IOT BASED SMART BLIND WALKING STICK USING ULTRASONIC SENSOR AND ARDUINO

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Abstract-

 The project describes ultrasonic blind walking stick with the use of Arduino uno. According to World Health Organization (WHO), 30 million people are permanently blind and 2.85 million people with vision impairment.If you notice them, you can very well know about it they can't walk without the help of other. One has to ask guidance to reach their destination. They have to face more struggles in their life daily life. Using this blind stick, a person can walk more confidently. This stick detects the object in front of the person and give response to the user either by vibrating or through command. So, the person can walk without any fear. This device will be best solution to overcome their difficulties. We are going to upgrade the project by increasing its application. In this project, we are going to use two ultrasonic sensors. So now, this smart stick will have an ultrasonic sensor to sense distance from any obstacle and a RF remote using which the blind man could remotely locate his stick.

Keywords: Arduino uno, ultrasonic sensors, RF remote.

Introduction-

This walking stick is an alternative to the traditional walking stick. Here, Arduino UNO , ultrasonic sensor, IR sensor , voice playback module , LCD display and voltage regulator are used. Arduino is a microcontroller which can do all the calculations very fastly and quickly with great accuracy. Ultrasonic sensor is used to detect the object in the front of the person by measuring the distance between the object and the stick. For left and right object detection, IR Sensor is used which is very small in range. So, it detects the object which are very close. Using more ultrasonic sensor may create calculation problem. So, IR Sensor is Preferred. The voice playback module will assist the blind person to reach the destination through the command or microphone

Problem Motivation-

In this work, most of the problems that may face the blind people are solved likethe barriers or people in front of him at a certain distance because they may cause acollision. The other problem is due to the presence of ponds that may immerse the feetof the blind in it and cause injuries too. In addition, holes or stairs in the way of theblind that will cause him to fall are another problem. Here the solutions to these problems are made and it differs from the others by the following points: The first one is that previous studies did not solve the existence of a hole in front of the blind, causing fractures in the bones or other injuries that will studied in this work. While, the second one is that all scenarios implemented practically and gave good results in addition to previous theoretical or simulated studies.

Objective-

Presented here is a smart stick using Arduino Uno. The stick uses Ultrasonic sensors for obstacle detection. The main aim of this project is to detect nearby obstacle and notify the user of the direction of that obstacle, there by enabling the user to determine the corrective direction to head

Methodology-

The working behind this blind stick is that it is used for special purpose as a sensing device for the blind people. The circuit provides 5V power supply for the circuit and maintains its output of the power supply at constant level. It is used widely to detect objects using ultrasonic sensor .

