ISSN 2229-5518

Intelligent Belt for the Blind

Sneha Venkateswar, Ninad Mehendale

Abstract— This system focuses on the Electronic Blind Mobility Aid that helps blind people to travel autonomously using sensors mounted on a belt to be worn around the waist.Many people with visual impairments can travel independently with this advanced technology. Blind people cannot always travel alone due to the various obstacles that come in their path. A blind belt can be used to extend the user's range of sensation. It is usually worn around the waist as an obstacle detector.It is well known that visually impaired people use their hearing sense to compensate for their reduced eyesight. For instance, they can recognize sound sources. This project helps blind people travel alone by using sensors mounted on a belt to be worn around the waist. Thus they can be forewarned about obstacles with the help of the headphones and speakers. This will allow them to benefit from a systemthat they can use every day and hence making the blind person independent, while being able to identify potential risks, obstacles and routes.

Index Terms— Belt, headphones, infrared, microcontroller, receiver, relay driver, speaker, transmitter.

1 INTRODUCTION

THIS project aims at helping the blind to travel independently using sensors attached to a belt. The sensors give a signal to the microcontroller which in turn plays a pre-recorded alert with the help of an APR and relays which warn the blind person about the obstacle ahead. The blind person has the option of using both headphones and speakers making the belt user friendly and useful.

The user is expected to wear the belt on the waist. The belt contains IR sensors which are interfaced with the microcontroller circuit.Whenever the Infrared receiver receives the infrared light there is a drop of voltage across it, which is given to the comparator to generate logic 0 which is given to the microcontroller.The programming of Atmega 8 is done such that whenever logic 0 comes on any of the input ports it sends logic 1 to the corresponding output port.The output port is connected to the ULN 2003 which drives the relays of the corresponding playback circuit. Thus whenever there's an obstacle in any one of the direction i.e. front, back, left and right the playback circuit would indicate the same.

2 BLOCK DIAGRAM

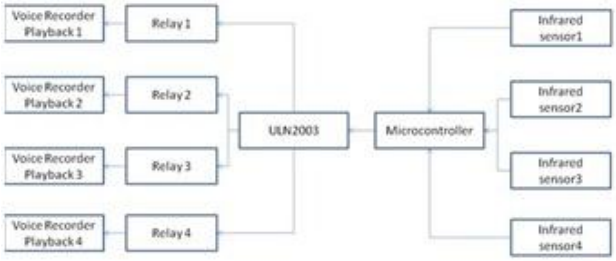

Fig. 1. Block Diagram

3 CIRCUIT DIAGRAM

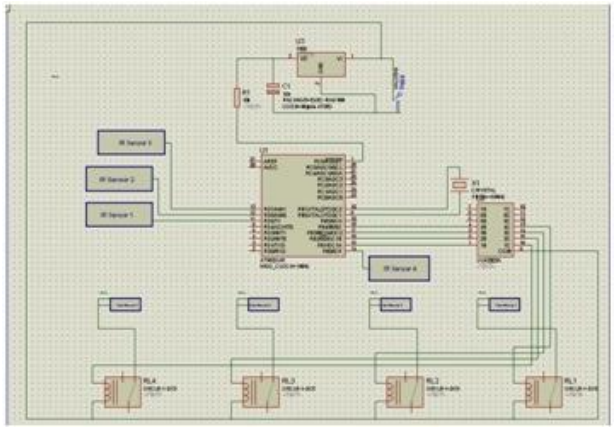

Fig. 2. Circuit Diagram

- *Sneha Venkateswar is currently pursuing bachelors degree program in electronics and telecommunicationsr engineering in Mumbai University, Indiay, PH-919820954636. E-mail: snehavenkateswar@gmail.com*
- *Ninad Mehendale is currently Assistant Proffesor in the electronics and telecommunication department in Mumbai University, India, PH-919820805405. E-mail: ninad243@yahoo.com*

