A Review on Voice Based Passenger Bus Predicting Arrival of Bus for Easy Navigation of Blind

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Abstract

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.

Key words: *Speech recognition, Zigbee, GPS, GSM, APR voice, Microcontrollers.*

I. INTRODUCTION:

In nowadays, we must make use of various high-tech tools and equipments to get our jobs done and make our life comfortable. In this presented paper we introduced an advanced public transportation systems (APTS) for public service specially for physically challenged. Advanced public transportation systems (APTS) are one of the most important applications, which can significantly improve the traffic situation in India. One such application will be to provide accurate information about bus arrivals to passengers, leading to reduced waiting times at bus stops. This needs a real-time data collection technique, a quick and reliable prediction technique to calculate the expected travel time based on real-time data and informing the passengers regarding the same. 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 survey which was conducted in 2009 by World Health Organization on disability, there are 269 million visually impaired and 45 million blind people worldwide. Ageing populations and lifestyle changes means that chronic blinding conditions such as diabetic retinopathy are projected to rise exponentially. Without effective, major intervention, the number of blind people worldwide has been projected to increase to 76 million by 2020 if current trends continue. There are many traditional and advanced navigational aids are available for visually impaired and blind people.

Usage of all these travel aids for detecting obstacles for smooth navigation requires a good training. Presently several electronic travel aids (ETA) are available for visually impaired and blind people.

Figure- 1.Image of Easy navigation system for blind

Recent navigation systems use digital video cameras as vision sensor along with other multiple sensors. These systems are quite bulky and involves physical interface with the subject. Captured images are re-sized, processed further and converted to speech, audio beeps, musical sound or vibrations. In such systems frequency of sound shares some relationship with the orientation of pixels. Some advanced systems use Global Positioning System (GPS) integration with the main system. GPS receiver is useful for understanding the current location of the subject and nearby landmarks. Although many advanced electronic navigation aids are available these days for visually impaired and blind people, very few of them are in use. Therefore user acceptability assessment of such systems is very important. The most influencing parameters in this regard are size, portability, reliability, useful functionalities, simple user interface, training time, system robustness and affordability in terms of cost. Considering all these user expectations and requirements, a tailor made low cost and reliable navigation system is proposed in this paper for visually impaired and blind people. As Speech recognition play a vital role and most convenient means of communication between humans. Whether due to technological curiosity to build machines that mimic human's or desire to automate work with machine, research in speech recognition as a first step towards human-machine communication. Speech recognition is the process of recognizing the spoken word to take necessary actions accordingly.

The speech recognition system is a completely assembled and easy to use programmable speech recognition circuit. Programmable, in the sense that you train the words (or vocal utterances) you want the circuit to recognize. This board allows you to experiment with many facets of speech recognition technology. It has 8 bit data out which can be interfaced with any microcontroller for further development. The speech recognition system is speaker dependant, meaning that the voice that trained the system has the highest recognition accuracy. But you can simulate independent speech recognition. To make the recognition system simulate speaker independence one uses more than one word space for each target word. Now we use four word spaces per target word. Therefore we obtain four different enunciations of each target word.
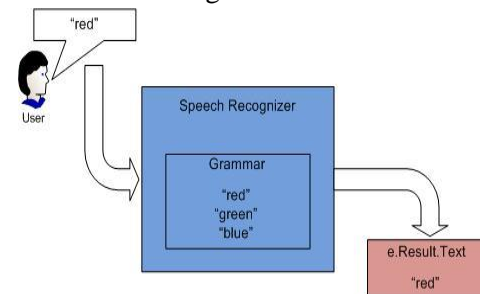

Figure- 2.Image of Speech recognition system for blind

For Easy navigation for blind the destination is provided through speech or voice commands as input to the speech recognition system and the details about the bus to travel will be announced using APR voice circuit which pronounces the bus details along with destination alerts. Voice circuit is a system which is capable of storing voices and playing back the stored voices when requested. This system eliminates the usage of old alarm systems and makes to configure the alerts through voice.

The aPR33A series are powerful audio processor along with high performance audio analog-to-digital

converters (ADCs) and digital-to-analog converters (DACs). The aPR33A series are a fully integrated solution offering high performance and unparalleled integration with analog input, digital processing and analog output functionality. The aPR33A series incorporates all the functionality required to perform demanding audio/voice applications. High quality audio/voice systems with lower bill-of-material costs can be implemented with the aPR33A series because of its integrated analog data converters and full suite of quality-enhancing features such as sample-rate converter. The output of voice circuit is provided with speaker converts an electrical signal into sound. The speaker moves in accordance with the variations of an electrical signal and causes sound waves to propagate through a medium such as air or water.

Figure- 3.Image of speaker for announcements

II. RELATED WORK:

In this paper we made a review on an assistive device based on artificial vision and geo located visual landmarks. In this device we use GSM, GPS and vision based positioning in case of emergencies like accidents detected using MEMS accelerometer sensor. The precise localization method combined with a GSM adapted to blind needs for the visually impaired population in terms of mobility and space representation. So this will be helpful for the blind people to reach their destination.

