SMART BLIND STICK CONNECTED SYSTEM USING ARDUINO

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ABSTRACT: The smart walking stick helps blind people to perform navigation and to do their work easily and comfortably. In normal stick, the detection of the obstacle is not done and normal stick is not efficient for visually impaired persons. Because the blind person does not know what type of things or what type of the objects come in front of him or her. The person cannot recognize what is the size of that object and how far is he/she from the object. It is difficult for blind person to move here and there. In smart walking stick, the object is detected with the help of a ultra sonic sensor which detects the distance between object and the person. If any obstacle comes in front of blind person, he/she can know about the obstacle by hearing the sound generated by the BUZZER. The system is very useful for people who are visually impaired and are often need help from others.

Key Words:

INTRODUCTION

Visually Impaired persons have difficulty to interact and feel their environment. They have little contact with surroundings. Physical movement is a challenge for visually impaired persons, because it can become tricky to distinguish obstacles appearing in front of them, and they are not able to move from one place to another. They depend on their family for mobility and financial support. Their mobility opposes them from interacting with people and social activities. In the past, different systems are designed with limitations without a solid understanding of the no visual perception. Researchers have spent the decades to develop an intelligent and smart stick to assist and alert visually impaired persons from obstacles and give information about their location. Over the last decades, research has been conducted for new devices to design a good and reliable system for visually impaired persons to detect obstacles and warn them at danger places.

Smart walking stick is specially designed to detect obstacles which may help the blind to navigate care-free. The audio messages will keep the user alert and considerably reduce accidents. A voice enabled automatic switching is also incorporated to help them in private space as well. This system presents a concept to provide a smart electronic aid for blind people, both in public and private space. The proposed system contains the ultrasonic sensor, water sensor, voice play back board, raspberry pi and speaker. The proposed system detects the obstacle images which are present in outdoor and indoor with the help of a camera. The Stick measures the distance between the objects and smart walking stick by using an ultrasonic sensor. When any International objects or obstacles come in range of an ultrasonic sensor then the buzzer tell the name of obstacle which is in front of the stick. The smart walking stick is a simple and purely mechanical device to detect the obstacles on the ground. This device is light in weight and portable. But its range is limited due to its own size. It provides the best travel aid for the person. The blind person can move from one place to another independently without the others help. The main aim of the system is to provide a efficient navigation aid for the blind persons which gives a sense of vision by providing the information about their surroundings and objects around them. In case the stick is lost around him a rf transmitter is induced in the stick along with arduino and ultra sonic sensor and the blind person carries an rf transmitter when he press the button the stick starts beeping so he can find the stick.

SYSTEM CONFIGURATION

The smart stick, as shown in Fig. 1, is basically an embedded system integrating the following: pair of ultrasonic sensor to detect obstacles in front of the blind from ground level height to head level height of the stick in the range of 400 cm ahead, infrared sensor to detect upward and downward stairs, water sensor for detecting puddles. The sensors collect the real-time data and send it to the microcontroller for processing. After processing, the microcontroller invokes the right speech warning message through a Bluetooth earphone. The system is powered by a rechargeable battery.
The GPS based blind device with user input interfacing get alert the blind person when he reaches his destination by voice. This consists of microcontroller module, GPS Unit and a voice module to generate voice output. It stores the data of the current location which it receives from the GPS system, so that it can make use of the data stored to compare with the destination location of the user. By this it can trace out the distance from destination and produce an alarm to alert the user in advance. Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor which itself computes the distance to the target based on the time-span between emitting the signal and receiving the echo.
we’ll build a simple example that sends a message from an Arduino to another Arduino board using 433 MHz. An Arduino board will be connected to a 433 MHz transmitter and will send the “Hello World!” message. The other Arduino board will be connected to a 433 MHz receiver to receive the messages.

Fig 4 Rf transmitter and receiver

By combining the two objects i.e. wireless communication with Arduino, we can create a wide range of applications like remote controlled and wirelessly operated, simple data transfer etc. In this project, we are going to design a system in which two Arduino boards will communicate with each other using RF Module.

