



## ASSISTIVE SMART STICK FOR BLIND PEOPLE

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**Abstract:** Blind stick is a progressive stick designed for visually disabled humans for advanced navigation. The guy has been struggling with illnesses and weird. Visually challenged human beings are the ones that are hard to cope with of their manner. The main purpose of this paper is to feel the visually challenged people like a normal person with a higher navigation device. This smart walking stick is newer than traditional walking sticks. It makes use of a microcontroller to discover a barriers in the front, left, proper aspect, and additionally directs up-right all the way down to a man or woman. It is primarily based totally on ultrasonic sensors for distance size property. There is a voice playback module for displaying obstacles, which makes it possible to use sensors to track the path of obstacles around men or women with visual impairments. Also, a receiver and battery are attached to a stick to make it durable. This stick include LDR that's used to come across darkish area round them.

**Index Terms – Smart Stick, Stick for visually impaired persons**

### I. INTRODUCTION

Blind or visually impaired peoples not have the ability to see anything. As we all know, some people have problems with their eyesight, even though they can see a little when they touch it. In all of the world, blindness is normally due to malnutrition and illnesses of human beings. People have impaired vision due to illness or injury. World Health Organization (WHO) estimates 80% of visual impairment either preventable or curable with remedy, 285 million people are predicted to be visually impaired over worldwide. Till 2014, 39 million peoples are visually impaired and 246 have low vision. This is an area of progress over the last 20 years. Blindness can also affect a person's ability to engage in many professions, sports activities, and teachers in daily life. In this project, we are providing a navigation tool for visually impaired people to make traveling easier for them. It recognizes obstacles and accordingly generates a voice in the form of a buzzer. It is used for the blind people to walk through the path like as a normal person. Ultrasonic sensors are designed for blind people who evaluate the target by interpreting the reflected signal. It measures or calculates the distance between person and the obstacle and sends the signals. USG owned the GPS (Global Positioning System) based radio navigation satellite system. The GPS device presents an important positioning functionality to all customers across the world. There are 24 satellites in space developed by United States. Through the remote controller, from the far distance also we can operate the device wirelessly. In future we can upgrade more feature in the existing system from the present that is not much capable. The buzzer activates when an object is detected by the ultrasonic sonic sensor and on this occasion voice playback module plays the voice. In this system, buzzer plays a main role of detecting the obstacles.

### II. LITERATURE REVIEW

According to a report by World Health Organization (WHO) and International Agency for Prevention of Blindness (IAPB) [1] nearly 285 million people worldwide have visual disabled. However an extra impressive reality is that out of those 285 million human beings, 39 million human beings are absolutely blind. It isn't always a herculean project to recognize the quantity of problem that's inflicted upon those harmless souls. Even, many kids are blind for the reason that their start and we need to recollect the reality that those kids have a totally lengthy existence beforehand of them. Their lives can be advanced significantly if their dependence is reduced to a considerable extent. This played an essential role in our decision to come up with the very notion of an advanced blind stick. This plays a vital position and helps the people to walk through smart stick easily with belief.

The term "independence" refers to the ability to live without action, judgment or external factors (including opinions and rules). But in reality especially for the visually impaired person; it is very difficult for their travelling in the crowded street pose a great challenge in front of them. For little bit avoiding these kind of situation we have designed this stick with adjustable sensitivity with the help of ultrasonic proximity sensor and a GPS module to assist these blind persons to walk fearlessly and independently in both indoor and outdoor environment. This stick can overcome all narrow boundaries and protect that person. Attachment of the system to the clothes, shoe, body area and as well as to the walking stick make its utilization more versatile and reliable. [2]

The smart walking Stick helps blind people to perform their work effortlessly and comfortably. Blind people cannot see the size of this object and its distance. So, it is difficult for blind person manage on the street or anywhere to move here and there. The smart walking stick supports object recognition, and the output is mainly voice output. In Smart Walking Stick, we detect the object with the help of a buzzer. Here the ultrasonic sensor is used to measure the distance between the objects and the stick. When the objects or obstacles come in range of the ultrasonic sensor, the speaker tells Name of obstacle in front of the stick. The pictures are taken with a camera and the camera is connected to the Raspberry Pi. If there is an obstacle in front of a blind person, you can recognize the obstacle by the sound produced by the headset. The smart walking stick is very useful for the visually impaired persons for their safety and freedom from the other persons at all the time. The developed system delivers good results in the detection of obstacles in front of the user [3].

