International Journal of Scientific Engineering and Applied Science (IJSEAS) - Volume-1, Issue-4, July 2015
ISSN: 2395-3470
www.ijseas.com

GPS Based Virtual Eye For Visionless

Deekshith B N[1], Shwetha M N[2],Amritha Padmakar[2], Gouthami H N[2],Nafisa Sultana[2]

[1]Assistant professor, Dept. of Telecommunication Engineering, GSSSIETW, Mysuru
[2] Student of 8thsem, Dept. of Telecommunication Engineering , GSSSIETW, Mysuru

Abstract: Till date blind people struggle a lot to live their miserable life. Their problems have made them to lose their hope to live in this competing society. They seek help from others to guide them whole day. This project aims to make the blind person fully independent in all aspects. The proposed system is based on Global Positioning System and Obstacle detection and object avoidance technologies. The aim of the overall system is to provide a low cost and efficient navigation aid for blind which gives a sense of artificial vision by providing information about the environment scenario of static and dynamic object around them.

***Keywords*: GPS module, Microcontroller, GSM module, Speech IC, Ultrasonic sensors and fire sensor.**

I. INTRODUCTION

Sight is considered to be the most essential of all the senses, people lacking this sense are looked upon with pity by others. Visually impaired persons face numerous difficulties to perform their day to day task. They are totally or partially dependent on someone for help. Till date blind people are managing to travel with walking stick and obstacle detecting cane and other devices.

Several steps and measures have been taken to help the visually disabled people which include fitting a cane with a K-SONAR device, This device had to be operated manually throughout the movement and this approach could detect obstacles only in the ground level and its coverage area was very less and it used to cause physical stress to the person using because it required continuous pressing of the switch button and hence was not an efficient method. These have improved their lifestyle significantly from nothing to something but haven't set them totally free.They show them odd among other people, which leads to complexity in them. Thus the assisting devices available in

present scenario are not sufficient for supporting them completely.

The most important drawback of these aids is necessary skills and training phase, range of motion and very little information conveyed. With the rapid advances of modern technology, both in hardware and software font has brought potential to provide intelligent navigation capabilities. Recently there has been a lot of Electronic Travel Aids (ETA) designs and devised to help the blind navigate independently and safely. Also high end technological solutions have been introduced recently to help blind persons navigate independently. To identify the position and orientation and location of blind person any of those solutions rely on Global Positioning System (GPS) technology while such system suitable for outdoor navigation, due to need for line of sight access to satellites, they still need additional components to improve on resolution and proximity detection to prevent collision of blind person with other objects and hence subject his/her life to danger.However in comparison to other technologies many blind guidance systems use ultrasound because of its immunity to the environmental noise. Another reason why ultrasonic is popular is that the technology is relatively inexpensive, and also ultrasound emitters and detectors are small enough to be carried without the need for complex circuitry. Apart from the conventional navigation systems, a blind aid system can be provided a new dimension of Real time assistance and artificial vision along with dedicated obstacle detection circuitry.

In order to overcome these drawbacks, we have designed a system which would be of immense advantage in comparison to the devices that are used by blind people today. This system is capable of fulfilling all the requisites of visually impaired and helping them in becoming independent like normal humans. This system acts as a virtual eye for the blind people and sets them free in all aspects.

II. RELATED WORK

Over the last decades, research has been conducted fornew devices to design a good and reliable system for blindpeople to detect obstacles and warn them at danger places. There are some systems which has some deficiencies.

Benjamin et al. introduce a laser cane with three photodiodes and three laser diodes function as receiver makingan optical triangulation. The laser cane detects the obstaclein three different directions. One is 45^0 to the ground forOver-hanging obstacles, the second one is parallel to theground and third one is for sharp deepness. The laser canehas no system for determining location and position. J.Naproposed an interactive guide system for indoor positioning,which can't detect the obstacles and hurdles. The system is not suitable for the outdoor activities.

