SMART WALKING STICK WITH SOS

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***Abstract* — Blind people often face difficulties to navigate around crowded streets and are often dependent on others to help perform most of their daily tasks. We propose a system that aims to reduce this dependency on sighted people by implementing a Smart walking stick. This smart stick is equipped with ultrasonic sensors, RF module, GPS and GSM module. Ultrasonic sensors used in the system detects obstacles and potholes on the way. The RF module is used as a stick locator. In this system, we have also aim to incorporate e-SOS. This is implemented through the GSM and GPS module. The user when he feels any discomfort while navigating if the user feels lost then the user will be able to notify a family member of his/her location.**

***Index Terms* - Ultrasonic Sensors, RF Module, GPS and GSM Module, Blind Stick, Arduino Uno, Vibrator, Buzzer.**

I. INTRODUCTION

The eyes are one of the most powerful tool a human being can have sadly 285 million people all over the globe are impaired astonishingly around 39 million people are completely blind as per World Health Organization (WHO). It's not a huge task to understand the level of trouble these people go through in their day to day life. They face difficulty to navigate through crowded areas without any help from sighted people. Also, if these people venture to travel on their own there is a possibility of them getting lost. Incorporating the developments in latest technology we aim to make their lives independent. Their inability to move freely opposes them from interacting with people and social activities. Children who are blind from birth have a long life ahead of them. The inability to see should not affect their life. This played an important role in our decision to come up with solution for visually impaired people as we want them to live a life which isn't much different from that of a sighted person.

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II. LITERATURE SURVEY

A lot of research has been conducted in order to come up with ways to assist visually impaired people. In a proposed system by Chaurasia S., & Kavitha K.V.N. two ultrasonic sensor are used of varying ranges to detect obstacles which when detected sets a buzzer on. Also, two infrared sensors are mounted on the lower end of the stick with the aim of detecting small obstacles ranging 2-10cms. There is also a button at the top of stick which when pressed alerts the concerned person that the user is in distress and needs help. Although there is no provision made to send the user's location to the concerned person. In another system presented by Ashraf Anwar and Sultan Aljahdali the stick is able to perform functions of obstacle detection, water, light and heat sensing. The water sensor detects any wet surface and produces output on a buzzer when the surface has water on it. The light and heat sensor detect illumination of the surroundings and for any fire in the proximity respectively. Also a GPS sensor is included with lets the user know his/her current location. In our system we have also included a GSM sensor, which on working along with GPS sensor gives location update of the person in distress to his/her family member's phone in the form of a SMS on the press of SOS button. Moreover, we have also implemented the functions- pothole and step detection in addition to obstacle detection as visually impaired people find it very difficult to climb steps on their own and also to detect any potholes. We have not put in provision for light, water and heat sensor as too many sensors will drain the battery faster and also for the reason that these features are unnecessary.

III. METHODOLOGY

In the proposed system a power supply is connected to an Arduino in which ultrasonic sensors, RF module, GPS module, GSM module, vibrator and buzzer are attached. The output will come through buzzer and vibrator as soon as it receives signals from Arduino.

ARDUINO UNO

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The complete system is processed in it.

Fig. 1 Arduino

ULTRASONIC SENSOR

The ultrasonic sensor is used to calculate distance using ultra sonic waves. In the proposed system the sensor is used to determine an obstacle ahead, up-down stairs and also potholes

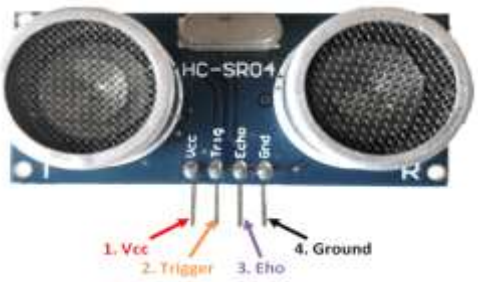

Fig. 2 ultrasonic sensor

RF MODULE

RF module is a small size electronic device, which is used to transmit or receive radio signals between two devices. In the proposed system it is used to help the user locate the stick incase user misplaces the stick

