Smart Aid Stick Prototype for Blind People

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Abstract- *Blind people are using a traditional tool (stick) for guiding them when they walk from one place to another. Although, the traditional stick is the most popular tool that is used today by the visually impaired person. In this work, we have implemented all the traditional features such as information about obstacles along the path with the help of various sensors used in the stick and also one additional feature that is push button for intimating to his relatives regarding his current location through SMS and in mobile application. The stick is used to help blind people to walk with the same ease and confidence as a normal people. This stick sends location of the blind person to his relatives via SMS for tracking using push button and at the same time it updates the tracking information in mobile phone application which is developed for tracking the blind person.*

Key Words: **IR Sensor, Navigation system, Smart phone, Object detection, GPS, Flame Sensor, Ultra sonic Sensor.**

1. INTRODUCTION

As per the survey there are approximately 10 to 11 million blind and visually impaired people in India, and it is growing at very fast. These people have difficulty of knowing where they are, where they are moving, how to take help from their relatives, and even they feel isolated. In this paper we have implemented one prototype for smart stick which guides the blind people for the movement. This stick can detect obstacle with the help of four different type sensors used for obstacle detection: ultrasonic sensor, IR sensor, water sensor, fire sensor, and microcontroller (µC)(Arduino Uno R3) to make sure for shape path to him/her, and also intimate his current location to his family member through SMS and update the current location status in mobile application by pressing push button provided in stick, tracking application which is developed for android phone or pc with the help of GSM/GPS.

2. RELATED WORK.

According to [1] blind people use a traditional cane as a tool for directing them when they move from one place to another. When blind person detects obstacle in front of them he will be alerted with Voice message and Vibration [2]. Ultrasonic sensor, IR sensor and various other equipped technologies (Arduino IC, sensors etc.) is the boon for blind people [3]. In [4] stick is designed to act like an artificial vision and alarm unit, system consists of five sensors: ultrasonic sensor, IR sensor, water sensor, fire sensor, and light (LDR) sensor, microcontroller (Arduino Uno R3) to receive the sensor signals and process them to short pulses to the Arduino pins where buzzers, vibrator and voice alarms are connected. GPS navigation in the Mobile can be used to guide the blind for new places and unfamiliar places.

3. IMPLEMENTATION.

We have implemented all the features presented in [4] for blind persons and one additional feature to help blind person when he requires help from his relatives just by pressing push button.
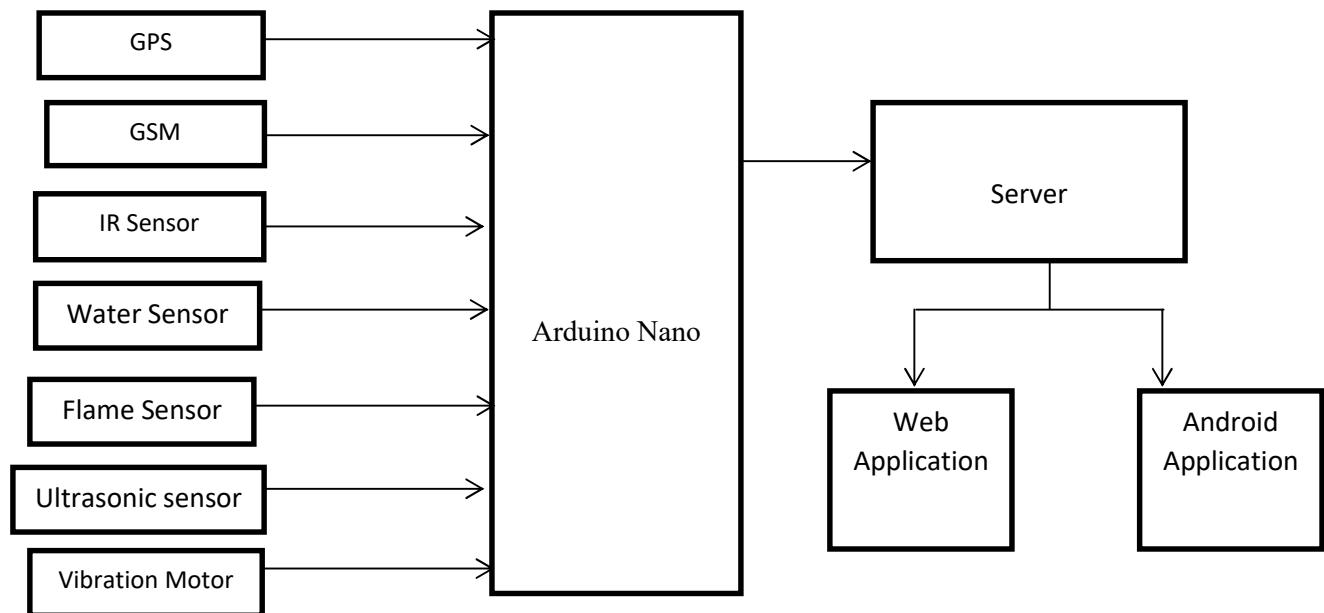

