

Eyeless Pole Using IOT

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Article Received: 30 August 2018

Article Accepted: 29 December 2018

Article Published: 15 March 2019

ABSTRACT

Eyeless Pole is an innovative stick created for visually challenged people for well-defined navigation. We here designed an advanced blind pole that allows visually challenged people to navigate with ease using an advanced technology of Internet of Things. The Eyeless Pole is integrated with ultrasonic sensors along with light and water sensors. Our project initially makes use of ultrasonic sensors to detect obstacles ahead using ultrasonic waves. When obstacles are sensed the sensor passes the data to the Node MCU (microcontroller with Wifi). The Node MCU then processes this data and calculates whether the obstacle is close enough or not. If the obstacle is not that much close enough the circuit does nothing. If the obstacle is close the Node MCU sends a signal to a buzzer and then it alerts. It also detects water and light and alerts the person with the help of two different types of Buzzers. One more advanced feature is that it serves the blind to sense if there is light or darkness in the room they exist. This system has one more additional feature integrated to help the blind find their stick if they forget where they left behind. A voice recognizer is used for this purpose. The blind can use a keyword to search for their stick so that it can be easily recognized and gives a buzzer alarm to find their stick. Thus this proposed system allows for obstacle detection as well as finding stick if misplaced by visually impaired people.

Keywords: Node MCU, Microcontroller, Voice recognizer.

1. INTRODUCTION

Blind people or so called visually challenged people find difficult while travelling in an unknown environment. Mobility means moving around in an unfamiliar environment without any supplementary assistance. Visually challenged people face many hardships while mobility. Visually impaired people can be benefitted with the help of some sound technology. This proposed system is referred as Navigation Assistance for Visually Impaired (NAVI). There are many researches that are going on to help people suffering from blindness and partially sight impaired. Mostly these technologies guide the people with its performance and efficiency. People who are visually impaired will make use of dogs or kind of walking sticks to find out their paths. The most crucial shortcomings of these aids includes essential skills and training phase, range of motion, and very insignificant information been communicated.

The ordinary walking stick cannot scan the surface or platform as such and it just serves as a device to help people from dangerous situation like traffic or while crossing the road. The main problem with eye loss people is how to navigate their way to wherever they want to go. Such people need guidance from others having good eyesight. These devices help them to give a secured feeling and to choose a path without objects or obstacles in an anonymous path. Electronic Travel Aids (ETAs) is a kind of device that alerts the user with the help of some vibrations or sound waves or it can be through physical interaction with people. The designed system yields an important measure to overcome accidents among visually impaired people in common traffic areas and warning them by building a great tendency to find objects and obstacles as death has become a common issue because of

CITE THIS ARTICLE: J.Vijay Franklin & Jennitha.S.Paulin, "Eyeless Pole Using IOT", *Asian Journal of Applied science and Technology*, Volume 3, Issue 1, Pages 249-253.

their inability to see and manage situations in heavy traffic areas. With the rapid advances of upcoming technologies both in hardware and software it has become easier to provide intelligent guidance system to the visually impaired.

Node MCU is a microcontroller with wifi which can do all the calculations very quickly and accurately with great efficiency. Ultrasonic sensor is used to find the object in the front of the person by calculating the distance between the object and the stick. Whenever the pole gets into water or some slippery area immediately one type of vibration sensed buzzer will alert the user. The light sensor helps to sense the presence of light in a room or in a place they travel.

2. SYSTEM ARCHITECTURE

2.1 Ultrasonic sensor

An ultrasonic sensor is a device that measures the distance of objects using ultrasonic waves. It has a transducer to send and receive ultrasonic waves that relay back information about an object's proximity. It provides distinct echo patterns using the high frequency sound waves reflected from the boundaries of an object. The frequency of the ultrasonic sound will be above the range of human hearing. In our proposed system we made use of two ultrasonic sensors since it has the capability of sensing up to 180'. Ultrasonic sensors use a single transducer to send and receive the pulse and echo. It is basically used to detect the presence, level, position and distance of a particular object. Ultrasonic sensors are mostly helpful to avoid collision between objects. It is independent of colour, dust, smoke and light. This device is not advisable for woollen materials because it absorbs the ultrasonic waves.



Fig.1. Ultrasonic Sensor

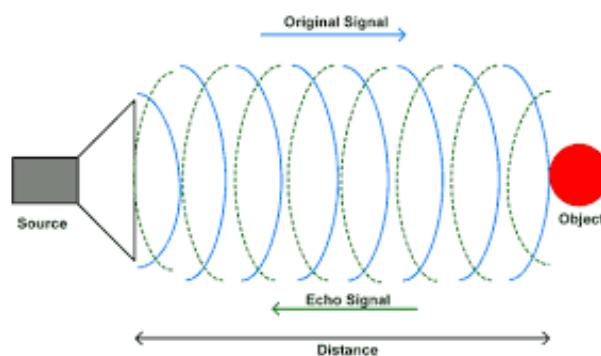


Fig.2. Working of Ultrasonic Sensor

2.2 Water Sensor

A water sensor is a device to detect the presence of water. It sends a signal whenever it senses the presence of water through electrical conductivity. In our system when the walking stick gets into water it senses the moisture and indicates the user with one type of buzzer vibration.