S. Innet and N. Ritnoom have introduced a stick for distance measurement using infrared sensors, which is a complex and time wasting process. The stick has different vibration modes for different range which is difficult for a blind to differentiate, it needs time for training. The stick informs the person clearly at dangerous stage which conveys less information and safety. The stick has no location and positioning features.

Shoval*et.al* developed a Navbelt, an obstacle avoidance wearable portable computer which is only for indoor navigation. Navbelt was equipped with two modes,in the first one the system information was translated to audio in different sounds. One sound for free for travel direction and other for blocked, it was difficult for the person to differentiate the sounds. Other problem was the system would not know the user momentary position.

N. Bulusu, J. Heinemann and D. Estrin provided the possibility of locating small devices without GPS. A very simple connectivity metric method for localization in outdoor environments that makes use of the inherent RF communication capabilities is used in locating small devices.

III. DESIGN METHODOLOGY

In order to overcome the difficulties in the existing method and to provide the cost effective and user friendly system for blind navigation, the following design is carried out. Figure1 shows that this project mainly consist on seven parts namely GPS receiver, Ultrasonic sensors, GSM module, Microcontroller, Speech IC, Headphone, Power supply.

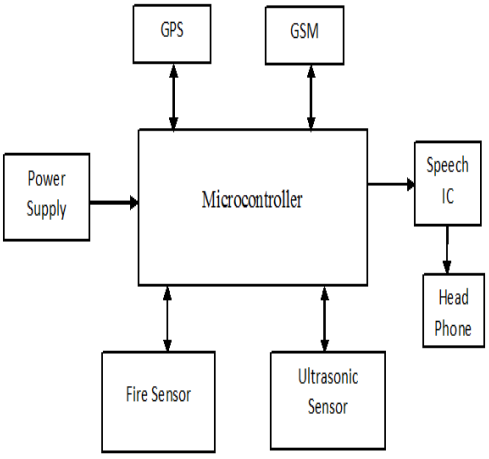

Figure 1: block diagram of virtual eye.

Since all electronic circuit work only with low D.C. voltage. We need a power supply unit to provide the appropriate voltage supply. This unit consists of battery, rectifier, filter and regulation.

The microcontroller used in this GPS and GSM based device with user input interface.Based AT89S52 microcontroller, since it is a low power CMOS 8 bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the AT89S52 achieves throughputs approaching 1 MIPS per MHZ allowing the system designed to optimize power consumption versus processing speed.

The LM358 OpAmp is used in the comparator mode. The IR photodiode is used in a potential divider in a reverse bias mode. A threshold voltage is set at the inverting terminal of the opamp using a potentiometer. So when the heat radiation in front of the photodiode the resistance of the photodiode would decrease and this inturn when exceeds the threshold voltage will make the output of the opamp go high. LM358 has two opamps in its 8 pin package, this two sensors could be built out of one IC. We can also use LM 324 which has 4 opamp inside it.

In order to provide the obstacle avoidance, Ultrasonic sensor is used. Ultrasonic ranging provides 2cm-400cm non-contact measurement function, the ranging accuracy can reach to 3mm.it includes ultrasonic transmitters, receiver and control circuit. Ultrasonic use IO trigger for at least 10us high level signals. Sensor automatically sends eight 40 KHz and detect whether there is a pulse signal back. IF the signal back, through high level, time of high output IO duration is the time from sending ultrasonic to returning.

The Global Positioning System (GPS) and Global System for Mobile communications (GSM) are interfaced to the microcontroller to detect the blind person location. The proposed architecture consists of a GPS signal receiver and GSM connected.The GPS will be sending the location information to the controller continuously.

The same will be routed to the GSM modem through the controller. GSM will forward this information to the preferred mobile numbers. the user after receiving the message. If the person wants to know the location of the blind person, he has to send one message like TRACK immediately he will get the blind person location coordinates. The SIM900 is used in this project. The SIM900 a complete Quad band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuringan industry standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900 MHz performance for voice, SMS,Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3mm, SIM900 can fit almost all thespace requirements in your M2M application, especiallyfor slim and compact demand of design.

