

WIDE ANGLE VIEW FOR VISUALLY IMPAIRED

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Abstract - The very big challenge for the visually impaired people is to navigate around places. They suffer in a strange surrounding without any manual aid. According to "World Health Organization" report and the updated survey on October 17 on visual impairment, the estimated people live with vision impairment is about 253 million; 36 million are totally blind while 217 million suffer from moderate to severe vision impairment. The proposed solution is developing a wearable head band to help the visually impaired cope with the many challenges they face. This technology is developed with Arduino Pro Mini and Ultrasonic Sensor. As a result of evaluating the proposed application, it is easy to use and useful and can be employ for many important purposes in daily life.

Key words - Arduino UNO, ultrasonic, blind, Global positioning system(GPS) Global system for mobile(GSM).

I. INTRODUCTION

The visually impaired people also has eyes and they also cry. Blindness is one of the most misunderstood type of disability. The most important thing for the visually impaired person is to gain independence, so that they can lead a life without depending on anyone. There are many equipments that are developed for these people to do work on their own without expecting others help. The purpose behind this system is independent mobility of a visually impaired people. Walking through a different environment becomes a real challenge for most of the blind people, although they rely on their other senses. The very ancient mechanism used for assisting the blind people is a white cane commonly known as walking cane, a simple device to detect the ground, uneven surfaces. However, such aids fails to detect dynamic obstacles to prevent from accidents occurring to the blind person. But most of them hesitate to go outdoors unless they are forced to do so. Further, the biggest hurdle for blind is to travel distant unknown or dynamically changing environments. To help them and provide them with some level of comfort, many solutions and techniques have been tried and developed. One of these techniques is called orientation and mobility. In this technique, a specialist helps the visually impaired and trains them to move on their own. They are trained to depend on their other remaining senses to move independently and safely. Another method is through using a guide dogs. In this method, the dogs are trained specially to support the movement of the blind

people. The dogs navigate around the obstacles as an alert to the user to change his way. However, it is difficult for visually impaired people to understand the complex direction provided by these dogs. Additionally, the cost of these trained dogs is very high. There are many techniques that are developed for enhancing the blind people's transportation. In order to support blind and visually impaired people's mobility indoor and outdoor, this work proposes a simple head band which is efficient. The system utilizes devices including Arduino Pro mini board, ultrasonic sensor and GPS detector. It is a type of wearable band that is used to detect the obstacles. The speaker gives the information about the obstacles and the direction to take so that the person is moved out of danger.

II. LITERATURE SURVEY

To help the visually impaired people to move freely, many techniques have been enhanced. These methods and the newly developed devices help them in finding the obstacles and get them out of danger. Although many devices have been developed, there are many limitations in using those devices.

Samarthakoharwal, developed a navigation system for the blind people that uses the embedded vision system which is efficient. The system uses three types of devices namely IR sensor, sonar sensor and camera. All the sensors are made to work properly they give accurate readings. However, the range of the prototype is not high, which makes the raspberry pi hot.

Ayat nada developed a smart stick for the blind people to identify the obstacles around. The stick is provided with an infrared sensor that is used to detect the stair cases. An ultrasonic sensor is used to detect the obstacles in front of the user. This device is based on the embedded system.

Fabricio Puente-Mansilla designed a wearable UV sensor prototype which is provided with an audio notification system based on a smartphone app. The ultraviolet radiation from the sun is considered as the essential part for obtaining the vitamin D by the human body. Low cost components are used, although they give very good accuracy.

Poojasharma designed a virtual eye to improve the mobility of the blind people in a specific area. This device consist of a head hat, mini stick and foot shoes to help the blind walk alone safely. Ultrasonic sensor is also used for the navigation purpose. The main problem of this method is that heavy load is made to fit on the user which may be considered as uncomfortable for the people using it.

Lamyaalbraheem is developing a mobile application which uses man powered technology to help the blind people. The application is developed in the arabic language. This device is mainly developed for the arabic blind people, so that it can be used only by the arabic people. EstebonBayro Kaiser presented a wearable navigation system for the visually impaired people to transport safely. This system will track the position of the user who is walking in an unknown environment. The user will be provided with a wearable computer for data processing. This method is not made to replace the use of stick, it can just gather the information about the navigation of the user.

