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AN INTELLIGENT WALKING STICK FOR VISUALLY CHALLENGED PEOPLE WITH VOICE ALERT

GUNTURU UDAY KIRAN*1, Mr. P.V.M VIJAY BHASKAR*2, AMMISETTY NAVEEN*3, DUMPA VENKATA ASHOK KUMAR REDDY*4, TAGARAM VARAPRASAD*5

ABSTRACT:

The main object of this project is to come up with an idea to help blind and visually impaired society people. Using blind stick the blind person can walk independently on his own and stick will assist the person to navigate. People with visual disabilities often depend on external assistance for their help like humans, trained dogs, or some kind of electronic device as their support systems. We accomplished this goal by adding buzzers and ultrasonic sensors which will help the user to overcome this difficulties. The proposed system will guide the user where the object is with the help of ultrasonic sensors. In case of the emergency situation the location of the person is shared to their family members so that they can track them easily.

I. INTRODUCTION

Independence plays the most important role in ours lives in achieving our goals, dreams and objectives in our lives.Blind people are people who finds it difficult to recognize the things around them difficult with the healthy eyes, so the stick which we have built will help them recognize things easily and make them feel comfortable. Blind or visually impaired person always looks for some kind of helping hand from the other person whenever they go out of the house which make them feel less independent. Blind people goes through a lot of problems while walking on the streets. This system design and develops a stick which will help the blind person navigate easily on the streets and make them more comfortable and independent. Most of the blind guide systems use ultrasound sensors because of the immunity to the environmental noise. The blind stick which we have developed will help visually impaired people roam easily and comfortably without any problem. With the rapid advancement in the technologies both in hardware and software it has become much easier to provide intelligent navigation system for the visually impaired peoples.

* 1,3,4,5 B. Tech Students, *2 Assistant Professor,
Dept. of Electronics and Communication Engineering,
RISE Krishna Sai Prakasam Group of Institutions

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II. LITERATURE SURVEY

Today the system which is in wide use involves the practice followed from many years. This involves the sealed boxes containing the question papers which will be distributed to the examination centers. This system involves many disadvantages which may lead to leakage of question papers at various instances while the box is moved from printing location to examination centers. This happens due to easy tampering of sealed boxes and more human interference.

The other method which is in use today involves the mailing of the question papers from the university to respective colleges prior to examination. The colleges take the printouts of the question paper and then the examination procedure follows.Even this particular method also involves many disadvantages. The sever breakdown may occur, website may be hacked, and more than 100 colleges should take printouts which involves the threats like power failure, system failure and leakage of the paper. The idea for the proposed system which involves the electronic protection is derived from modern day equipments like automated teller machine (ATM), Electronic lockers and other security enhanced electronic systems.

III.DESIGN OF HARDWARE

This chapter briefly explains about the Hardware. It discuss the circuit diagram of each module in detail.

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 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 a AC-to-DC adapter or battery to get started.The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Arduino board has the following new features:

- 1.0 pin out: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.
- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

Fig: ARDUINO UNO

POWER SUPPLY:

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can by broken down into a series of blocks, each of which performs a particular function. A d.c power supply which maintains the output voltage constant irrespective of a.c mains fluctuations or load variations is known as “Regulated D.C Power Supply”.

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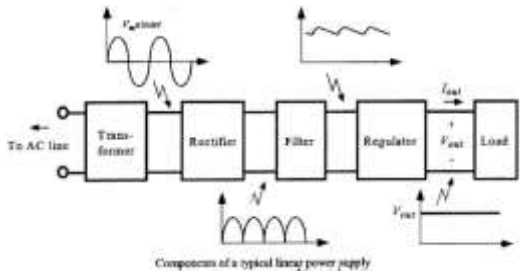


Fig: Block Diagram of Power Supply

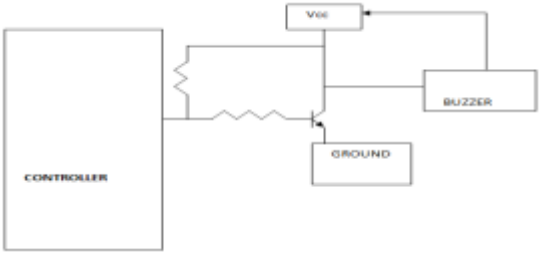
LCD DISPLAY

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (Hitachi) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics.

