Audio Guidance System for Blind People

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Abstract — The most of blind people in the world use white canes to go from one place to another place. Due to their blindness they are not able to perceive their surroundings. So the mobility of visual impaired people is limited. People with visual disabilities are often dependent on external assistance which can be provided by humans, trained dogs, or special electronic devices as support systems for decision making.We accomplished this goal by adding ultrasonic sensors at specific positions to the cane that provided information about the environment. The system consists of obstacle and moisture detection sensors for receiving , processing and sending signal to the alarm system which finally alerts the user prompt action. Blindness is one of the most feared afflictions in the world. It is difficult to travel to a desired destination for blind people. This feature of this device are real time obstacle detection ,voice command ,functionality vibration for guidance.

Key words— Arduino Uno, Ultrasonic Sensor, Audio playback voice recorder, Speaker.

I INTRODUCTION

In this world approximately 21.2 million blind or visually impaired people in the US alone. Currently most blind people rely on other people, dogs, and their canes to find their way in building. This project aims to help the blind in object detection with the distance of the object and to provide audio information about the object detect. The system facilities blind people to navigate independently without any external help by means of talkative assistance.

The system is equipped with obstacle sensors such as Ultrasonic and RF sensors to alert the blind people. The goal of this paper is develop a intelligent system for guiding by providing information about the environmental of object around them. The main functions of this system are path for recognition. The system is equipped with a small embedded system.

The recognize the destination place from voice command a route from current position to desire destination. Ultrasonic sensor will provide information about obstacles in the range. The device to develop a good reliable system for visually impaired people to identify obstacles and alert and the audio recognition for the blind people. The study purpose a improved technique for designing a smart stick to help visually impaired people for their system. In this system, the ultrasonic sensor are used to detect the obstacles by using sensor. By sensing the obstacles the sensor passed the received data to the microcontroller.

II EXISTING SYSTEM

Existing system which provides guidance to blind like guide cane, smart vision use ultrasonic sensors or RF sensor to detect in front of blind by transmitting the reception of reflected. It produces an audio or vibration in response to detected to blind person. System like ultra cane help blind people by collecting information through sensors transmitting through vibration or audio message to hopes provide a blind people. Systems like Sound View use single camera or stereo video cameras mounted on a wearable device to capture images. These captured images are resized, processed further and converted to speech, audio, musical sounds or vibrations. In such systems, the frequency of warning sound signal is correlated with the orientation of pixels. Some systems like Ultra Cane help blind people by collecting information through sensors and then transmitting recommendations through vibration or sound message to the user. The above solutions have disadvantages for instance, they can’t detect obstructions that are hidden but very dangerous for the blind such as downward stairs, holes etc.

III PROPOSED SYSTEM

It's basically an embedded system integrating the following pair of ultrasonic sensor detect to obstacles in front blind from ground level height to head level height of the stick . The sensor collect the real-time data and send to the arduino microcontroller for processing. Guide cane the which is built specifically to help of blind users in easily cross the unfamiliar areas. It is also help in solving to routine problems for blind people about. This data is then forwarded to software layer through hardware to calculate the location and distance of the obstacle by using predefined GPS maps. Finally, the speech layer converts the obtained data from the software layer into audio form (speech). This speech can guide the blind person inside the building.

1. IV BLOCK DIAGRAM

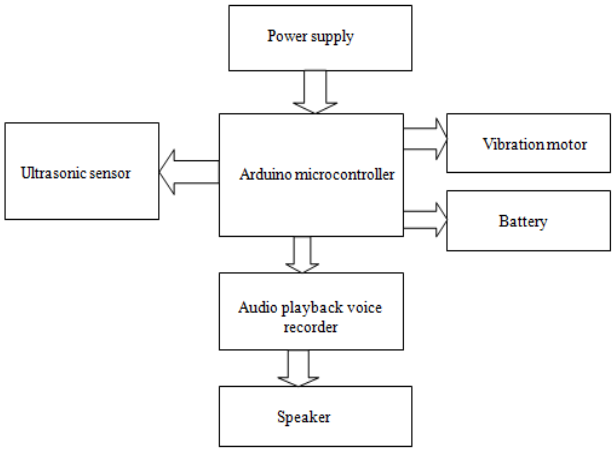

Fig. Block diagram of the system

Above figure shows the block diagram system is audio guidance system for blind people.

This block diagram includes following components.

- Arduino Microcontroller
- Power Supply
- Ultrasonic Sensor
- Audio Playback Voice Recorder
- Speaker
- Vibration Motor
- Battery

1. ARDUINO

The Arduino Uno R3 is a open source microcontroller board based on the ATmega328 chip. This Board has 14 digital input/output pins, 6 analog input pins, Onboard 16 MHz ceramic resonator, Port for USB connection, Onboard DC power jack, An ICSP header and a microcontroller reset button. It contains everything needed to support the microcontroller. Using the board is also very easy, simply connect it to a computer with a USB cable or power it with 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 Atmega16U2Atmega8U2 up to version R2) programmed as a USB-to-serial converter. While the Arduino UNO can be powered via the USB connection or with an external power supply, the power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery.

The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Also leads from a battery can be inserted in the Gnd and Vin pin headers of the Power connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 5v to 12v for Arduino Uno.

