The Working Flow

Let's see how the system will work; as we read in above paragraph, Blind person will have Receiver part. Every bus stop will have its unique id. If a blind person wants to travel from one destination to another by bus, He/she will store the unique id of destination bus stop, with a help of the keypad provided in system. After giving destination ID, receiver will start and continuously searching for Id which match destination Id. In transmitter side which placed in buses, its continuously transmit the bus stops id to nearest bus stops. As soon as the transmitter id of bus and systems destination id matches, system will activate the vibrator motor and sound will generated to give alert for blind person that he/she can board in bus for journey.

As the journey started, system will again waiting for the transmitter id which matched with destination id. As destination stop arrived the system will again give vibration with help of the vibration motor and sound with help of Voice IC to alert a blind person that stop arrived he/she can get down from bus.

There is another mechanism in this system. This mechanism is specially designed for safety of blind person. If accident of blind person is occurred the accelerometer is activated which is placed in system and GSM 800 modules, which generate message which contains the location of blind person. This Message will send to the relative's number of blind person, which is already stored in system. This helps the relatives to find the blind person and it gives more safety to that person.

III. ALGORITHM

A. Transmitter Side

Step1: Start.
Step2: System variables initialize.
Step3: System peripherals initialize.
Step4: Monitor ID from DIP switch.
Step5: Generate packet of ID.
Step6: Send to XBee.
Step7: Monitor for ID from DIP switch.

B. Receiver Side

Step1: Start.
Step2: System variables initialize.
Step3: System peripherals initialize.
Step4: Get destination ID from User.
Step5: Monitor for wireless Bus ID.
Step6: Check ID matched with User ID.
Step7: ID does not match? Go back to Step 5.
Step8: Generate voice alert
Step9: Start vibrator motor.
Step10: Monitor live GPS location
Step11: Check for User's Bus stop location.
Step12: Location does not match? Go back to step 10.
Step13: Generate voice alert.
Step14: Start vibrate motor
Step15: Stop.

IV. Result & Discussion

When the person reaches the bus station, he can find the buses that pass through a particular location with the help of voice recognition system and voice synthesizer. When the bus approaches the bus station, there is an indication in the bus by the beep sound of a buzzer that there is a blind person available in the bus station.

This is achieved with the help of XBee unit both in the bus unit and blind unit. Finally when the bus reaches the station the bus number is announced to the blind through headphones.

There are currently available systems for the outdoor navigation but they will not assist in travelling to unfamiliar areas. Some systems use PDA which is not so economic and cannot be afforded by all. In most of the systems RFID tags are used which are required in 1000s of numbers for tracking of route. Also it provides only one way communication. The system we use is a mobile unit, weightless and economically feasible.

C. Advantage

- User-friendly interaction with the user.
- Reliable for blind people.
- Easy to operate.
- Visual alerts through LCD
- Audible alerts through Voice module and also buzzer alarm.
- Speech based input for destination
- Wireless data transmission using zigbee.
- MEMS based accident detection
- Location based alerts using GPS receiver module
- User-friendly interaction with the user.
- Highly sensitive.
- Reliable for blind physically challenged people.
- SMS based alerting system using GSM in case of emergencies.
- Highly efficient and low cost design with portability

D. Disadvantages

- Easy to operate.
- Visual alerts through LCD
- Audible alerts through Voice module and also buzzer alarm.

V. Conclusion

Primarily, the blind person in the bus station is identified with RF communication. The blind informs the location he needs through the microphone which is given to the voice recognition system which produces the output of bus numbers in the voice synthesizer unit which is heard in headset.

Then this location is transmitted to the transceiver in the bus. If the names in the transceiver in the bus matches with that of the name send by the blind, then there is an alarm in the bus unit alerting the presence of blind and a voice to the user's headset that the particular bus has arrived. With the help of GPS

tracker connected with audio output the destination chosen by the blind is intimated when the bus reaches the correct location. PDA's can be used for GPS tracking but it is not cost effective.

