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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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Project Report

SMART BLIND STICK

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TABLE OF CONTENTS

LIST OF FIGURES

ABSTRACT

The main aim of this project is to help the blind people so that they can easily interact with the physical world by using the smart blind stick. About 280 millions of people are visually challenged. Worldwide there are 39 million blind and about 244 million people have low vision. Those people can't walk without help of others. A physically impaired person has to ask guidance from others in order to reach their destination. With the help of this Smart blind stick, they can walk more confidently. This stick comes with an ultrasonic sensor to detect the object if it is in front of the person and it will give response to the user by an alarm with the help of the buzzer. So, they can walk without any fear. LDR sensor is used in this stick to identify if it is day or night or if they are in dark or not for the blind people. The Arduino Uno is used to receive the sensor signals and process them to the Arduino pins where buzzers are connected. Smart blind stick will be a best and easy to use solution to overcome the difficulties faced by the blind people which helps them to live a better life.

1. INTRODUCTION

Visually impaired blind people have difficulty to interact with others and feel the environment. These people have only little contact with their surroundings. Physical movement has been a challenge for visually challenged peoples, because it is difficult to differntiate obstacles appearing in front of them. They often face difficulty to move from one place to another. They depend on their families and others for mobility and support. Over the last few years, research has been conducted for discovering new devices to design a good and reliable system for visually challenged persons to detect obstacles and alert them at every danger places. Smart walking stick is a specially designed mechanical aid to detect obstacles which will help the blind people to move safely. The alarm will make the user alert which may considerably reduce accidents. This proposed system is presented to provide a smart electronic aid for blind people which can be used in both public and private space. The proposed blind stick consists of the Ultrasonic sensor, LDR, and the Buzzer. The smart stick measures the distance between the objects and walking stick by using an ultrasonic sensor. If any obstacles comes in range of an ultrasonic sensor then the buzzer will alarm and alert the user. The smart blind stick is a simple and a mechanical device to detect the obstacles and objects on the ground. The smart device is light in weight and portable. But the range of detection is limited due to its size. It provides the best travel aid for the blind, so that the blind person can move from one place to their destination independently.

2. LITERATURE SURVEY

In [1], A Smart White blind stick with an ultrasonic sensor along with IR sensor and other technologies such as Arduino IC is a boon for blind people. The application of ultrasonic sensor scheme along produces electronic walking stick with many improved features for the blind people is a technological advancement.

In [2], The stick deals with a design of Intelligent White stick which is capable of tracking the signal receptor services. A model design of white stick has been designed from our end where it has an extra unique features such as Navigation system to guide family members of blind to know their location.

In [3], A smart stick guide model represented for visually challenged person to guide their way. It consists of a Global Positioning System and a Global System for Mobile Communication modules along with some sensors like Ultrasonic sensor and IR sensor.
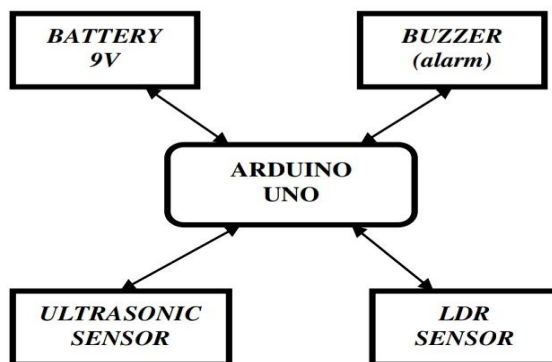
3. PROPOSED CIRCUIT DIAGRAM/EXPERIMENTAL SETUP

Fig1.1 Schematic setup

4. COMPONENTS USED AND THEIR DESCRIPTION

4.1 Hardware components:

The hardware requirements are :-

- Arduino UNO
- Battery (9V)
- Buzzer
- Jumper Wires
- Ultrasonic Sensor HC-SR04
- LDR Sensor

4.1.1 Arduino UNO

Arduino is an intelligent tool for making computers which can sense and also control the physical world more than the desktop and a computer. It is an open source computing platform that is based on a simple microcontroller board. It is a developed environment for writing a software for a board. These boards can be assembled by person and it can be purchased.

Fig4.1 Arduino UNO

4.1.2 Battery 9V

The 9V battery works well in an Arduino kit. Connect the positive end of the battery to Arduino Vin and the negative end to Arduino ground.

Fig 4.2 9V Battery

4.1.3 Buzzer

The buzzer is connected to the Arduino kit with the help of jumper wires. It is used to alert the user by making an alarm.