Fig: LCD

BUZZER

Digital systems and microcontroller pins lack sufficient current to drive the circuits like relays, buzzer circuits etc. While these circuits require around 10milli amps to be operated, the microcontroller's pin can provide a maximum of 1-2milli amps current. For this reason, a driver such as a power transistor is placed in between the microcontroller and the buzzer circuit.



WIFI MODULE:

The **ESP8266** is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer, Espressif Systems.The chip first came to the attention of western makers in August 2014 with the **ESP-01** module, made by a third-party manufacturer, Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted.[2] The very low price and the fact that there were very few external components on the module which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.The **ESP8285** is an ESP8266 with 1 MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.The successor to these microcontroller chips is the ESP32.

L293D:

The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are

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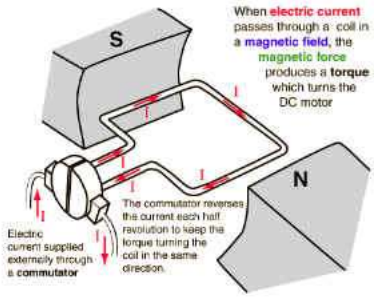
active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

DC MOTOR

A DC motor is designed to run on DC electric power. Two examples of pure DC designs are Michael Faraday's homopolar motor (which is uncommon), and the ball bearin motor, which is (so far) a novelty. By far the most common DC motor types are the brushed and brushless types, which use internal and external commutation respectively to create an oscillating AC current from the DC source -- so they are not purely DC machines in a strict sense.



Rain sensor

With the weather being as unpredictable as ever, it’s easy to leave your skylights open, only for it to suddenly start raining, leaving the interior below at risk. With this rain sensor, however, you can stop this from happening. You can use this sensor to monitor rain or slushy snow/hail and send closure requests to electronic shutters, windows, awnings or skylights whenever the rain is detected.

The working of the rain sensor is pretty straightforward. The sensing pad with series of exposed copper traces, together acts as a variable resistor (just like a potentiometer) whose resistance varies according to the amount of water on its surface.

ULTRASONIC RANGE FINDER

A guide to using the Arduino Ultrasonic Range Detection Sensor with Arduino in order to calculate distances from objects. In this case I'm also altering the output of an LED with PWM according to how close an object is to the sensor. So the nearer you are the brighter the LED. So if we start with the Arduino Ultrasonic Range Detection Sensor, it's an IC that works by sending an ultrasound pulse at around 40Khz. It then waits and listens for the pulse to echo back, calculating the time taken in microseconds (1 microsecond = 1.0 x 10-6 seconds). You can trigger a pulse as fast as 20 times a second and it can determine objects up to 3 meters away and as near as 3cm. It needs a 5V power supply to run.

Adding the Arduino Ultrasonic Range Detection Sensor to the Arduino is very easy, only 4 pins to worry about. Power, Ground, Trigger and Echo. Since it needs 5V and Arduino provides 5V I'm obviously going to use this to power it. Below is a diagram of my Arduino Ultrasonic Range Detection Sensor, showing the pins. There are 2 sets of 5 pins, 1 set you can use, the other is for programming the PIC chip so don't touch them!

Fire/Flame Sensor Module

Flame sensor is the most sensitive to ordinary light that is why its reaction is generally used as flame alarm purposes. This module can detect flame or wavelength in 760 nm to 1100 nm range of light source. Small plate output interface can and single-chip can be directly connected to the microcomputer IO port. The sensor and flame should keep a certain distance to avoid high temperature damage to the sensor. The shortest test distance is 80 cm, if the flame is bigger, test it with farther distance. The detection angle is 60 degrees so the flame spectrum is especially sensitive. The detection

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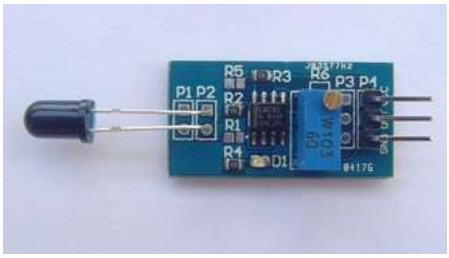
angle is 60 degrees so the flame spectrum is especially sensitive.