The accessibility of public transport for people with visual impairment is an issue that needs to be fairly debated. Nowadays, the use of public transportation is growing fast. There is expansion of the existing networks, capacity and the number of lines. But there are few, or any, strategies aimed for integrating people with visual impairments in a manner to facilitate their lives. The work proposed in this paper seeks to create a low-cost solution, low power consumption and an affordable system.

To reach these characteristics, it uses various electronic devices and widespread technologies, such as smartphone, application and embedded system. This helps to lower the costs of the system, and facilitates its maintenance. With preliminary tests, for distances adjusted to real situation, the system showed satisfactory results.

The communication link between the modules was successfully performed, where could be confirmed via HyperTerminal. However, the system needs to be tested in others situations, like using more than one Module, to analyse the behaviour when more users are connected to the network. This will require a management of the information to attend all the users at the right time.

VI. ENHANCEMENTS

A. Future Modifications

- The project can be extended using GPRS module using which the bus details can be monitored directly from predefined web link.
- This approach eliminates the problem of blind pedestrians. We designed an assistive device for the Blind based on adapted GSM, fusion of GPS and vision based positioning.
- The assistive device improve user positioning, the estimated position would compatible with assisted navigation for the blind positioning.
- The future work enhances autonomous robots or vehicles localization. This project can be extended using GPRS module using which the live tracking of the physically disabled can be plotted in the Google maps.
- The system can be extended by using Android technology for plotting location tracking in Google maps.
- The project can be extended using wireless Wi-Fi network using which the destination can be provide as input using voice application and also touch application from android mobile.
- As future work, the user application for smartphone will be developed. It will contain already all public transport routes, and work with Talkback system.
- The prototypes modules will be developed to small and easy to transport. Final tests will be performed with people with visually impairment, to get a feedback about the system and improve it even more.

III. REFERENCES

[1]. G.Lavanya ME., Preethy. W1, Shameem.A 1, Sushmitha.R1 (2013) , "Passenger BUS Alert System for Easy Navigation of Blind " , International Conference on Circuits, Power and Computing Technologies IEEE ICCPCT-2013] , 798-202.

[2]. Shantanu Agrawal , Anuja Anwane , Prasad Bulankar, Dhiraj K. Thote , (April 2014) , "Bus Recognition System For Visually Impaired Persons (VIPs) Using RF Module " , International Conference on Industrial Automation and Computing (ICIAC- 12-13th April 2014)

[3]. G.Raja , D. NaveenKumar ,G.Dhanateja , G.V.Karthik Y, Vijay kumar ,(Apr-2014) , "Bus

Position Monitoring System To Facilitate The Passengers " , IJESAT] International Journal of Engineering Science & Advanced Technology] Volume-3, Issue-3, 132-135

[4]. Ravi Mishra and Sornnath Koley, (2012),'Voice Operated Outdoor Navigation System For Visually Impaired Persons', International Journal of Engineering and Technology,Vol 3, Issue 2,pp.l53-157

[5]. Lamya El alamy, Sara Lhaddad, Soukaina Maalal, Yasmine Taybi,Yassine Salih-Alj ,(2012), "Bus Identification System for Visually Impaired Person " ,IEEE Sixth International Conference on Next Generation Mobile Applications, Services and Technologies

[6]. Rishabh Gulati (2011), 'GPS Based Voice Alert System for the Blind', International Journal of Scientific and Engineering Research, Volume 2, Issue 1, pp 1-5

[7]. Hyn Kwan Lee , Ki Hwan Eom , Min Chul Kim and Trung Pham Quoc, (2010), 'Wireless Sensor Network Apply for the Blind U-bus System', International Journal of u- and eservice, Science and Technology,VoI.3,No.3, pp.l3-24

[8]. Brendan D Perry, Sean Morris and Stephanie Carcieri,, (2009), 'RFID Technology to Aid in Navigation and Organization for the Blind and Partially Sighted', pp. 1-52

