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Designing of Smart Stick for Blind and Visually Impaired People using Arduino

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Abstract: In the survey of the world health organization, it is found that globally, the number of visually impaired peoples of all ages is estimated to be 250 million, and 39 million of them are fully blind. So we are coming up with one device called "smart stick for blind and visually impaired people" to help such peoples. This device comprises of Arduino Nano, Ultrasonic Sensor, LDR, Buzzer, LED, vibrating motor, 7805 IC, 433MHz RF transmitter and receiver, Resistors, Capacitors, Pushbutton, Perf board, 9V batteries. When the user starts walking with this device, the ultrasonic sensor present in the circuit senses the obstacles and gives warnings to the user through a buzzer. This device not only helps the user to walk but also it can identify the condition with help of the LDR sensor whether it is dark or not, if it is the dark condition then this device gives a warning to the user via buzzer. Along with this, there is one more circuit which is a remote circuit, this remote circuit will help the user to find lost stick if it gets lost mistakenly from the user. This stick can help blind and visually impaired people to walk independently without needing any help them.

Keywords: Arduino, Ultrasonic Sensor, LDR, Walking Stick.

I. INTRODUCTION

According to the survey of the World Health Organization, globally the number of visually impaired peoples of all ages is estimated to be 250 million, and 39 million of them are fully blind. Nowadays, peoples with no legs can use prosthetic legs and claims to live to normal life. Likewise, blind peoples also can transfer blindness through technological innovations. Although this is a big problem, but the answer to the biggest problem is with technology.

Because there have been lots of upgrades from many years in technology and using this technology we want to develop a smart stick which could be found helpful for those people who can't see. This stick can help blind people to walk independently without needing any help to a blind person.

II. LITERATURE SURVEY

A. Smart Stick for Blind People

This system takes ultrasonic sensors into work. The instrument senses the obstacles within the range of four meters and the infrared instrument senses the nearer complications in front of the blind people. Thus the receiver and transmitter help the user to find the smart stick by means of the buzzer. When obstacles get detected The vibration motor which is fitted on a stick gets activated and produces a vibration. This system Arduino Uno for controlling. this system is capable to sense all difficulties in front of the user. The smart stick is very handy, simple to use, very responsive, power-efficient, lighter weight, and fold by the user.

B. Assistive Infrared sensor-based smart stick for Blind People

In this paper, they have proposed a handy, user-friendly, cheap, lightweight, very responsive, and very power-efficient smart stick that takes infrared technology into work. Where infrared sensor detects the obstacles and staircase which are coming in user path. This device can detect obstacles that are within two meters range. The device gives good accuracy and this stick is able to detect all the obstacles.

C. Smart Stick for the Blind and Visually Impaired People

This proposed idea can guide the user by sensing obstacles in the range of the stick. It is able to detect all the obstacles that are in the user's path with the help of various sensors present in the device. All the data coming from sensors is given to the microcontroller and pass it on as vibrations which will notify the user about obstacles on the way. It is efficient, very responsive, and user-friendly.

D. Ultrasonic Sensor Based Smart Blind Stick

In this system, obstacle detection is done by an HC-SR04 and ultrasonic sensor module, and all the warnings are given via a buzzer. They have implemented this system using PIC microcontroller 16F877A. It can detect obstacles that are within the range of 5 to 35 cm.

E. Smart Walking Stick for Blind Integrated with SOS Navigation System

This system has an in-built ultrasonic sensor with a microcontroller system. Where the ultrasonic sensor is used for the detection of obstacles. after detection of obstacles by the sensor, it sends the data to the microcontroller. Then microcontroller processes the data and decides whether the obstacle is close enough. If it is not close enough the circuit does nothing. If it is close, then the microcontroller gives an alert signal to the user. As well as it includes embed e-SOS (electronic Save Our Souls) in the system.

F. Multiple Distance Sensors Based Smart Stick For Visually Impaired People

This smart stick is capable of detecting obstacles of any height in front or slightly sideways of the person. The stick gives proper information about the distance and the location of obstacles through vibrations in hand and audio in the ear of the user. There is a wireless Bluetooth connection between the earphone and the stick. It is a very accurate and responsive system.

