Navigation System based on Passive RFID Transponder for Visually Impaired People

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Abstract: Over the world there are somewhere around 285 million visually impaired individuals with visual debilitations. Out of which 39 million are completely visually impaired and 246 million are having low vision issues. These individuals think that its hard to play out the everyday errands and have a typical existence. This brought the need to create diverse guides for facilitating their lives. Such frameworks could be determined by the advances in innovation and inquires about done everywhere throughout the world. Advances like RFID, GSM, GPS, voice help, image processing have been an aid to these revelations.

Keywords: Visually impaired; Navigation; IR sensor; Voice assistance; GPS; GSM; RFID

I. INTRODUCTION

The five detects locate, hearing, contact, smell and taste are on the whole vital piece of individuals. Not every person on the planet is talented with this help. A standout amongst the most significant faculties is vision which guides us in decisions that we make in our lives. Some do not have this feeling of vision by birth, while others get it because of unending issue like retinopathy, mishaps, presentation to destructive synthetic concoctions. Having not having the capacity to see this with their eyes or perform routine errands typically, impedes the self-assurance of the outwardly tested individual. It influences their identity both physically and rationally. However the help accessible to them is simply disheartening. This impelled us to construct a navigation system that can improve their lives.

There are different sensors which accumulate data from encompassing that are handled by controller. These sensors incorporate ultrasonic sensor, IR sensor, PIR sensor, Image sensor, and so forth. RFID has been productively tried for giving away or data identified with items to the outwardly tested individuals. It is the best decision for distinguishing proof of articles by labeling strategy. Additionally a sound-related criticism is received so as to give rules to the outwardly tested individuals for route. GPS is satellite base radio route framework that empowers to decide an ongoing area.

This area data is sent to concerned individual if there should be an occurrence of crisis. A GSM module is utilized for the equivalent. Different modules like Bluetooth, Wi-Fi, and so on can likewise be utilized for correspondence. The client is alarmed through signal sound, vibrations, sound-related reactions.

The framework can be utilized both indoor and outside route. Dazzle individual's area can be followed at whatever point required which will guarantee extra security. Distinguishes deterrents and alarms the visually impaired individual through and discourse yield.

II. SYSTEM MODEL

A. LPC2148

The LPC2148 is a 16 bit or 32 bit ARM7 family based microcontroller and available in a small LQFP64 package. ISP (in system programming) or IAP (in application programming) using on-chip boot loader software. On-chip static RAM is 8kB - 40kB, on-chip flash memory is 32kB-512kB, the wide interface is 128 bit, or accelerator allows 60 MHz high-speed operation. One or two 10-bit ADCs offer 6 or 14 analog i/ps with low conversion time as 2.44 μs/ channel. Only 10 bit DAC offers changeable analog o/p. External event counter/32 bit timers-2, PWM unit, & watchdog. Low power RTC (real time clock) & 32 kHz clock input.

B. IR SENSOR

IR sensor basically consist an IR LED and a Photodiode, this pair is generally called IR pair or Photo coupler. 5V DC Operating voltage. I/O pins are 5V and 3.3V compliant. Range: Up to 20cm. Adjustable Sensing range. Built-in Ambient Light Sensor. 20mA supply current. When we turn ON the circuit there is no IR radiation towards photodiode and the Output of the comparator is LOW. When we take some object (not black) in front of IR pair, then IR emitted by IR LED is

reflected by the object and absorbed by the photodiode. Now when reflected IR falls on photodiode, the voltage across photodiode drops, and the voltage across series resistor R2 increases. When the voltage at Resistor R2 (which is connected to the non-inverting end of comparator) gets higher than the voltage at inverting end, then the output becomes HIGH and LED turns ON.

C. RFID READER

RFID tags can be either passive or active. In the proposed system, the passive RFID tags are used. A passive tag is cheaper and smaller because it has no battery; instead, the tag uses the radio energy transmitted by the reader. We are using RFID Reader NSK EDK - 125 –TTL. The specifications are: Connection - 5 volts and GND. TX - TTL output Can be directly connected to Microcontroller (To convert TTL to UART use Converter Board). D0 & D1 - is used for Wiegand Protocol (This connection is not necessary if you are using TTL communication) Output- TTL or Wiegand26. Plug-and-Play, needs +5V to become a reader. Buzzer indicates tag reading operation.

D. APR33A3 SPEECH KIT

The proposed system consists of the APR33A3 speech kit. The features of it are: Total 11 minutes of recording time each channel (M0 to M7) having 1.3minutes of recording time, single chip, high quality voice recording and playback solution, user friendly and easy to use operation. Non-Volatile flash memory technology, no battery backup required. Audio output to drive a speaker or audio out for public address system. Can record voice with the help of on-board microphone

E. GSM MODEM SIM300

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection.

This is a GSM modem which has a serial interface and plug and play facility. The modem can be used to send SMS, receive and make the calls, and do the basic GSM operations with the help of AT commands. A standard RS232 interface is used so that we can use it to interface with microcontrollers and PCs. It has power regulation, SIM holder and external antennas.

III. METHODOLOGY

The proposed framework comprises of the LPC2148 controller, IR sensor, RFID tag and reader, GSM modem, APR discourse kit, LCD, panic alert switch, mode determination switch. The framework has two units, indoor route and obstacle detection.

