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ARDUINO BASED BLIND GUIDE

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ABSTRACT

Technology is taking different phases in order to provide safe and flexible movement for the people. In a highly developed technology, People strive to live independently. For this, a low cost ultrasonic strap ups are designed for blind people to achieve personal independence. So that, they can travel to their destination easily and safely. A newly constructed strap ups is structured in such way that it could detect the obstacles in the moving path using ultra sonic sensors. It consists of sensors to scan the various directions, an Arduino Uno R3 kit, HC-SR04 Ultrasonic Module, vibrating motor, driver circuit and LCD display. The vibrating motor and driver circuit is made active when obstacle is to be detected. In addition to that the strap ups are worn by blind person that acts as a supporting wall. Embedded C Programmingis functioned successfully for this system. Computer simulation is done to essence the performance of system using technical software and easy working Arduino kit.

***Keywords*: Arduino Uno R3,HC-SR04 Ultrasonic Module, Strap Ups, Obstacles, Blind People.**

I. INTRODUCTION

There are so many people present around us with varying disabilities.These include deaf, handicapped, dump, blind etc. They depends the normal people for their daily activities. If this people can do their activities by themselves, it gives more confidence to them to interact with the society. Then they do not have any feel of their disabilities. This paper focuses on the problems of blind people.Due to the development of modern technologies, many different types of devices are available to assist the blind. They are commonly known as Electronic Travel Aid. Many of these travelling aids use either ultrasound or laser beam. One of such devices is the laser cane that is similar to a long cane with built-in laser ranging facilities.

But most of the commonly used electronic travelling aids use ultrasound for functioning. These devices use the reflectance property of the high frequency ultrasound. The problem with using Ultrasonic Sensors on blind stick is the limited direction that it can sense as well as well as it can sense at only one specified height.

In our proposed system a wearable ultrasonic sensor which can be worn on both the legs at knee height so he can sense if obstacle is only on left side or right side or both sides.Moreover we will also be using one wearable ultrasonic sensor on the hands which the blind person can move and detect at different Places.

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Normally buzzers are provided as indication but the problem is it creates a lot of noise and can be irritating. So instead we will be using simple vibrating motors besides the ultrasonic sensor and thus indicate if there is obstacle there or not.

II. SYSTEM REQUIREMENTS

The system in this paper proposes consist ofconsists of Arduino Uno R3 microcontroller, Ultrasonic sensor, Mini vibrating DC motor, Driver circuitry,LCD.The block diagram of proposed system is as follows.

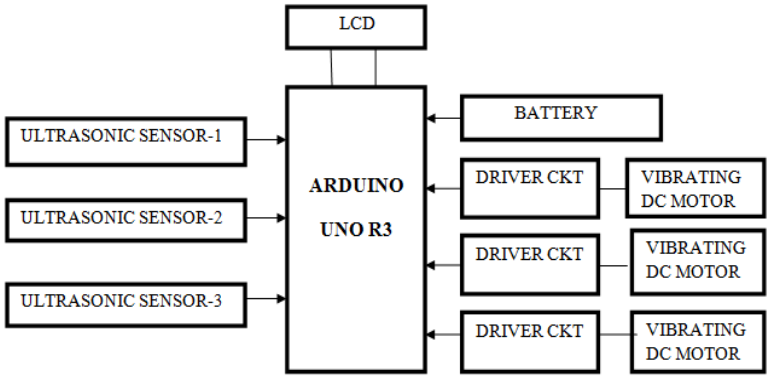

Fig 1: Basic Block diagram of the Advanced Electricity Consumption Monitoring System.

2.1 Arduino Uno R3Microcontroller

Arduino is an open source electronics platform based on easy to use hardware and software.The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz ceramic resonator, 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 an AC-to-DC adapter or battery to get started.

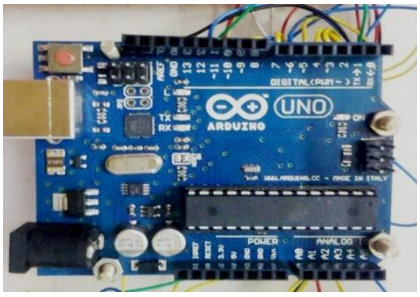

Fig.2 Arduino Uno R3 Microcontroller

2.2 Ultrasonic Ranging Module HC - SR04

Ultrasonic transmitter emitted an ultrasonic wave in one direction, and startedtiming when it launched. Ultrasonic spread in the air, and would returnimmediately when it encountered obstacles on the way. At last, the

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ultrasonicreceiver would stop timing when it received the reflected wave. As Ultrasonicspread velocity is 340m / s in the air, based on the timer record t, we cancalculate the distance (s) between the obstacle and transmitter, namely: s =340t / 2, which is so- called time difference distance measurement principleThe principle of ultrasonic distance measurement used the already-known airspreading velocity, measuring the time from launch to reflection when itencountered obstacle, and then calculate the distance between the transmitterand the obstacle according to the time and the velocity. Thus, the principle ofultrasonic distance measurement is the same with radar.Distance Measurement formula is expressed as: L = C X TIn the formula, L is the measured distance, and C is the ultrasonic spreadingvelocity in air, also, T represents time (T is half the time value from transmittingto receiving).

Fig.3HC-SR04 Ultrasonic Module

Set low the Trigger and Echo port when the module initializes , firstly, transmitat least 10us high level pulse to the Trigger pin (module automatically sends eight40K square wave), and then wait to capture the rising edge output by echo port,at the same time, open the timer to start timing. Next, once again capture thefalling edge output by echo port, at the same time, read the time of the counter,which is the ultrasonic running time in the air. According to the formula:testdistance = (high level time * ultrasonic spreading velocity in air) / 2, you cancalculate the distance to the obstacle.