The presented application is a low cost solution for an efficient SMS alerting system in case of emergencies when any sudden accidents occur which is detected using MEMS accelerometer sensor along with location using GPS. The proposed solution can be used in other types of application, like in security and tracking regions etc where the information needed is requested rarely and at irregular period of time (when requested).

The GSM modem provides the communication mechanism between the user and the microcontroller system by means of SMS messages. It is capable of receiving a set of command instructions in the form of Short message service and performs the necessary actions. We will be using a dedicated modem at the receiver module i.e. and send the commands using SMS service as per the required actions.

Figure- 4.Image of GSM modem

GPS Receiver

In the idea behind an efficient health service provider we used location based alerts in emergency times using GPS receiver. GPS stands for global positioning system, which provides unequalled accuracy and flexibility of positioning for navigation. The GPS provides continuous three-dimensional positioning 24 hrs a day throughout the world. GPS provides accurate location and time information for an unlimited number of people in all weather, day and night, anywhere in the world. The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit
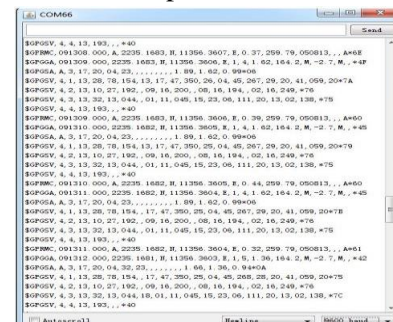

Fig 5. String data from GPS receiver

III. REVIEW OF PORTABLE DEVICE

An embedded system is a computer system designed to perform one or a few dedicated functions often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer (PC), is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today.

Embedded systems are controlled by one or more main processing cores that are typically either microcontrollers or digital signal processors (DSP). The key characteristic, however, is being dedicated to handle a particular task, which may require very powerful processors. For example, air traffic control systems may usefully be viewed as embedded, even though they involve mainframe computers and dedicated regional and national networks between airports and radar sites.

The proposed idea of Passenger bus alerting system consists of two sections.
(i) Passenger section
(ii) Bus section

The portable Electronic alerting system which is with passenger or physically disabled person (Blind) 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 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.

Micro controller is the heart of the device. It stores the data of the current location which it receives from the GPS system. So that it can make use of the data stored to compare with the destination location of the user. By this it can trace out the distance from the destination and produce an alarm to alert the user in advance. This device helps the blind people in their journeys. It helps him to get the voice based alerts. The Microcontroller used is programmed using Embedded C language.

The communication network provided between the passenger system and the bus is wireless zigbee network. Zigbee is a PAN technology based on the IEEE 802.15.4 standard. Unlike Bluetooth or wireless USB devices, Zigbee devices have the ability to form a mesh network between nodes. Meshing is a type of daisy chaining from one device to another. This technique allows the short range of an individual node to be expanded and multiplied, covering a much larger area.

ZigBee is expected to provide low cost and low power connectivity for equipment that needs battery life as long as several months to several years but does not require data transfer rates as high as those enabled by Bluetooth. In addition, ZigBee can be implemented in

mesh networks larger than is possible with Bluetooth. ZigBee compliant wireless devices are expected to transmit 10-75 meters, depending on the RF environment and the power output consumption required for a given application, and will operate in the unlicensed RF worldwide (2.4GHz global, 915MHz Americas or 868 MHz Europe). The data rate is 250kbps at 2.4GHz, 40kbps at 915MHz and 20kbps at 868MHz.

IEEE and ZigBee Alliance have been working closely to specify the entire protocol stack. IEEE 802.15.4 focuses on the specification of the lower two layers of the protocol (physical and data link layer). On the other hand, ZigBee Alliance aims to provide the upper layers of the protocol stack (from network to the application layer) for interoperable data networking, security services and a range of wireless home and building control solutions, provide interoperability compliance testing, marketing of the standard, advanced engineering for the evolution of the standard. This will assure consumers to buy products from different manufacturers with confidence that the products will work together.
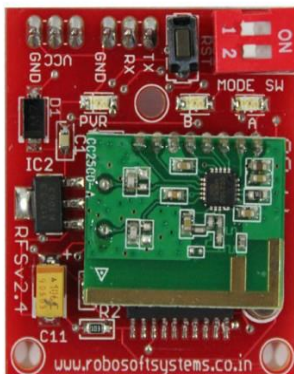

Fig 5. Image of Zigbee module

IV ADVANTAGES AND DIADVANTAGES:
Advantages:
- User-friendly interaction with the user.
- Highly sensitive.
- Reliable for blind physically challenged people.

- Easy to operate.
- Audible alerts through Voice module and also buzzer alarm.
- Speech based input for destination target
- Wireless data transmission using zigbee.
- MEMS accelerometer sensor based accident detection
- Location based alerts using GPS receiver module
- SMS based alerting system using GSM in case of emergencies.
- Highly efficient and low cost design with portability

Disadvantages:
- Interfacing of all wireless modules is highly sensitive
- GSM modem depends on network signal strength
- GPS module depends on satellite communication
- Periodic monitoring is required for battery power consumption and its charging

V. FUTURE SCOPE AND CONCLUSION:
This paper presents review work for the most problematic issue in the visually impaired (VI) population. 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.

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