III. EXISTING SYSTEM

The existing system is made of a wearable technology for the visually impaired. The device uses Arduino pro mini and ultrasonic sensor. The Arduino pro mini is worn like a device. Using the ultrasonic sensor, the blind people can identify the obstacles around them and can travel safely. When the obstacle is detected, it is notified in the form of beep or vibration. Although, this device consist of wearable bands that are worn at 5 different places which may be considered a little difficult to worn.

IV. PROPOSED SYSTEM

In this project, we proposed to help the visually challenged people, a study that helps those people to walk more confidently is proposed. The study hypothesizes a smart wearable head band that helps the visually-impaired people over obstacles, wall and water in front so that they can walk with less accident. It outlines a better object navigational tool for the blind people. It consists of a simple head band equipped with sensors to give information about the environment. GPS technology is designed with the pre-programmed locations to determine the optimal route to be taken. In this system, ultrasonic sensor, pit sensor, level converter, driver, vibrator, voice synthesizer, keypad, speaker or headphone, Arduino controller and battery are used. The overall aim of the device is to provide a efficient and danger free method for the blind to overcome their difficulties in daily life

V. SCHEMATIC DIAGRAM

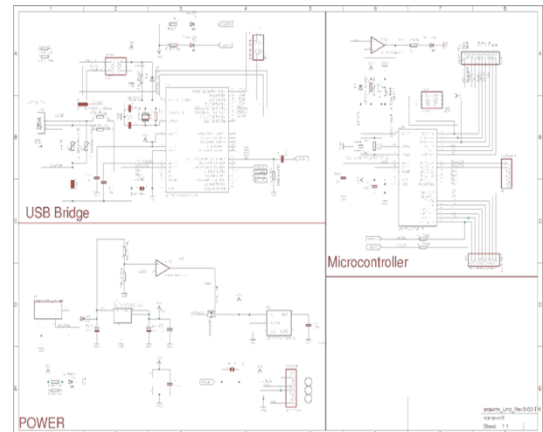


Fig-1: schematic diagram

VI. CONNECTION DIAGRAM

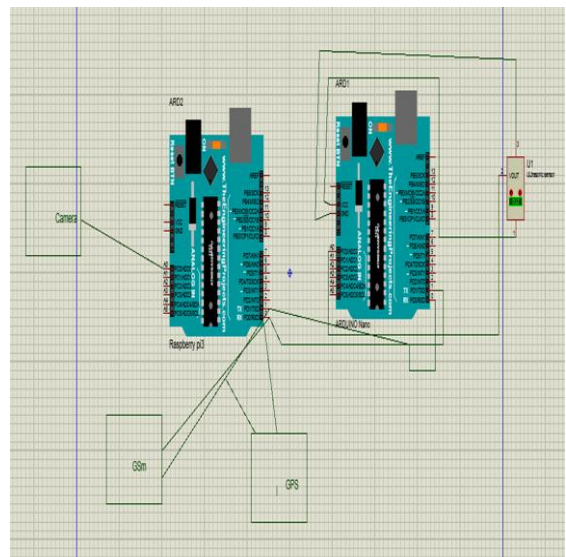


Fig-2: block diagram

VII. METHODOLOGY

This project proposes the design of a wearable head band used by the visually impaired people to identify the obstacles around them and have a free mobility without any danger. This device is an automated one which help the blind people either through vibration or speaker. So that the user can walk confidently and safely even in a crowded area. This method uses Arduino pro mini and ultrasonic sensor to detect the closeness of the object. The alert is given to the user by vibrating and an audio message is also send to the person with respect to the closeness of the object.

VIII. HARDWARE REQUIREMENTS

The device uses various components for giving the wide angle view for the blind people. The hardware components used in the system are:

- Arduino UNO microcontroller
- Ultrasonicsensor
- Voiceboard
- Speaker
- Headband
- GSM module
- GPS module
- Battery
- Regulator

The system design consist of the following software components:

- Arduinosoftware

i. arduino uno

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past outdated boards see the Arduino index of boards