4 WORKING

The system is using four obstacle sensors that are made up of transmitters and receivers. The transmitter always transmits the signal and as soon as we detect an obstacle with reflection, the transmitter sends a signal to the receiver which is detected by the latter. An infrared transmitter LED and an infrared receiver or a photo diode for reception will be used. The signal is then given to the amplifier. The amplified signal is converted into digital logic via a comparator. The comparator will check whether the signal has been reflected back from the obstacle or not. Accordingly the comparator forms the digital logic and gives it to Atmega 8.The system will have four sensors, in the front, behind, left and right. Each of the four sensors is connected to the comparator and the comparator output is given to the microcontroller. The comparator output i.e. the digital logic will give a signal to the microcontroller indicating where obstacle has been detected (i.e. left, right, behind or forward). The microcontroller ATMEGA 8 is connected to APR 9301 (Audio Program Recorder) in which it will be pre-recorded messages e.g. 'obstacle on left'- if the obstacle has been detected by the sensor on the left. Similarly there exists an APR 9301 for each of the other three sensors (right, front, behind). Each APR will have a 'Play' button. Each of these 'Play' buttons is connected to relay. The relay is driven by ULN 2003 IC. The system is using pins 16, 15, 14 and 13 of ULN 2003 to drive the relays. And the other ends of the relays are connected to pin number 9 which is given to a common 12 volts supply. The relay has a common contact, NC (normally connected) and NO (normally open). The common and NO terminals are shorted when the relay is excited. The 'Play' button of the APR is given to the relays common terminal and the other one will go to the NO terminal of the relay. The ULN is triggered by the microcontroller ATMEGA 8. The ULN 2003 receives triggers from the microcontroller at the pins 1, 2, 3 and 4. As soon as the relay is triggered the APR gets the signal and produces the pre-recorded message which will be given to the speaker. In order to enable the blind person the use of headphones there is an extra SPDT (Single Pole Double Throw) in the same relay circuitry. The speaker will throw on this switch. Hence one terminal of the speaker is connected to the common terminal which is connected to all the speakers. When the 'Play' button of the APR is pressed then the output of specific APR is given to this speaker by completing the connection and the blind person will hear the pre-recorded message from that specific APR. The duration of the message e.g. 20 seconds can be controlled by a simple resistor connected at APR 9301 pin 6. There is a direct supply voltage of +5volts for the APR to work. Now to design the +5 volts supply for the entire circuit, a 9 volts rechargeable battery is used whose output is given to the IC 7805 at pin 1 and pin 2. Pin 2 of the 7805 acts as circuit ground and pin 3 of 7805 generates the required +5 volts supply. In order to filter the supply there is a capacitor of 10 micro farad and 16 volts. For microcontroller basic circuitry there is one resistor of 10 k between pins 1 and 7 for reset circuitry pulled up by Vcc with pin 8 grounded. Pin numbers 9 and 10 of ATMEGA 8 are connected piezoelectric crystal between them of 16 MHz frequency. Pins 11,12,13,14 are used to trigger ULN 2003 and pins 3,4,5,6 of Atmega 8 are used to get data from the digital output i.e. output of the comparator. Hence as the sensor detects any obstacle the blind person will get the message from the APR on both the speaker and the headphones.

5 FLOW CHART

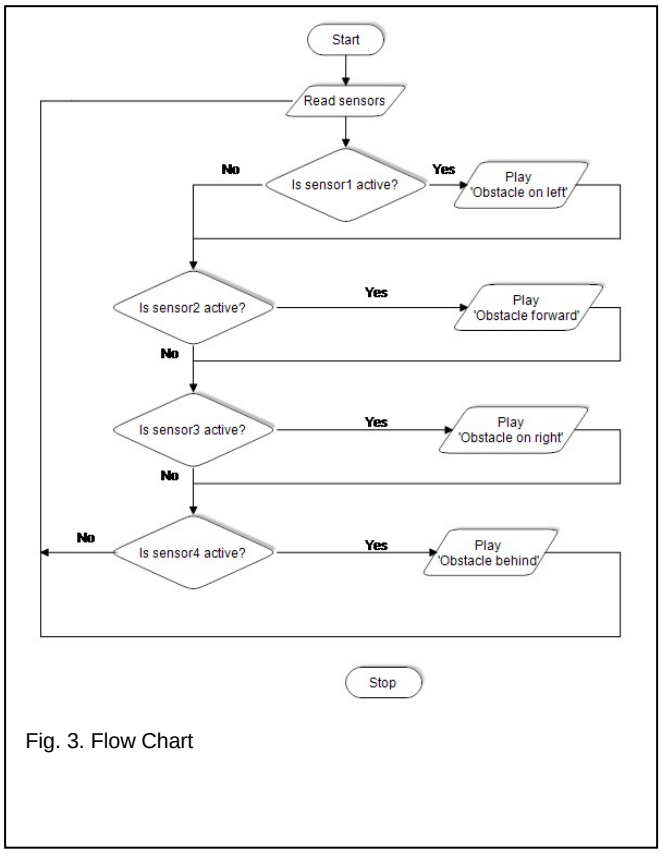

Fig. 3. Flow Chart

6 CONCLUSION

This project aims at making the visually impaired travel safely and autonomously. All obstacles will be detected by the blind belt and the blind person shall receive a pre-recorded message as a warning. Hence the blind person can travel independently.

.

ACKNOWLEDGMENT

We would like to thank the respected Principal Dr. Hari Vasudevan of D.J.Sanghvi College of Engineering and Head of Department of Electronics and Telecommunication, Dr. Amit Deshmukh for supporting us and giving us facilities and immense guidance. We would also like to thank Shri Vile Parle Kelavani Mandal for encouraging us in such co curricular activities

REFERENCES

[1] \bibitem{IEEEhowto:kopka}
[2] http://www.atmel.com/images/doc2486.pdf