There is a massive organization of people who have difficulties in their day by day routine because of dropping their eyesight. Walking with confident is one of them that may also have specific demanding situations in certain environments/countries. We have taken into consideration Indian context wherein outside environments are frequently clustered and noisy. Considering these difficult situations, we have developed a new smart stick that can define boundaries on the top of the front or just on both sides of a man or woman. The stick gives a clear idea to the person about the distance and the location of obstacles via vibration in hand and audio. We implements a wireless connection between the user of the stick and the stick. Different frequencies of the generated vibration and different tracks of the audio alert the person about the distance of the obstacle. Real-time experiments had been performed in exclusive environments via way of means of exclusive human beings to take a look at the accuracy of the stick and consequences are pretty encouraging. [4]

Kher Chaitrali S et al., (2013), shows that visually challenged people face many challenges in their daily life, the situation get worse when this type of person travels to an unknown place, only the few points of the navigation system are standing to disposal. For blind people who can enable dynamic navigation through voice output. RFID tags are installed in public buildings and are also installed in walking sticks for the blind. This unit is connected to an Android phone through a Bluetooth device. For voice navigation based on RFID tags; An Android application will be developed that will track the person's location and be updated regularly on the server. Another application is designed for family members who have access to track the blind person's location. Its aim is to solve the problems that blind people face in their daily life. The system also takes measures to ensure your safety. [5].

### III. PROPOSED SYSTEM

In propose system, we propose a voice based module that contain ultrasonic sensor which helps for visually challenged people to walk. The ultrasonic sensor collects data about the environment and extracts the visual information from the data. This visual data is then converted into an audio signal to recognize information from the environment through primarily audio-based speech. The voice playback module is used to record a voice together with his headphone also included for visually impaired people. User can identify an obstacles by connecting a stepper motor that rotates the ultrasonic sensor in two types with steep angle 90 degree. The sensor can detect obstacles in the front, left and right side of the person.