Data Flow Diagram-

Data Flow diagram (DFD) is a traditional demonstration of the view of information flowing within a system. A clean and clear DFD can clearly show the right amount of system requirement. It can be manual, automatic, or a combination of both. Indicates how data enters and leaves the system, what changes the data, and where the data is stored. The purpose of the DFD is to indicate the size and parameters of the entire system. It can be used as a communication tool between a program analyst and any person who plays a role in an order that serves as the starting point for program rebuilding. DFD is also called data flow graph or bubble chart.
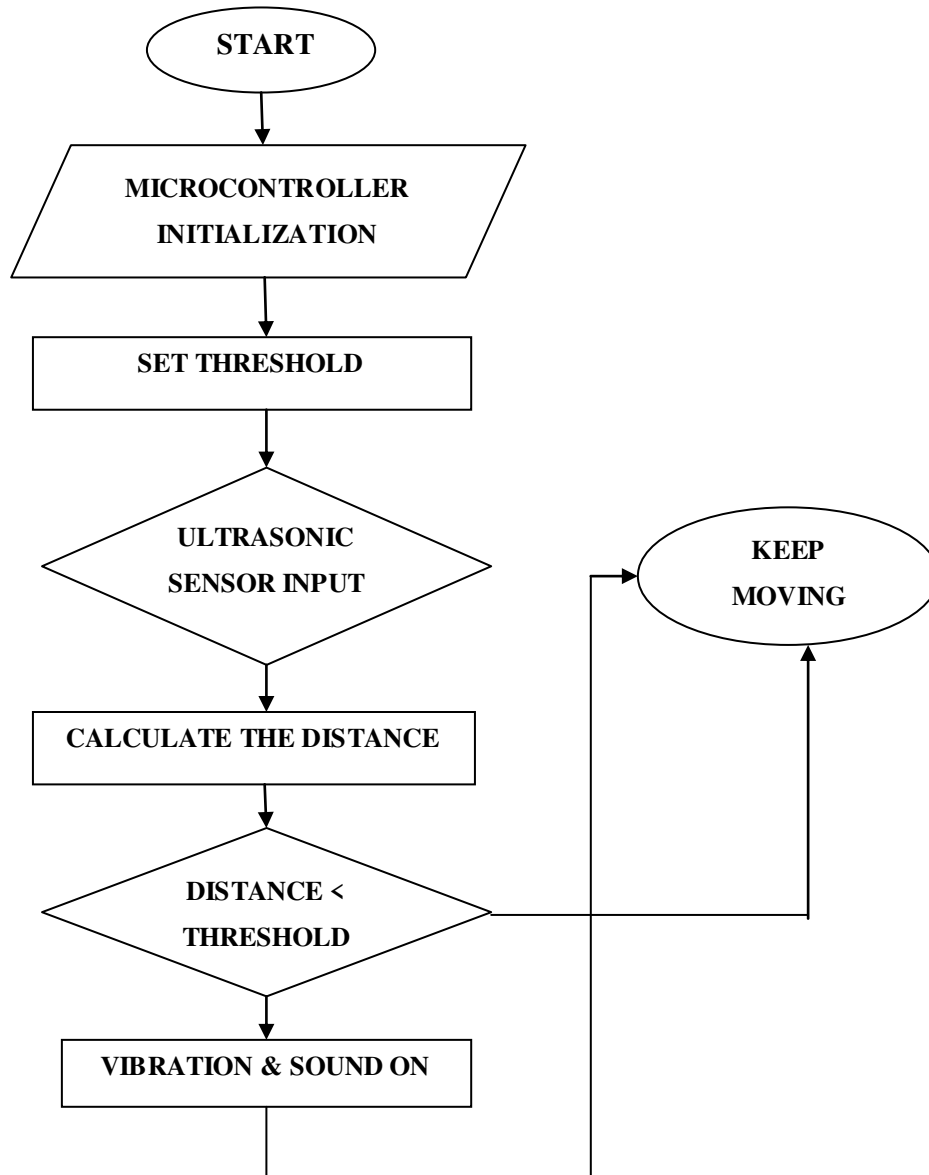
Fig1.1 Flow Chart of the developed system

System Architecture-

System design defines its main components, their relationships (structures), and how they work together. Software design and construction incorporates a number of contributing factors such as Business strategy,

quality attributes, human capabilities, design, and IT environment. System Architecture serves as a blueprint for a system.
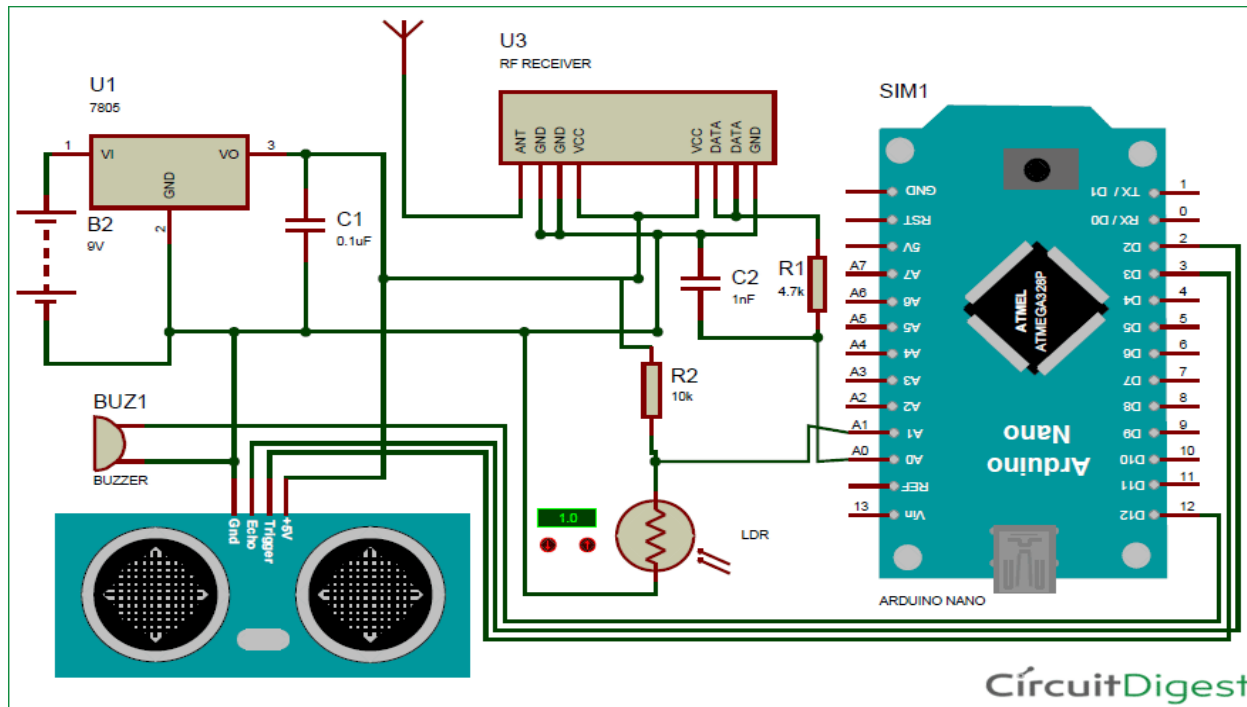

