

INTELLIGENT WHITE CANE

R.M.L Rajapaksha*, M.A.A Karunarathna

Department of Electronics, Wayamba University of Srilanka, Kuliypitiya, Sri Lanka

*manojlankar@gmail.com**

ABSTRACT

Finding exact locations and the way is a real challenge for a blind person. Sometimes doorways and intersection points need to be counted to find exact locations. Usually most of them use traditional white canes for that purpose. Even if there are Braille signs a blind may not be able to find them. Most of the electronic canes currently at the market mainly aimed at obstacle detection purpose using sensor technology and not to find path or locations. Also visually impaired people will be helpless if they lose their way while travelling at outdoor. Through the project 'Intelligent White Cane' provides opportunity to identify predetermined locations and path using RFID technology. Also it utilizes GPS and GSM technologies to send a SMS message regarding current location details of the user to a preprogrammed mobile user if the blind lose the way while outdoor travelling. Intention of the operation is to provide extra protection to user by let him to get assistance from a friend or a relation if required.

Keywords: RFID, GPS receiver, GSM module, AT commands, Electronic travel aids

1. INTRODUCTION

People with various kinds of disabilities are part of our society and they truly need more attention and assistance from the rest of the society. Some have been disabled from their birth and some due to unfortunate accidents. In Sri Lanka for last few decades' people faced a civil war and many soldiers and civilians lost their lives and some became disables.

The intension of this project is to pay more attention on visually disabled people. In Sri Lanka, generally most of the blind people use white canes. By using white canes they can identify path and objects (barriers), but it is not a reliable method to find locations. Also they become helpless if they lose their way while travelling at outdoor. So, after analyzing this necessity, the intention was to design an electronic device which helps blind people to find the path and locations exactly on their own and provides extra protection during outdoor/indoor trevally.

2. EXPERIMENTAL

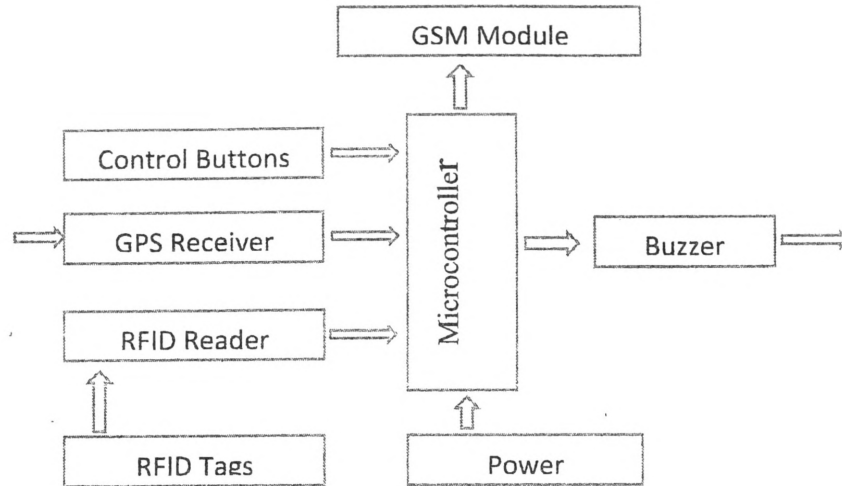


Figure 1: The Block Diagram of the model of Intelligent White Cane

Initially, all the equipment are checked by using the basic methods and confirm those are working properly. The GPS device's exact longitude and latitude of the locations were confirmed by using Google Map. Then all the components are step by step connected to the Microcontroller in a proper manner.

The GPS Receiver, RFID Reader and all the Control buttons (input devices) are identified and connected to the Microcontroller as inputs. After that the all output devices (GSM receiver and The Buzzer) are connected to the Microcontroller.

The microcontroller programed by using AT commands to fulfil the requirements. All the identified individual requirements are mentioned when programming the microcontroller. Finally, the RFID receiver detects signals from RFID tags when the experimental model moving closer to it. The receiver then sends that 'detected signal' as an input to the Microcontroller. Then it will make a specific output signal to the buzzer. An added feature to this device is the emergency key. When and if the blind person felt that he is lost or if he needs to share his location with someone he can press the emergency key. Then using the GSM module the device will send an automated SMS to specific number.