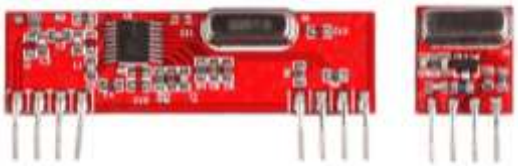

Fig. 3 RF module

GPS MODULE

The GPS module is used for location detection and navigation purposes. The module checks for its location on earth and provides its longitude and latitude coordinates.

Fig. 4 GPS module

GSM MODULE

A GSM modem or GSM module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. The function of the GSM Module in the device is to read the location detected by the GPS module and send it to the predefined mobile number in the form of SMS, on the press of an SOS button.

Fig. 5 GSM module

IV. SYSTEM ARCHITECTURE

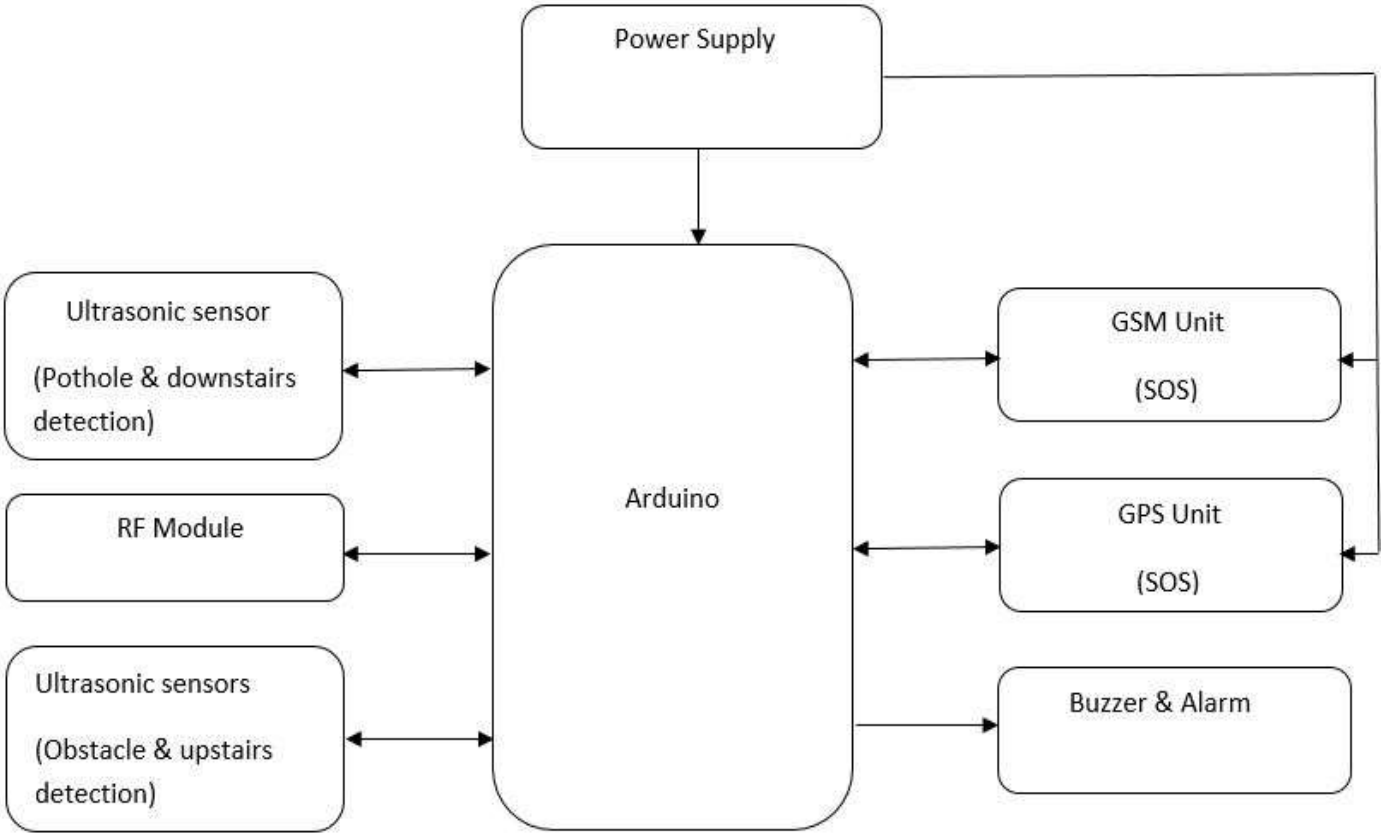

Fig. 6 System architecture

V. PROPOSED SYSTEM

While walking an ultrasonic sensor will sense any obstacles in path and help the user avoid them, by generating buzzer sound. The ultrasonic sensor can be calibrated within a range of 2cm-400cm. Using second ultrasonic sensor step detection can also be done by calibrating the two sensors accordingly. The GPS sensor on the press of SOS button fetches the location and then the GSM module sends a message to the target mobile device which consists of a link to the Google map location of the person in distress. If the person accidentally loses contact with the stick during usage, then RF module will be activated with a given button and the buzzer will go off thus helping the person locate the stick. While walking an ultrasonic sensor will sense any obstacles in path and help the user avoid them, by generating buzzer sound. The ultrasonic sensor can be calibrated within a range of 2cm-400cm. Using second ultrasonic sensor step detection can also be done by calibrating the two sensors accordingly. Furthermore, a third ultrasonic sensor is put into place to help the user detect any potholes that are encountered during the commute.

VI. CONCLUSIONS

The aim of this paper is to create a convenient assistive walking stick for the visually impaired people so as they can reduce their dependency on others to minimum. The stick proposed is of very low cost so as it can be easily afforded by everyone.