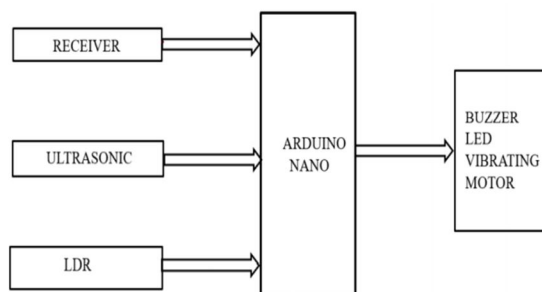
G. Embedded Assistive Stick for Visually Impaired Persons

In this system, pothole detection is done by setting the ultrasonic sensor at a 30-degree angle on a suitable blind stick. it is to sense if there is a hole or staircase in front of the blind person at about 30 cm distance to avoid a person from falling. along with this one moisture sensor is placed at the down of the stick to measure the degree of water land soil moisture and in order to the aware user as soon as that degree exceeds a measured level that may submerge the foot of him. One more obstacle detection system is implemented at the knee above by using an additional ultrasonic sensor on the top of the stick to give alert via alarm and vibration when there is a person, obstacle, or wall at a distance of 50 cm in front to avoid an accident. This device is full of features and very useful but it is not a budget-friendly device.

III. SYSTEM INFORMATION

This system incorporates two circuits, one is the main circuit which is mounted on the stick and another is the remote circuit. The main circuit is to detect the obstacles and to give warnings to the user and the remote circuit is to find out the lost stick, in case the user loses the stick then the user can find out the lost stick by means of the remote circuit. The main circuit comprises an Ultrasonic Sensor HC-SR04, LDR, Buzzer, LED, Arduino nano, 7805 voltage regulator IC transmitter, Resistors, Capacitors, 9V battery, and remote circuit consist of receiver and push-button, 9V battery.

IV. BLOCK DIAGRAM



V. WORKING OF SYSTEM

The brain of our system is Arduino Nano. We have used Arduino Nano here to control all the sensors, the ultrasonic sensor which is present in the system starts emitting the waves, in case any obstacle is in the path, the waves emitted earlier will reflect back, then the output of the ultrasonic sensor is given to Arduino and Arduino reacts over it by buzzing the buzzer and thus the blind person will know that some obstacles are in the path. Along with this, we have used one LDR (light-dependent resistor) sensor in this system, basically, this sensor is used to check the intensity of light. Which tells about the lighting condition. When it is too bright, the system gives a warning in a delayed tone and when it is too Dark that time also the system gives a warning in another tone. If the lighting condition is normal then, it does nothing.

We have designed one remote also, it contains a transmitter and button and it runs on battery. In case a blind person loses his stick then they just have to press the button of that remote then the transmitter will send a signal which will be received by the receiver which is mounted on the stick and Arduino will react over it by buzzing the buzzer and thus it will help to find out the lost stick.

VI. COMPLETED DESIGN



VII. APPLICATIONS

- A. It can be used by blind people as well as visually impaired people
- B. It can be helpful for blind people to reach their destination.
- C. Help blind people to walk easily.
- D. Help blind people to avoid obstacle
- E. Prevent blind people from the injury that may happen due to obstacles.
- F. Help blind people to detect the obstacle.
- G. Help blind people to identify the light.

VIII. ADVANTAGES

- A. The advantage of our project is that it can detect any obstacle with the help of an ultrasonic sensor.
- B. It will help blind people when they are walking outside of their homes.
- C. It has many features like detection of light intensity, tracking the location of the lost stick, etc.
- D. Our project is simple to use.
- E. Our project can support blind people in any situation.
- F. There will be fewer accidents with blind peoples.
- G. It is very affordable.

IX. DISADVANTAGES

- A. It is not completely waterproof.
- B. battery needs to charge regularly.
- C. It does not come with so many features.
- D. It can not detect potholes.
- E. This system does not include GPS.
- F. It can not determine the exact location of the user.

X. OBJECTIVES

- A. Our objective is to provide an application for blind peoples to detect obstacles.
- B. We want to develop such a stick by which blind peoples can go anywhere without seeking anyone's help.
- C. Our purpose to build this stick is to spread happiness in their life.
- D. Our objective is to help visually challenged people.
- E. We want to make blind peoples independent with this smart stick.

XI. CONCLUSION

Blindness happens due to some reasons, or it may be from birth, and such a person has to suffer a lot. For everything, these people have to depend on others, it is a big problem, but with the increasing technology day by day, there is a solution to this problem and by taking advantage of this technology, we have designed this 'smart stick'. We have mentioned advantages, features, working in this paper. And from all those aspects it can be seen that 'smart stick for blind' is a good concept, and also, it is able to detect the obstacles. So if every blind person will have this kind of device, then lots of problems going to be sorted out, which will spread happiness in their life.

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