2.3 Coin Vibration Motor

Precision Micro drives currently produces coin vibration motors, also known as shaft less or pancake vibrator motors, generally in Ø8mm - Ø12mm diameters for our Pico Vibe range. Pancake motors are compact and convenient to use. They integrate into many designs because they have no external moving parts, and can be affixed in place with a strong permanent self-adhesive mounting system.Enclosures can easily be moulded to accept the coin form of our shaft less vibration motors. Within the coin motor range, we offer both leaded and spring & pad mountable versions. Like all of our vibration motors, we are happy to quote for variations to the base design such as a modification to the lead length and also connectors.

Fig.3Vibration Motor

Due to their small size and enclosed vibration mechanism, coin vibrating motors are a popular choice for many different applications.

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2.4 LCD

A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it.

III. METHODOLOGY

The three Ultrasonic sensors, two on strap ups and one on hand, will sense the obstacles upto 4m. If any obstacle is detected, the sensor will give the signal to the Arduino. Arduino will give the signal to the Vibrating Motor which is similar to the motor used in mobile phone. But Arduino cannot be directly connected to the motor; hence a Driver circuitry is placed in between Arduino and motor. So, the Arduino will activate the Driver and then the Driver will activate the motor. As soon as the Ultrasonic sensor sense an obstacle the motor will start vibrating and the Blind person will get an indication of the obstacle.

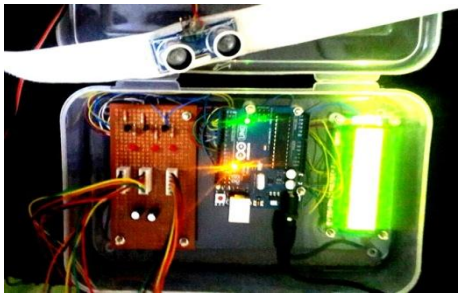

Fig 4: PCB showing Arduino Uno and interfaced components.

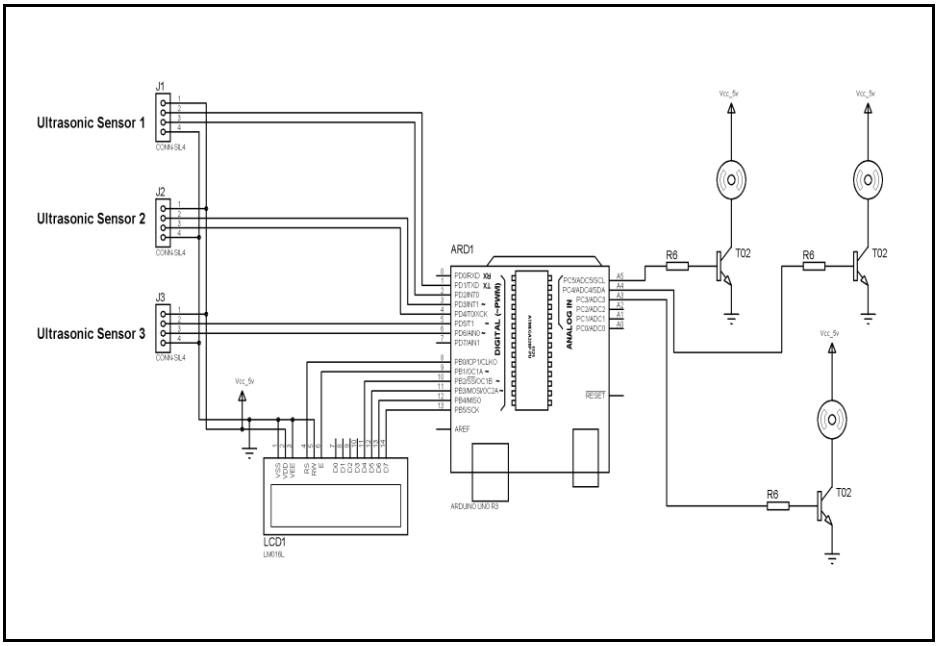

Fig 5: Circuit diagram of the Advanced Electricity Consumption Monitoring System.

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IV. RESULTS AND DISCUSSION

The ETA (Electronic Travelling Aid) system when faces an obstacle, within 1 meter distance it willsense the obstacle through ultrasonic sensor and produce vibration based signal as “path guiding obstacle detected” and display the same in LCD.

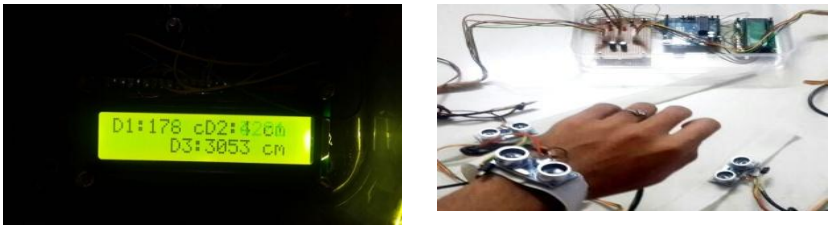

Fig 6: Sample Results on Display.

V. CONCLUSION

The design and architecture of a new concept of Smart Electronic Travel Aid Strap ups for blind people. The advantage of the system lies in the fact that it can prove to be a very low cost solution to millions of blind persons Worldwide. The proposed combination of various working units makes a real-time system that monitors position of the user and provides dual feedback making navigation more safe and secure.

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