VII. NOVELTY

The uniqueness of allowing blind person to move freely/independently by upgrading the features such as pothole detection, obstacle detection. It is also able to trace a blind person when he is in distress by sending the location to a concerned person via text message. Along with all these features we are implementing stair case detection. Additionally, we are also using RF module which in case a person loses his contact with the stick he will be able to locate his stick with the help of buzzer. With the reminiscence and veracity of all these features a blind person will be able to move more freely and independently in nearby areas.

VIII. SCOPE OF IMPROVEMENT

Some kind of wearable device can be incorporated which will signal obstacle detection, staircase detection instead of buzzer and vibrators. We could incorporate live location detection of the user by interfacing the stick with a smart phone. By using special detectors we can differentiate the condition of the surface whether the surface contains mud, stagnant water.

IX. REFERENCES

[1] World Health Organization. (2013). Universal eye health: a global action plan 2014-2019.)
[2] Nada, A. A., Fakhr, M. A., & Seddik, A. F. (2015, July).Assistive infrared sensor based smart stick for blind people.
[3] Chaurasia, S., & Kavitha, K. V. N. (2014, February). An electronic walking stick for blinds. In Information Communication and Embedded Systems (ICICES), 2014
[4] Ashraf Anwar, Sultan Aljahdali- A Smart Stick for Assisting Blind People, IOSR Journal of Computer Engineering (IOSR-JCE)

[5] Md. S.Arefi and, T. Mollick, Design of an Ultrasonic Distance Meter, International journal of scientific and engineering research Vol. 4, Issue3, March, 2013.
[6] BrainPort Technologies. BrainPort® V100, 2015. Available http://www.wicab.com/en_us/v100.html
[7] S.Koley Menikdiwela, M. P., Dharmasena, K. M. I. S., & Abeykoon, A. H. S. (2013, December). Haptic based walking stick for visually impaired people. In Circuits, Controls and Communications (CCUBE), 2013 International conference on IEEE.