Fig 1.Block diagram of prototype

ATmega328 Microcontroller(µC) used for implementation of prototype is high-performance 8-bit AVR RISC-based µC combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. Which processes the all the inputs received from various sensors guides the blind person.

Ultrasonic sensors(Ultrasonic Ranging Module HC - SR04) are used for generating, detecting & processing ultrasonic signals. Ultrasonic is the production of sound waves above the frequency of human hearing and can be used in a variety of applications such as proximity detectors, movement detectors. The object detected is at a distance 4 meter or more then it, identified as far (safe) zone in all three directions. Otherwise it comes under danger zone and sensor will sends signal to µC, and stick will inform to blind person through some vibration as well as with different beep sound.

IR sensor is used to detect small obstacles like pit, staircase, as it located at the lower side of the stick. After detecting such obstacles on ground, this sensor will send the signal to the µC, as a result µC enables vibration module for vibrating the stick. And at the same time it will enable the buzzer with different beep for informing the blind person about presence of pit or staircase on ground.

Water sensor is used for sensing the water on the ground; it is located at the base of the stick to have precaution against the wet surface. When the water sensor comes in contact with the wet surface, it produces an electrical signal which triggers the µC. A µC enable the buzzer with different beep against a wet floor.

Heat sensor is used to identify the fire in front of blind person when he is moving. It is very sensitive to the heat and can detect the heat from long distance. If the sensor detects the heat radiation it will send an electrical signal to the controller and thus buzzer will enable beep as alarming message.

Buzzer unit, that operates in the lower portion of the audible frequency range of 20 Hz to 20 kHz. Buzzer is used in this implementation to warn the blind person against obstacle and help from other people by generating sound. Vibration motor is used to enhance the overall safety for the person who receives the warning against obstacles in different formats of vibrations. Global Positioning System (GPS) unit is used to provide current location of the blind person. This facility can be used by blind person's relatives to track the person current location. In this prototype we have given one more additional feature that is when everything is correct from sensor side but blind person need help from his relatives he can press one push button provided for help, once he press that button the current location of the person is sent to his relative mobile phone who is using tracking application developed for tracking the blind person along with one SMS.
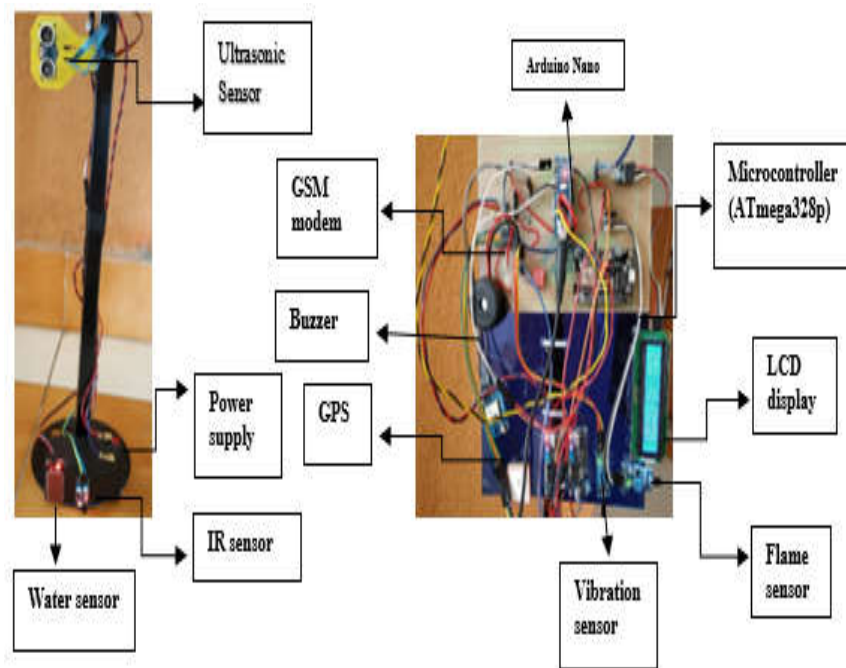