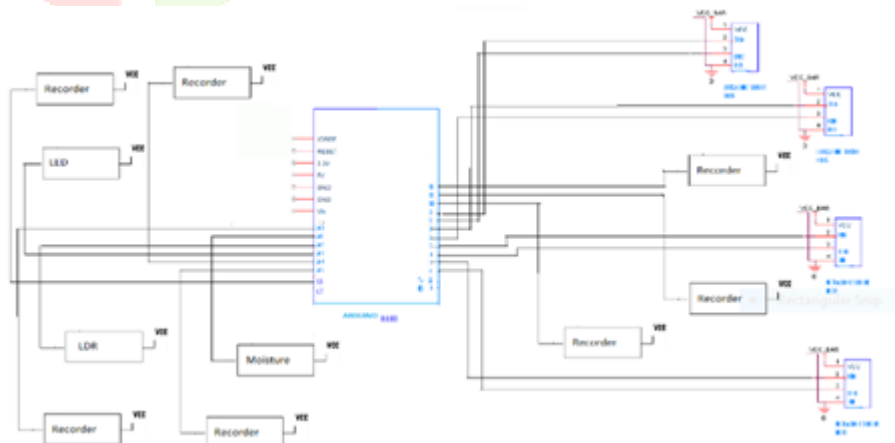


Figure 1. Circuit Diagram of Proposed Work

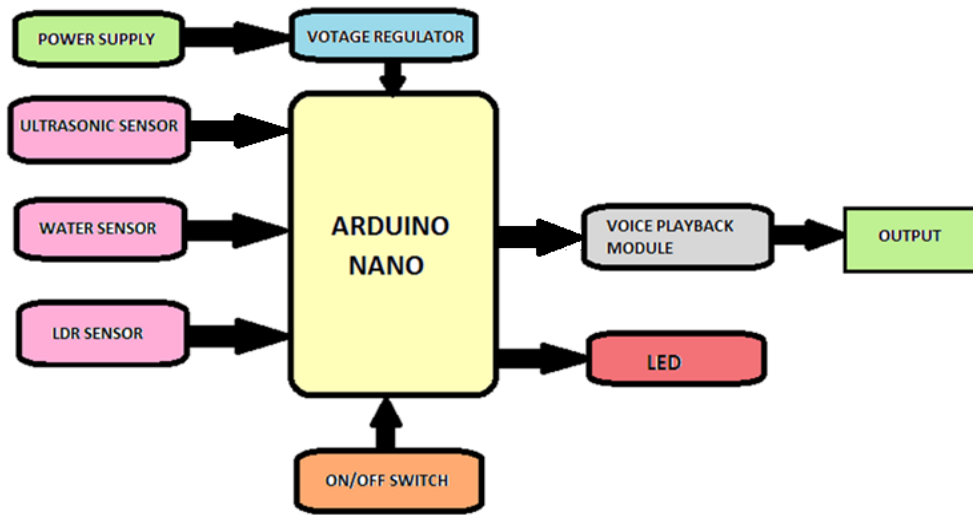


Figure 2. Block Diagram of System

#### IV. HARDWARE REQUIREMENT

##### A. Arduino Nano

It is a Microcontroller board developed by Arduino.cc and based on Atmega328p / Atmega168. Arduino boards are widely used in robotics, embedded systems, and electronic projects whenever automation is a vital part of the system. It comes with an operating voltage of 5V, but the input voltage can range from 7 to 12V. The Arduino Nano pinout includes 14 digital pins, 8 analog pins, 2 reset pins and 6 power pins. Each of these digital and analog pins has several functions assigned, but its basic function must be configured as input or output. They are acted as input pins when they are interfaced with sensors, but if you are driving some load then use them as output.

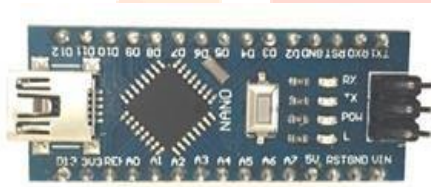


Figure 3. Arduino Nano Circuit

##### B. Ultrasonic Sensor

Ultrasonic sensor is used to detect the object in front of the person. The ultrasonic sensor HCSR04 has 4 pins for ground, Vcc, trigger and echo. It ranges 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 transmit high-frequency ultrasonic waves and receive signals.

The distance can be calculated with the following formula:

$$\text{Distance } L = 1/2 \times T \times C$$

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.)



Figure 4. Ultrasonic Sensor

### C. Voice Playback Module

This module detects the user spoken word through a microphone or a speaker. It notifies the person when it has found any object or obstacles through a speech commands which is already stored in the system. This project uses WTV-SR IC as recognition module. This module used to store the recorded voice and generates that voice when the stick is in use of blind people to know about. It has a great benefits in the duration time of recording and cost performance.



Figure 5. Voice Rec/Playback

### C. LDR Sensor

Light Dependent Resistor, changes its resistances due to change of the light intensity. During night, LDR will have high resistance and no current pass through it but through a LED connected parallel to it which illuminates and acts as a Flashlight, which can be easily noticed by others. It alerts people about the presence of blind person to let him to pass the way.