[9]. World Health Organization. (2009). 10 facts about blindness and visual impairment Online]. Available: www.who.int/features/factfiles/blindness/blindness_facts/en/index.html

[10]. Advance Data Reports from the National Health Interview Survey (2008). Online]. Available: http://www.cdc.gov/nchs/nhis/nhis_ad.htm

[11]. International Workshop on Camera-Based Document Analysis and Recognition (CBDAR 2005, 2007, 2009, 2011). Online]. Available: http://www.m.cs.osakafu-u.ac.jp/cbdar2011/

[12]. X. Chen and A. L. Yuille, "Detecting and reading text in natural scenes," in Proc. Comput. Vision Pattern Recognit., 2004, vol. 2, pp. II-366–II-373.

[13]. X. Chen, J. Yang, J. Zhang, and A. Waibel, "Automatic detection and recognition of signs from natural scenes," IEEE Trans. Image Process., vol. 13, no. 1, pp. 87–99, Jan. 2004.

[14]. D. Dakopoulos and N. G. Bourbakis, "Wearable obstacle avoidance electronic travel aids for blind: A survey," IEEE Trans. Syst., Man, Cybern., vol. 40, no. 1, pp. 25–35, Jan. 2010.

[15]. B. Epshtein, E. Ofek, and Y. Wexler, "Detecting text in natural scenes with stroke width transform," in Proc. Comput. Vision Pattern Recognit., 2010, pp. 2963–2970.

[16]. Y. Freund and R. Schapire, "Experiments with a new boosting algorithm," in Proc. Int. Conf. Machine Learning, 1996, pp. 148–156.

[17]. N. Giudice and G. Legge, "Blind navigation and the role of technology," in The Engineering Handbook of Smart Technology for Aging, Disability, and Independence, A. A. Helal, M. Mokhtari, and B. Abdulrazak, Eds. Hoboken, NJ, USA: Wiley, 2008.

[18]. K. Kim, K. Jung, and J. Kim, "Texture-based approach for text detection in images using support vector machines and continuously adaptive mean shift algorithm," IEEE Trans. Pattern Anal. Mach. Intell., vol. 25, no. 12, pp. 1631–1639, Dec. 2003.

[19]. KReader Mobile User Guide, knfb Reading Technology Inc. (2008). Online]. Available: http://www.knfbReading.com

[20]. S. Kumar, R. Gupta, N. Khanna, S. Chaudhury, and S. D. Joshi, "Text extraction and document image segmentation using matched wavelets and MRF model," IEEE Trans Image Process., vol. 16, no. 8, pp. 2117–2128, Aug. 2007.

[21]. Joonyoung Jung1 , Kiryong Ha1, Jeonwoo Lee1,Youngsung Kim2 and Daeyoung Kim3. Wireless Body Area Network in a Ubiquitous Healthcare System for Physiological Signal Monitoring and Health Consulting.

International Journal of Signal ProcessingJ].Image Processing and Pattern Recognition.2008,pp47-54(2008)

[22]. Pei Zhi-jie, Ding Xiao-di. Development of Wireless Remote Medical Monitoring System J]. Computer & Digital Engineering, 2008,12, 55-58

[23]. Li Wen-zhong, Duan Chao-yu,et al. The Introductionand Actual Combat of Zigbee Wireless Network TechnologyM].Bei Jing: Aerospace University Press, 2007.4

[24]. Guo Shi-fu, Ma Shu-yuan, Wu Ping-dong, Chen Zhilong. Pulse Wave Measurement SystemBased on ZigBee Wireless Sensor NetworkJ]. Application Research of Computers, 2007.4,258-260

[25]. Shahab, F. Shafait, and A. Dengel, "ICDAR 2011 robust reading competition: ICDAR Robust Reading Competition Challenge 2: Reading text in scene images," in Proc. Int. Conf. Document Anal. Recognit., 2011, pp. 1491–1496.