Fig 2. Implemented prototype

3.1 Working of Location Tracker

The GPS device collects the information regarding latitude and longitude and then sends it to the server. As and when blind person press the push button SMS will be sent to his relative's mobile phone and tracking information to in the phone application developed for tracking, the emergency status regarding that blind person will be updated on that phone application will look like under Help Required status it will show YES and under Location status it will show longitude and latitude information of the blind person as shown in figure 3.
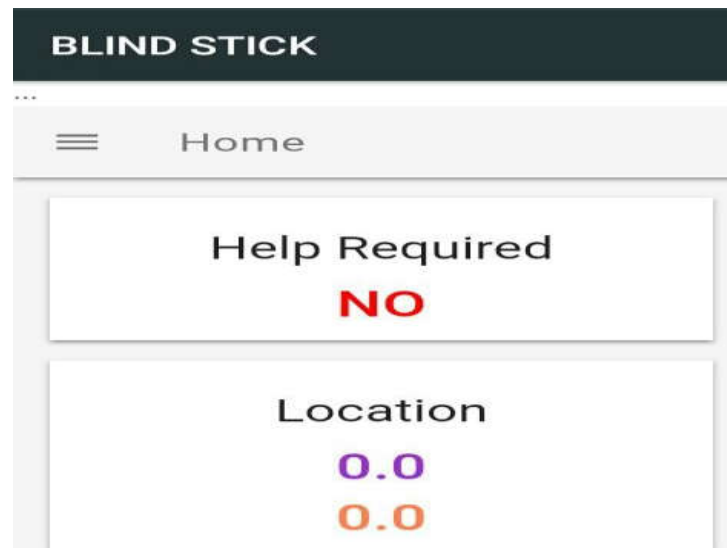
Fig 3. Tracking information in Mobile Phone.

4. CONCLUSION

The prototype implemented is a new concept of smart electronic guiding stick for blind people with additional care. The advantage of the system lies in the fact that it can prove to be very low-cost solution to blind persons worldwide. The proposed combination of various working units makes a real-time system that monitors position of the user and provides more safe and secure. It can be further improved to have voice feedback for the user. It aims to solve the problems faced by the blind people in their daily life. The system also takes measures to ensure their safety with real time location monitoring.

5. REFERENCES

1. Gurubaran, Gowrishankar Kasilingam, Mritha Ramalingam" A Survey of Voice Aided Electronic Stick for Visually Impaired People" International Journal of Innovative Research in Advanced Engineering (IJIRAE) ISSN: 2349-2163 Volume 1 Issue 8 (September 2014).

2. Mohd Helmy Abd Wahab, Amirul A. Talib, Herdawatie A. Kadir , Ayob Johari , A.Noraziah , Roslina M. Sidek , Ariffin A. Mutalib "Smart Cane: Assistive Cane for Visually-impaired People" IJCSI International Journal of Computer Science Issues, Vol. 8, Issue 4, No 2, July 2011 ISSN (Online): 1694-0814.

3. Nitish Ojha , Pravin Kumar Pradhan, Prof. M.V.Patil "Obstacle Sensing Walking Stick for Visually Impaired" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 04 Issue: 04 | Apr -2017.

4. Ashraf Anwar, Sultan Aljahdali "A Smart Stick for Assisting Blind People" IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278-0661,p-ISSN: 2278-8727, Volume 19, Issue 3, Ver. II (May.-June. 2017), PP 86-90.

5. Ayat Nada, Samia Mashelly, Mahmoud A. Fakhr, and Ahmed F. Seddik " Effective Fast Response Smart Stick for Blind People" Second International Conference on Advances in Bio-Informatics and Environmental Engineering - ICABEE 2015, At Italy.