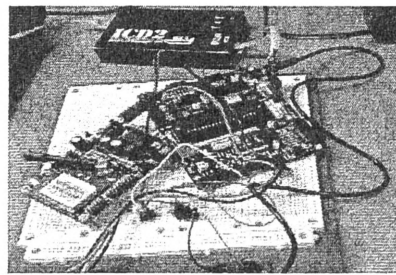


Figure 2: Interfacing components

3. RESULTS AND DISCUSSION

The intelligent white cane is developed for the blind persons to identify their path appropriately. Final outcome of this project is successful identification of the path by using the device.

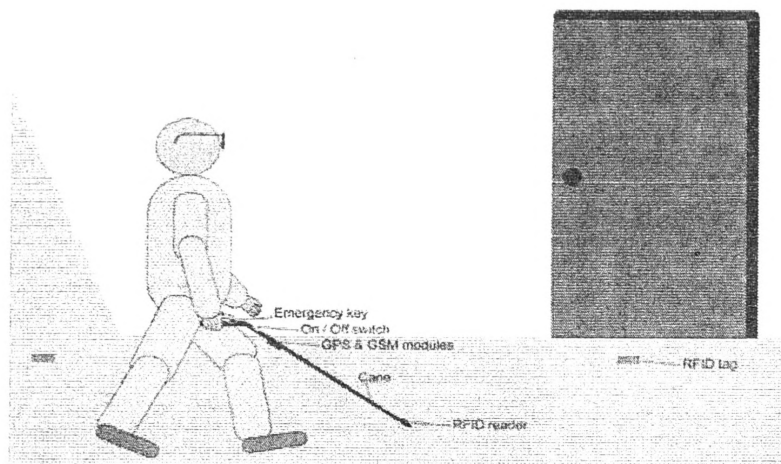


Figure 3: Use of Intelligent white cane.

It is created for indoor navigation but can also be develop it as an Outdoor navigator. It include a special emergency key, it helps the protection of the user. Cost of the used equipment is depending on the accuracy of the unit. The cost of making this unit is around Rs. 14000.00 (PIC18F4520 650.00, SIM300 4240.00, U blox NEO-6M 7600.00, RFID Tags and Reader 500.00)

4. CONCLUSION

The implementation of “Intelligent White Cane” using RFID, GPS and GSM is done successfully. It provides opportunity to find exact locations while indoor travelling and acknowledge a specific person via SMS to get assistance if the blind person lost his way during outdoor travelling. High frequency (13.56MHz) passive RFID⁴ tags were used to place at required locations and they could be identified by the RFID reader as different beep sounds were provided by buzzer. Read range of used RFID reader was approximately 10cm which was not practical enough due to the difficulties in finding tags. One to two feet distance is an ideal read range for the device.

Also the buzzer can provide only a few numbers of different audio signals which eventually reduce the number of tags can be used. A GPS receiver⁵, GSM module³ and an emergency key were included to the cane with the intension of sending location details to a preprogrammed mobile user. During the testing process when the emergency key is pressed, SMS regarding

location details could be received successfully. Then received location information were checked from Google maps and found an error of approximately 1km to the actual position.

To improve the accuracy and reliability of the system more accurate GPS receiver and a RFID reader with one to two feet readable range should be used. Also future developments of the system can be carried out in following ways^{1,2}.

- Instead of buzzer a sound record and replay IC can be utilized to play recorded location names or a guide instruction when that particular location is identified by the system.
- Ultrasonic sensors can be placed at the bottom of the cane to detect obstacles which are in front of the user.

Finally the project “Intelligent White Cane” was implemented successfully up to a desired level.

5. ACKNOWLEDGEMENTS

The authors would like to acknowledge and extend gratitude to the person who has helped to make this project a success.

6. REFERENCES

- [1]. http://www.omron-ap.com/technical_guide/rfid_system/features_classification.asp
- [2]. http://www.inlogic.com/rfid/passive_vs_active.aspx
- [3]. <http://www.sainsmart.com/arduino-compatibles-1/module/gprs-gsm-sim300-module-development-board-v2-voice-adapter-code-for-avr-arduino.html>
- [4]. <http://www.brooks.com/applications-by-industry/rfid/rfid-basics>
- [5]. <http://www.pocketgpsworld.com/howgpsworks.php>
- [6]. Muhammad Ali Mazidi, Rolind D. Mckinlay, Danny Causey. (2008) *PIC microcontroller and embedded systems: using Assembly and C for PIC18*. Eighth edition. New Delhi: Pearson Education.
- [7]. <http://www.microchip.com/wwwproducts/Devices.aspx?dDocName=en010297>