2. POWER SUPPLY

If the barrel connector and an AC-DC adapter are being used to power up the Arduino, make sure that the output of the adapter is between 7-12V. Although the rated input can exceed to as much as 20V, it is safe to stay within the recommended range to protect the voltage regulator from excessive heating. Also, see to it that the GND and Vin pins are not shorted .But if you are using the 5V and GND pins to power up the Arduino, it is imperative that the 5V input is stable and steady. If the Vin/5V and GND pins are being used to power up the Arduino, double-check the polarity because if the GND and 5V/Vin pins are mixed up, it can potentially damage the Arduino board.

3. ULTRASONIC SENSOR

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear).

Ultrasonic sensors have two main components: The transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver. The formula for this calculate D=½T x C (where D is the distance, T is the time, and C is the speed of sound ~ 343 meters/second). For example, if a scientist set up an ultrasonic sensor aimed at a box and it took 0.025 seconds for the sound to bounce back, the distance between the ultrasonic sensor and the box would be:

D=0.5*0.025*343

Ultrasonic sensors are used primarily as proximity sensors. They can be found in automobile self-parking technology and anti-collision safety systems. Ultrasonic sensors are also used in robotic obstacle detection systems, as well as manufacturing technology. In comparison to infrared (IR) sensors in proximity sensing applications, ultrasonic sensors are not as susceptible to interference of smoke, gas, and other airborne particles (though the physical components are still affected by variables such as heat). Ultrasonic sensors are also used as level sensors to detect, monitor, and regulate liquid levels in closed containers (such as vats in chemical factories). Most notably, ultrasonic technology has enabled the medical industry to produce images of internal organs, identify tumors, and ensure the health of babies in the womb.

4. AUDIO PLAYBACK VOICE RECORDER

ISD1820 is a small Voice Recorder and Playback module that can do the multi-segment recording. The user can achieve a high quality of recording (for 8 to 20secs) for each application with the adjustment of the on-board resistor. This Voice Recorder/Playback module is designed with embedded-Flash memory, which can hold data for up to 100 years and erase/record the life cycle up to 100,000.Voice Record Module is base on ISD1820, which a multiple-message record/playback device. It can offers true single-chip voice recording, no-volatile storage, and playback capability around 10 seconds. This module is easy to use which you could direct control by push button on board or by Microcontroller such as Arduino, STM32, Chip Kit etc. From these, you can easy control record, playback and repeat and so on.

5. SPEAKER

The most common output devices used with computer systems. Some speakers are designed to work specifically with computers, while others can be hooked up to any type of sound system. Regardless of their design, the purpose of speakers is to produce audio output that can be heard by the listener. Speakers are transducers that convert electromagnetic waves into sound waves.

The speakers receive audio input from a device such as a computer or an audio receiver. This input may be either in analog or digital form. Analog speakers simply amplify the analog electromagnetic waves into sound waves. Since sound waves are produced in analog form, digital speakers must first convert the digital input to an analog signal, then generate the sound waves.

6.VIBRATION MOTOR

An eccentric rotating mass vibration motor (ERM) uses a small unbalanced mass on a DC motor when it rotates it creates a force that translates to vibrations. A linear resonant actuator (LRA) contains a small internal mass attached to a spring. Vibration motor is a coreless DC motor and the size of this motor is compact.

The main purpose of this motor is to alert the user from receiving the call by without sound/vibrating. These motors are applicable for different applications like pagers, handsets, cell phones, etc. The main feature of this motor is, it has magnetic properties, lightweight, and motor size is small. Based on these features, the motor performance is highly consistent. The configuration of these motors can be done in two varieties one Is coin model and another one is a cylinder model. The vibrator motor specifications mainly include type, max operating torque, max .centrifugal force, weight range, rated current and output. creates a force when driven.

IV WORKING PRINCIPLE

The ultrasonic sensor to be connect the Arduino UNO The input pins of trigger and echo is connect to ultrasonic sensor is pin no. 7 and 6. The vibration motor is connect to pin no. 9. Audio playback voice recorder is connect to arduino. Speaker is connect to audio playback to continue in arduino programming.

The Arduino code to detect the obstacle to speaker output:

```
const  inttrigPin = 7;
const  intechoPin = 6;

#define RELAY  8



#define VIBMOTOR  9
float duration ,  distance;

void ultrasonic( )
{
digitalWrite (trigPin, LOW);
delayMicroseconds (2);
digitalWrite (trigPin, HIGH);
delayMicroseconds (10);
digitalWrite (trigPin, LOW);

duration = pulseIn (echoPin, HIGH);
distance = (duration*.0343)/2;
Serial.print (“Distance: “);
Serial.print1n(distance);
Delay(1000);
If (distance<20)
```

```
{
digitalWrite (RELAY, HIGH);


  digitalWrite (VIBMOTOR, HIGH);
delay(500);  digitalWrite (RELAY, LOW);
 delay(1000);
  digitalWrite (VIBMOTOR, LOW);
Serial.print1n("OBJECT DETECTED….STOP");
 delay(3000);
}
else
{
  digitalWrite (RELAY, LOW);
}
}

void setup ( )  {
PinMode (trigPin,    OUTPUT);
PinMode (echoPin, INPUT);
PinMode (VIBMOTOR, OUTPUT);
PinMode (RELAY, OUTPUT);

delay (1000);
Serial.begin (9600);
}

void loop ( )
{
ultrasonic ( );

}
```

V CONCLUSION

This project proposed to design and architecture of a new concept of audio guiding system for blind people. The benefit of the system is the fact that it can prove to be very cheap cost solution to billions of blind person worldwide. The presented interaction of various working units results in a real-time system that examines position of the user and provides dual feedback making more secure and safe.

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