APR33A3 is used in the system. APR33A3 is 11 Minutes Audio Record & Play Model. It Offers true solid state storage capability and requires no software or microcontroller support. It provides high quality recording and playback with 11 minutes audio at 8Khz Sampling rate with 16 bit resolution. Using on board jumpers, total duration can be divided in individual triggers of 1, 2, 4 &8 segments which can be triggered by on board switches or external low trigger like microcontroller pins.

The headphone is used in this project for guiding the visually impaired persons to navigate independently by amplifying the predefined voice signals.

IV. WORKING PRINCIPLE

Our project is an innovative idea of intelligent system which has basically two features the first one is Obstacle detection and the second one is providing accurate location and position through GPS. It will provide safety and support to visually impaired Persons. The ultrasonic sensors in the system will sense surrounding and will detect the obstacles and give feedback to speech IC change the path wa**y.**

The power supply activates the circuit.The sensor transmitter transmits the frequency, which reflects from the obstacle. Sensor receiver receives the reflected frequency and gives it to microcontroller. The fire sensor is used to detect the fire near to blind. When the voltage is more than the threshold voltage the microcontroller processes it and gives signal to speech IC. Speech IC gives sound and start to inform the person that the obstacle is detected through headphone. The GPS module receives the co- ordinate continuously and gives it to the microcontroller. Microcontroller access the location from the GPS modem and transmit the location to the GSM modem which will send a SMS messages to the all saved numbers.

V. KEIL PLATFORM VISION3

Keil Vision is a software tool for developing codes in assembly language and embedded C. The project requires programs for analog to digital conversion, serial communication and liquid crystal display and these are developed, debugged and compiled in embedded C using Keil IDE.

EMBEDDED C: Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as, fixed-point arithmetic, named address spaces, and basic I/O hardware addressing.

VI. ADVANTAGES

- Low design time.
- Low production cost.
- Save blind from fire.
- Detection of position of the blind.
- This system is applicable for both the indoor and outdoor environment.
- This system is capable of using in public places.
- It is dynamic system.
- Less space.
- Low power consumption.

VII. DISADVANTAGES

- It measures only the distance doesn’t give any direction for the user.

VIII. RESULTS

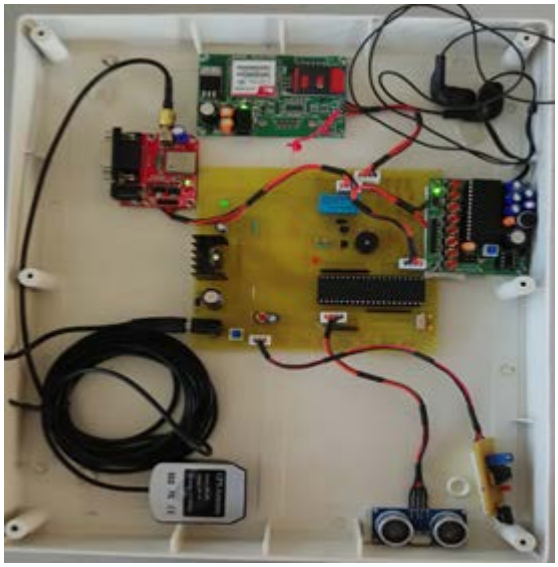

Figure2: Design module.

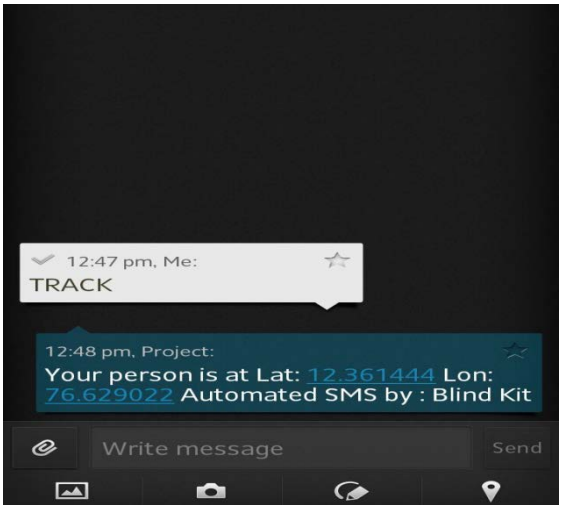

Figure3: Detection of the latitude and longitude.