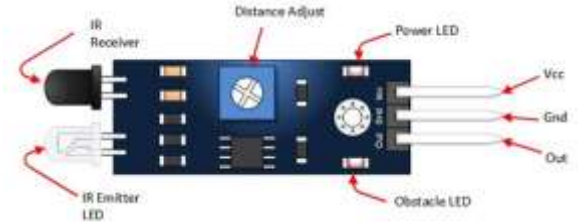
IR

IR technology is used in daily life and also in industries for different purposes. For example, TVs use an IR sensor to understand the signals which are transmitted from a remote control. The main benefits of IR sensors are low power usage, their simple design & their convenient features. IR signals are not noticeable by the human eye. The IR radiation in the electromagnetic spectrum can be found in the regions of the visible & microwave. Usually, the wavelengths of these waves range from 0.7 µm 5 to 1000µm. The IR spectrum can be divided into three regions like near-infrared, mid, and far-infrared. The near IR region's wavelength ranges from 0.75 – 3µm, the mid-infrared region's wavelength ranges from 3 to 6µm & the far IR region's infrared radiation's wavelength is higher than 6µm.

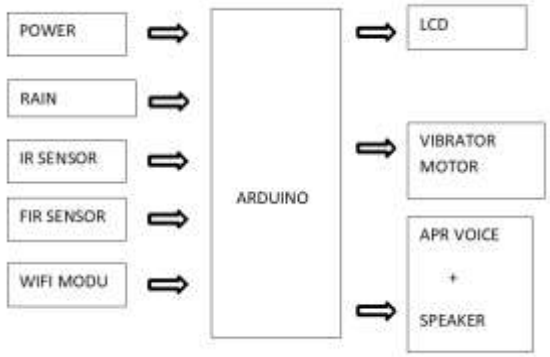
Infrared technology addresses a wide variety of wireless applications. The main areas are sensing and remote controls. In the electromagnetic spectrum, the infrared portion is divided into three regions: near infrared region, mid infrared region and far infrared region. The wavelengths of these regions and their applications are shown below.

- Near infrared region — 700 nm to 1400 nm — IR sensors, fiber optic
- Mid infrared region — 1400 nm to 3000 nm — Heat sensing
- Far infrared region — 3000 nm to 1 mm — Thermal imaging

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation.



IV.BLOCK DIAGRAM:



Working: During the evaluation of the design and development of Smart Sensor Based Walking Stick it was tested in practicable and real time conditions. It is also evaluated by blind person. There are different conditions on different routes have been chosen to test the performance. In first route, we have placed dummy of wall as obstacles in numbers. The blind person was unfamiliar with this place. At first Blind person used the white cane on this route and comparative performance with white can has been evaluated. The route was 27m long in distance and it was covered at a speed of 0.522 m/s with help of white cane. But when blind person used smart stick it was covered at speed of 0.78 m/s and without any problem. In the end route shows that "Smart walking stick" has outstanding performance as compared to white cane. Likewise first route we got excellent results when we tested this stick in other routes as well. The main purpose of this methodology is to help disabled people by advancing the techniques used earlier so that they will confidently and easily spend their life without any dependence. We have embedded the health monitoring features in smart stick because in

blind and elder people health is major issue and this walking stick health monitoring features will be a comfort. This stick will give them a feeling of relief and liberation and they always feel connected to some person whom they wanted to associate in case of emergency by sending an alert whenever needed. To advance the earlier designed electronic walking stick we have adjoin all necessary solutions in a single walking stick to the problematical concerns of daily life of elderly and blind users.

V.CONCLUSION

This paper presents the implementation of the blind stick that assists a visually impaired people to its destination safe and secure. We use various sensors to detect the obstacles and guide the person accordingly. As the person nears the obstacles the beep sounds will keep on increasing warning the person that he might get into danger. We have also used GSM and GPRS module which help to trace the blind person with the data collected by it.

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