Fig 4.3 Buzzer

4.1.4 Ultrasonic sensor

Ultrasonic sensors are used as transceivers in pairs. A device which emits sound waves is known as transmitter and a device which receives echo is called as a receiver. The sensors is based on a principle that is similar to radar or a sonar that detects the obstacle with the help of Echoes and sound from sound waves. This detect the obstacle and alarm to alert the blind user.

Fig 4.4 Ultrasonic sensor

4.1.5 LDR sensor

In order to detect the intensity of light and darkness, a sensor called an Light dependent Resistor(LDR) is used. It is a special type of resistor which allows high voltage to pass through it (i.e., low resistance) and if there is a high intensity of light and passes a low voltage (i.e., high resistance) if it is dark.
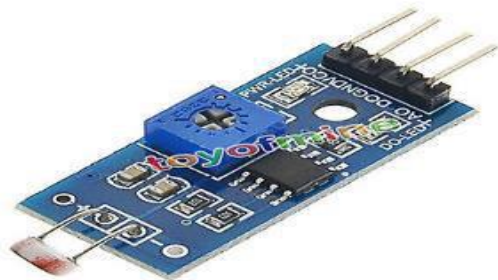

Fig 4.5 LDR sensor

4.2 Software components:

The software requirements are :-

- Arduino IDE
- Programming Language: C/C++

4.2.1 Arduino IDE

The Arduino IDE is an incredibly minimalistic software, but still it provides a complete environment for most of the Arduino-based projects. The Arduino coding shows the distance between the object or obstacle and the blind persons.

4.2.2 Programming Language: C/C++

In this smart blind stick project, the C/C++ programming language is used to write the coding.

5. FUNCTIONAL DESCRIPTION OF THE PROPOSED WORK

5.1 Working

The proposed project smart blind stick first uses ultrasonic sensor which helps to detect obstacles and objects without touching it using the ultrasonic waves. On sensing the objects the sensor passes the data to the Arduino. The Arduino then processes the data and then calculates if the obstacle or the object is close enough to the stick. If the object is far from the stick the circuit does nothing but if the obstacle or the object is close to the Arduino it sends a signal to sound the buzzer to alert the user. The Ultrasonic sensor is used to detect if there is any obstacle in front of the blind person or the user. The Detection Distance is of 2cm-450cm. Whenever there is any obstacle within this range, it will alert the user. One more added feature is that it allows the visually impaired person to detect if there is any light or darkness present in the room. The darkness and light can be found by using the LDR sensor. The LDR is a type of resistor whose resistance will vary depending upon the amount of light. In this smart blind stick the Ultrasonic sensor and LDR sensor are used. These sensors are connected to the Arduino, where the buzzer is also connected. The buzzer is used to make sound when the user is near any object and it will measure the distance between the obstacle and the visually impaired person. During darkness or during the night the buzzer will alarm.

5.2 Software code

```
const int trigPin=9;
```

```
const int echoPin=10;
const int buzzer=2;
const int ldr = A0;
long duration;
int distance;
int distanceInch;
int night = 0;
void setup()
{
Serial.begin(9600);
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
pinMode(buzzer, OUTPUT);
pinMode(ldr, INPUT);
}
void loop()
{
Serial.print("Distance!");
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distance = duration*0.034/2;
distanceInch=duration*0.0133/2;
night = digitalRead(ldr);
if (distance < 70 || night == HIGH)
{
digitalWrite(buzzer,HIGH);
}
```

6. RESULTS AND DISCUSSION

After testing, the system proposed in this paper helps people walk in a comparatively safe environment reliably, such as indoors, parks, and schools. The system not only

makes them more independent, but also free their minds and throw away many worries and doubts. However, in some specific open physical environment, such as on the road, the blind people still need someone accompany them in case of a long trip. The effect of this smart system will reduce the dependency of other people.

7. CONCLUSION

Visually challenged people face lot of difficulties while moving from one place to another. With the motive to help the blind, their problems, the smart blind stick is proposed. The system has an LDR sensor to detect day and night and ultrasonic sensor to detect obstacles. The proposed system takes the blind person to reach the destination without any difficulties in their path. The buzzer is used to make alarm sounds to warn them.

8. FUTURE SCOPE

This project has an excellent scope in the future as well as the present. The project can be executed with the different sensor to help the visually challenged people in the world. The most important theme of this project is to guide the blind people and make them to interact with the physical environment. In the near future this project can be improvised by adding GPS and GSM module. The modules are used to track the current location of the blind people. The emergency button is placed to help them if they are in any danger or need any help. The device can also be placed in their clothes or hat to make the device more portable and easy to use by the visually challenged people.

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