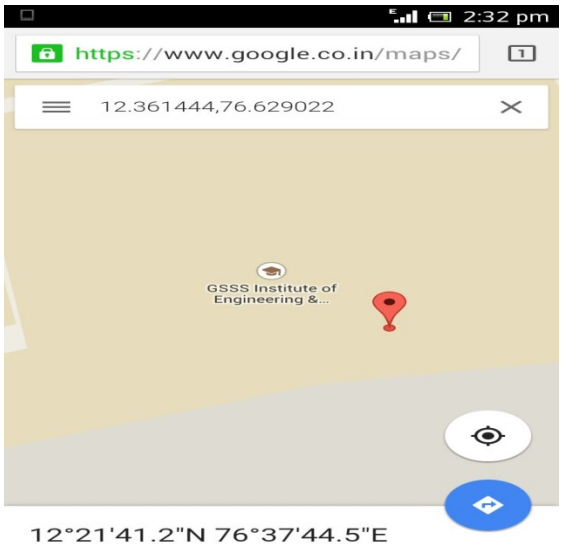

Figure4: Tracing of the position of blind.

IX. APPLICATION

- This system can be used in the home, hospital and colleges.
- This system can be used in both known and unknown environments like airports, malls, public parks etc.
- People who are completely blind by birth.
- For partially blind people.
- People who have lost their vision in accidents.
- For the old people who have lost vision due to ageing

X. CONCLUSION

This project proposed the design and architecture of a new concept of Smart Electronic Travel Aid System for blind people. The advantage of the system lies in the fact that it can prove to be a very low cost solution to millions of blind person worldwide. It helps the blind from fire by giving alarm. The proposed combination of various working units makes a real time system that

monitors position of the user and provides dual feedback making navigation more safe and secure.

REFERENCES**Journals**

[1] J. M, Benjamin, N. A. Ali, and A. F. Schepis (1973), Alaser cane for the blind, Proceedings of San Diego Medical Symposium.

[2] Clark-Carter. D, Heyes*et al* (1986), The Efficiency and Walking Speed of Visually Impaired People, Ergonomics, Vol. 29, No.12, pp. 1575-1581.

[3] Johann Borenstein and YoramKoren(April 1988), Obstacle Avoidance with Ultrasonic Sensors ROBOGA IEEE Journal of Robotics and Automation, Vol 4, No 2.

[4] Steven La Grow Ed. D(November/December 1990),The use of the Sonic Pathfinder as a secondary mobility aid for travel in business environments: a single subject design IEEE Transactions on Systems and Cybernetics, Vol 30, No 6.

[5] S. Shoval, J. Borenstein, Y. Koren,(May 1994) Mobilerobot obstacle avoidance in a computerized travel aid for the blind, Proceedings of the IEEE International Conference on Robotics and Automation.

[6] Bill N. Schilit, Norman I. Adams *et al*(December1994), Context-Aware Computing Applications in Proceedings of the Workshop on Mobile Computing Systems and Applications, Santa Cruz, CA, IEEE Computer Society, Pages 85-90.

[7] Louise Barkhuus(2003), Context Information vs. Sensor Information: A Model for Categorizing Context inContextAware Mobile Computing in Symposium onCollaborative Technologies and Systems, pp 127-133,

[8] SanDiego, CA.J. Na,(2006) The blind interactive guide system using RFID-based indoor positioning system, Lecture Notes in Computer Science, Springer Publications, vol. 4061, pp. 1298-1305.

[9] Hashino, S.; Ghurchian, R. (June 2010),A blind guidance system for street crossings based on ultrasonic sensors. Information and Automation (ICIA), 2010 IEEE InternationalConference.