Fig.3. Water Sensor

2.3 Light Sensor

The light sensor detects the presence of light with its intensity. It is mostly used to conserve the light energy from sun and converts into electrical energy. But in this the visually impaired people cannot feel the presence of light so eyeless pole helps them to know the presence or absence of light. It also intimates the user with one sort of vibration via a buzzer.



Fig.4. Light Sensor

2.4 Node MCU

Node MCU is a microcontroller unit and it supports both open source software and hardware environment. It runs on ESP8266 Wi-Fi SoC from Espressif. It is basically built on a very inexpensive System-on-a-Chip (SoC). This firmware is executed using Lua scripting language.



Fig.5. Node MCU

2.5 Voice recognizer

The Eyeless pole adds an additional feature with the help of this device also known as speech recognizer. It converts the analog signal to digital signal. In this system it helps to find out the stick where it was missed out. It has a transmitter and receiver.

3. WORKING PRINCIPLE

The proposed system stays handy for the users. The working principle is whenever the pole hits or supposed to hit an object it gives a gentle buzzer notification so that the user can predict the presence of an object. When the object is detected at the range of 2cm-400cm of non contact measurement and its accuracy will be around 3mm. It is a transducer it also produce and detect signals. As soon as the ultrasonic waves received the server motor runs and makes the buzzer vibration. The next thing is when the pole is supposed to gets into water or some moisture filled area the water sensor helps the user to determine the presence of water .When the water is sensed the sensor sends the signal and induces to another buzzer to vibrate so that the person will be alerted to take up the way or not. The next feature is the light sensor. It not only helps to forecast the day or night time it also indicates the existence of light or darkness in their path. If it senses darkness the light sensor will make a buzzer vibration and also switches on the LED light provided in the pole so that the person around or opposite them can judge the presence of the visually impaired person. When a situation like missing out of the eyeless pole is posted it will make easy for the user to find out the pole. This is one of the additional feature we are coming up with. For this we are using a voice recognizer in our system. There will be a small mike provided additionally with the stick so that the person can have a keyword setting .Whenever the keyword is announced there will be a receiver in the other end to recognize the speech. After it reaches it alarms immediately and guides the blind people to find out. The final outcome of our system is depicted in the upcoming figure.

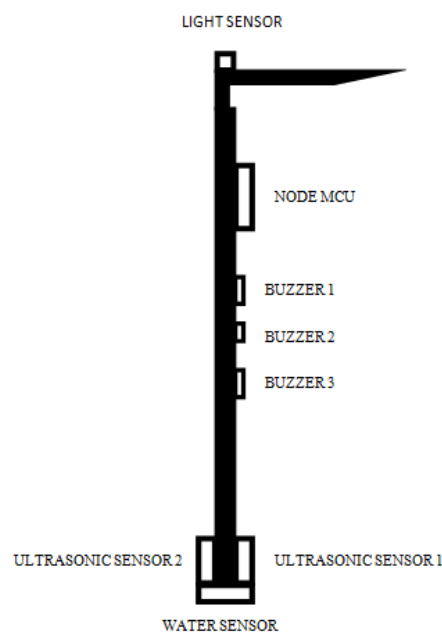
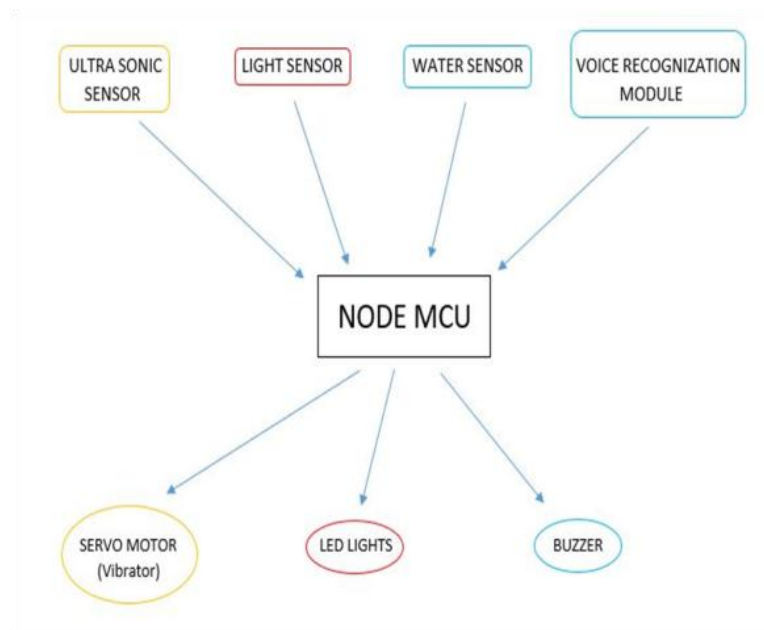


Fig.6. Product Design

4. BLOCK DIAGRAM



5. CONCLUSION

Usually the visually impaired people will not believe in the electronic gadgets that have been sold in the market. They preferred trained dogs and stick while travelling. Most visually impaired people hesitated to buy those aids since it costs so high. But in our system we came out with relatively low cost and having great accuracy. We discovered this model to overcome the issue of accidents and to be handy as well as eco-friendly too. It is so simple for the users to make use of it.

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