The indoor route unit utilizes the RFID innovation for helping the visually impaired. The RFID tag has the pre-put away data, which is read by the RFID reader as soon the reader comes in the region of the tag. That data is sent to the controller and from the controller the signal is sent

to the APR unit through which the voice output is obtained. The RFID labels can be introduced in spots, for example, near the gates of any buildings, and a similar data can customize telling that the individual is close to the entryway through the speech kit.The obstacle detection unit is intended to manage the oblivious in regards to explore in the surroundings effectively without being stressed of finding the obstacles present in his/her way. It utilizes IR sensors to distinguish the obstacles and the visually impaired is informed about it through a discourse speech kit. Obstacle recognition is done using image processing technique called Viola-jonas Algorithm.
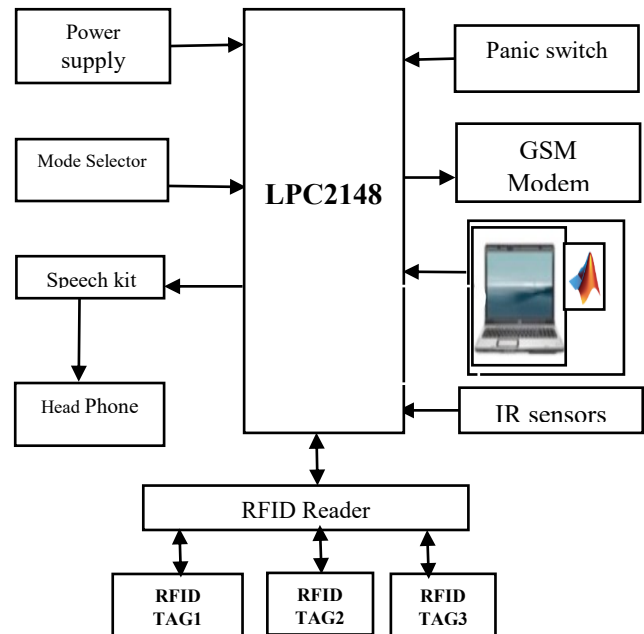

Fig 1.   Block diagram of Microcontroller Based Navigation system

IV.   RESULTS

Fig 2.   Obstacle detection using IR Sensor
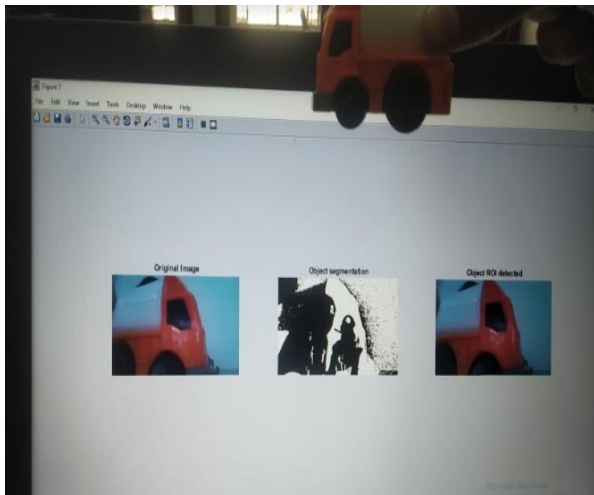
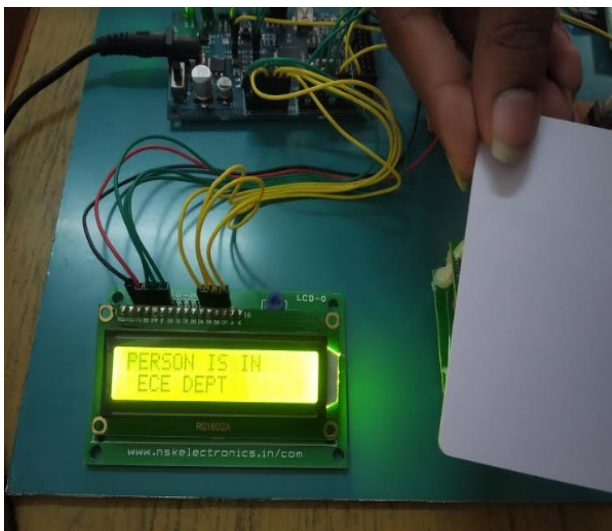Fig 3.   Obstacle recognition using MATLAB
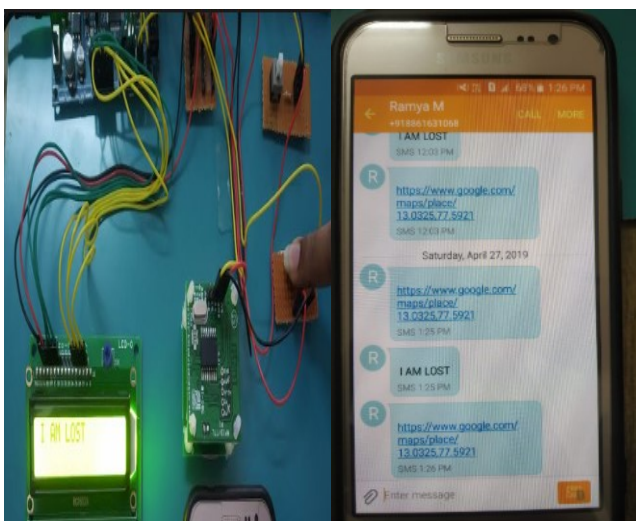

Fig 4.   RFID based indoor navigation

Fig 5.   Panic alert system

V.   CONCLUSION

An indoor based navigation system is designed using RFID technology. It has an additional feature of obstacle detection and recognition in the outdoor environment. Also a panic switch is provided which can be used in case of an emergency.

ACKNOWLEDGMENT

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