CONTROL APPROACH

Installing code to Arduino:
const int trigger = 3; //Trigger pin of 1st Sesnor
const int echo = 2; //Echo pin of 1st Sesnor
const int Buzz = 13; //Echo pin of 1st Sesnor
const int Remote = A0; //Echo pin of 1st Sesnor
const int Light = A1; //Echo pin of 1st Sesnor
long time_taken;
int dist;
int Signal;
int Intens;
int similar_count;
void setup() {
  Serial.begin(9600);
pinMode(Buzz,OUTPUT);
digitalWrite(Buzz,LOW);
pinMode(trigger, OUTPUT);
pinMode(echo, INPUT);
}

/*###Function to calculate distance###*/
void calculate_distance(int trigger, int echo) {
    digitalWrite(trigger, LOW);
delayMicroseconds(2);  
digitalWrite(trigger, HIGH);
delayMicroseconds(10);  
digitalWrite(trigger, LOW);
time_taken = pulseIn(echo, HIGH);
dist = time_taken*0.034/2;
if (dist>300)
dist=300;
}

void loop() { //infinite loopy
    calculate_distance(trigger,echo);
    Signal = analogRead(Remote);
    Intens = analogRead(Light);
    //Check if Remote is pressed
    int temp = analogRead(Remote);
    similar_count=0;
    while (Signal==temp) {
        Signal = analogRead(Remote);
        similar_count++;
    }
    //If remote pressed
    if (similar_count<100) {
        Serial.print(similar_count); Serial.println("Remote Pressed");
        digitalWrite(Buzz,HIGH);delay(3000);digitalWrite(Buzz,LOW);
    }
    //If very dark
    if (Intens<200) {
        Serial.print(Intens); Serial.println("Bright Light");
        digitalWrite(Buzz,HIGH):
delay(200);
        digitalWrite(Buzz,LOW);
        delay(200);
        digitalWrite(Buzz,HIGH);
        delay(200);
        digitalWrite(Buzz,LOW);
        delay(200);
        delay(500);
    }
    //If very bright
    if (Intens>800) {
        Serial.print(Intens);
        Serial.println("Low Light");
        digitalWrite(Buzz,HIGH);
        delay(500);
digitalWrite(Buzz,LOW);
delay(500);
digitalWrite(Buzz,HIGH);
delay(500);
digitalWrite(Buzz,LOW);
delay(500);
}
if (dist<50)
{
Serial.print(dist);
Serial.println("Object Alert");
digitalWrite(Buzz,HIGH);
for (int i=dist; i>0; i--)
delay(10);
digitalWrite(Buzz,LOW);
for (int i=dist; i>0; i--)
delay(10);
}
//Serial.print("dist = ");
//Serial.println(dist);
//Serial.print("Similar_count = ");
//Serial.println(similar_count);
//Serial.print("Intens = ");
//Serial.println(Intens);

RESULT:
The smart blind stick prototype has successfully designed and analyzed this paper. The newly designed stick complies with the human ergonomics because it is developed for adult users. The blind stick prototype is tested for different heights of obstacles and for the the front hole. In this work, two ultrasonic sensors are used to detect a different height of obstacles whether it is high or low and one laser ranging sensor is used to detect a front hole. The smart blind stick is able to detect the obstacles with the height below 40cm, is considered low obstacle, on the other hand, if the detection height is more than 40cm, it is considered high obstacles. Additionally, the laser ranging sensor has successfully tested for hole detection. The blind stick is able to detect the front hole while the stick is around 21.5cm far from the hole. Therefore this novel blind stick is capable to assist a blind person to move independently.

Fig 6 Smart blind Stick

CONCLUSION
The Blind Walking Stick has been finally made into prototype which can be used to guide the blind. Its aims to solve the problems faced by the blind people in their daily life. The system also takes the measure to ensure their safety. Smart blind Stick will operate to help all the blind people in the world to make them
It is easier to walk everywhere they want. It was done to help the blind to move in front very well. It is used to help the people with disabilities that are blind to facilitate the movement and increase safety.

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