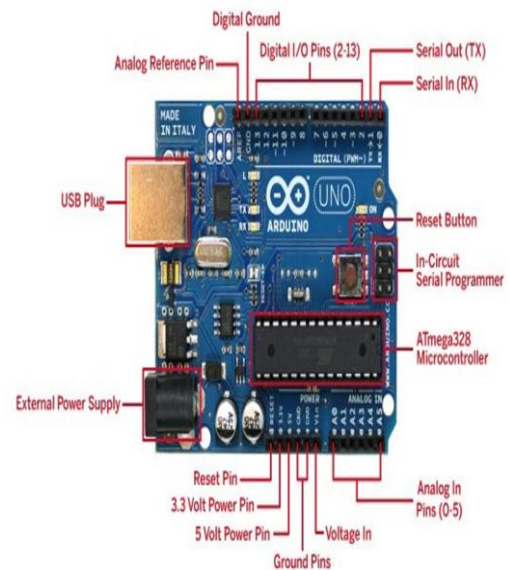


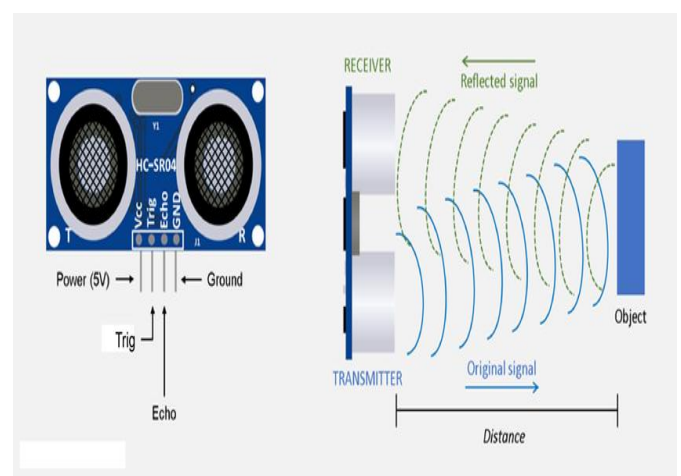
Fig-3: arduino board

ii. ultrasonic sensor

HC-SR04 Ultrasonic (US) sensor is a 4 pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. The sensor works with the simple high school formula that

$$\text{Distance} = \text{Speed} \times \text{Time}$$

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module



iii. gsm modules

GSM (Global System for Mobile Communications, originally Group Special Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI).

A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator- demodulator) is a critical part here. These modules consist of a GSM module or GPRS modem powered by a power supply circuit and communication interfaces (like RS-232, USB 2.0, and others) for computer.

iv. gps module

GPS receivers are generally used in smartphones, fleet management system, military etc. for tracking or finding location. **Global Positioning System (GPS)** is a satellite-based system that uses satellites and ground stations to measure and compute its position on Earth. GPS is also known as Navigation System with Time and Ranging (NAVSTAR) GPS. GPS receiver needs to receive data from at least 4 satellites for accuracy purpose. GPS receiver does not transmit any information to the satellites. This GPS receiver is used in many applications like smartphones, Cabs, Fleet management etc. GPS receiver uses a constellation of satellites and ground stations to calculate accurate location wherever it is located.

These GPS satellites transmit information signal over radio frequency (1.1 to 1.5 GHz) to the receiver. With the help of this received information, a ground station or GPS module can compute its position and time.

V. power supply

A power supply is also called as an PSU, which supplies power to the system. It is considered as an electrical device that is made to produce electric power. The main objective of the power supply is to convert electric current into current, voltage and frequency. By converting like this, the system will be able to function its process without any interrupt.

IX. SOFTWARE USED

A program for Arduino hardware may be written in any programming language with compilers that produce binary machine code for the target processor. Atmel provides a development environment for their 8-bit AVR and 32-bit ARM Cortex-M based microcontrollers: AVR Studio (older) and Atmel Studio (newer). Arduino is an source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for

building digital devices and interactive objects that can sense and control both physically and digitally. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits.

X. CONCLUSION

The proposed system tries to eliminate the flaws in the previous system. The main aim of this system is to solve the hurdles faced by the visually impaired people in their daily life. The system also takes measures to ensure their safety.

XI. FUTURE SCOPE

The proposed system can therefore be enhanced by using VLSI technology. This makes the system further more compact. Also, RFID tags can be used to transmit the location automatically to the PCB unit, when the head band is in its range. The RFID sensor doesn't have to read it explicitly.

XII. REFERENCES

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