Fig 4.1- System Architecture

Hardware Requirement-

Arduino Uno- is a microcontroller board based on the ATmega328P . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), 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.. You can tinker with your Uno without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

Fig-Arduino

ULTRASONIC SENSOR- Ultrasonic sensor is used to detect the object in front of the person . HC-SRC04 ultrasonic sensor has 4 pins-ground, Vcc, trigger and Echo . It ranging from 2cm to 400cm. Mainly it has two opening –one is transmitter which is used to transmit the signal and another one is receiver which is used to receive the signal. It sends ultrasound waves at high frequency and receive back the signal .

The distance can be calculated with the following formula:

Distance $L = 1/2 \times T \times C$

where L is the distance, T is the time between the emission and reception, and C is the sonic speed. (The value is multiplied by 1/2 because T is the time for go-and-return distance.)

Fig- Ultrasonic Sensor

Buzzer-A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications.
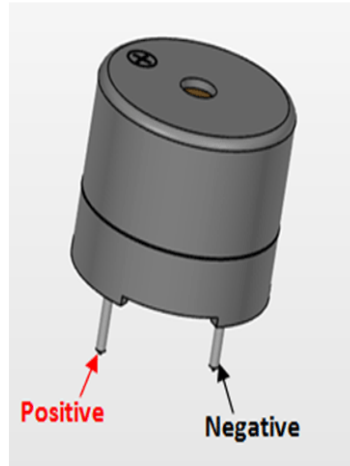

Fig- Buzzer

LDR- An LDR or light dependent resistor is also known as photo resistor, photocell, photoconductor. It is a one type of resistor whose resistance varies depending on the amount of light falling on its surface. When the light falls on the resistor, then the resistance changes. These resistors are often used in many circuits where it is required to sense the presence of light. These resistors have a variety of functions and resistance. For instance, when the LDR is in darkness, then it can be used to turn ON a light or to turn OFF a light when it is in the light.

Fig-LDR

RF transmitter-The 433 MHz RF transmitter and receiver module is a pair of small RF (i.e. radio-frequency) electronic modules used to send and receive radio signals between any two devices. The transmitter module sends the data from the transmitter end and the Receiver module receives that data at the receiver's end
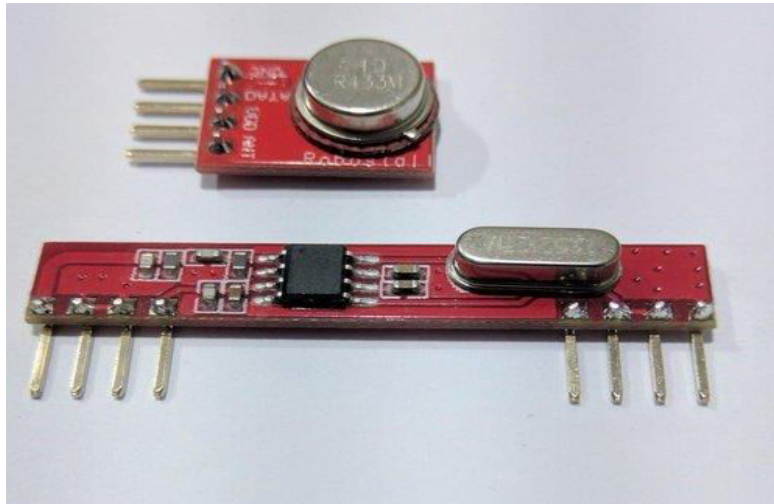

Fig- RF transmitter

Future Scope-

.   A variety of future scope are available that can be used of with the stick such as usage of Global positioning System can help the blind person to source to destination route information. GPS can help to find the shortest and best path as accordingly to Google (Bing map based on real time co- ordinates). GSM attachment can help in future for any immediate casualty help. It can also contain special arrangement to connect the walking stick to aadhar card of blinds, helping the government serve the physically disable even better. Water sensor that sense any kind of water allowing the safe walk of the blind people in order to avoid slipping.

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 . This project will operate to help all the blind people in the world to make them easier to walk everywhere they want. It was done to help the blind to

move infront 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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