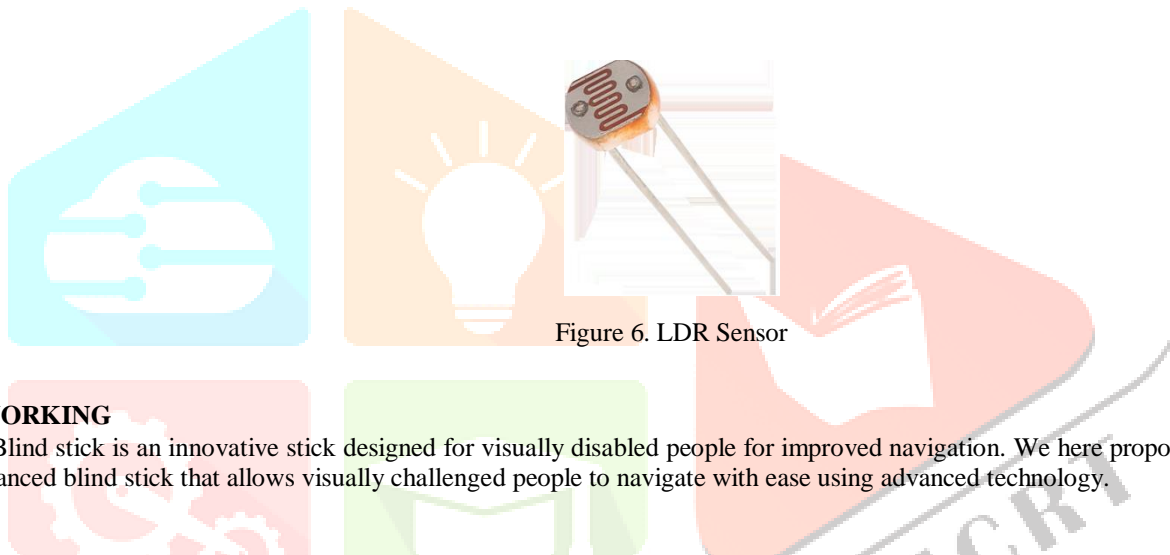


Figure 6. LDR Sensor

### V. WORKING

Blind stick is an innovative stick designed for visually disabled people for improved navigation. We here propose an advanced blind stick that allows visually challenged people to navigate with ease using advanced technology.

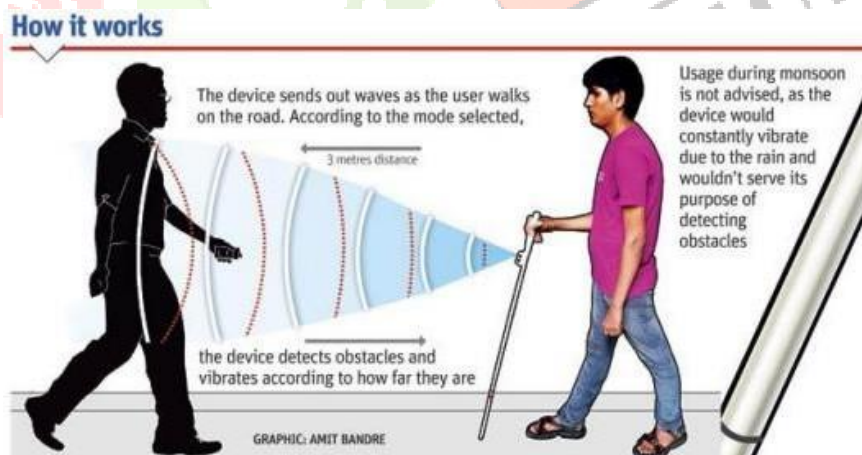


Figure 7. Working of Smart Blind Stick

The Smart Stick is implemented with ultrasonic sensor along with the light and water sensor. In our proposed project, ultrasonic sensors will first be used to detect obstacles in front of you with the help of ultrasonic waves. When it detects obstacles, the sensor forwards this data to the microcontroller. Here microcontroller processes that data and calculates if the obstacle is close enough. If the obstacle is not too close to the circuit then it does nothing. And if the obstacle is nearer to the microcontroller, it sends a signal and activates the buzzer. According to the obstacle like water and other it generates the voice. It is integrated as part of a complete device that often includes hardware and mechanical parts. Many devices in use today are powered by embedded systems. 98 percent of all microprocessors are factory-made as elements of embedded systems. It operates with low power consumption, short ranges, and has a small size and low power consumption. It uses low processing resources; that make them significantly difficult to program. By building intelligence mechanisms on the hardware, using any existing sensors and the presence of a

network of integrated drives, however, the resources available at the drive and network level can also be optimally managed beyond what is available.

## VI. ADVANTAGES

- The system enables the blind people to move with the same ease and confidence as sighted people.
- Accurate detection of objects.
- The System can be used for indoor and outdoor navigation.
- Obstacles and alerts blind peoples through vibration alert and speech output.
- Provides Auto detection of objects.

## VII. APPLICATIONS

- To assist the blind people, a smart walking stick is designed in such a way that the stick operates just like a radar system that uses ultrasonic sensor to identify the fixed and moving objects.
- Light sensor is used to detect the presence or absence of light
- Moisture sensor is used to detect the moisture (Something like water or liquid) present on the surface.
- Used also to detect the little object i.e. stone or something present in front at the little height in front of the blind person.
- Light sensor which is on the stick plays an important role ; it alerts the people around the blind person on the night
- It uses two ultrasonic sensors to detect below or the obstacles in between.

## VIII. CONCLUSION

The smart stick will serve as a basic platform for more assistive devices for the next generation, which will help visually impaired people navigate safely inside and outside the home. It is efficient and economical. It gives good results in detecting obstacles in the user's path within a range of three meters.

## IX. FUTURE SCOPE

- The Global position of the user is obtained using their current position and through GPS (Global Positioning System) and guidance to their destination will be given the user by their voice
- We can connect stick with the mobile application that will guide blind people's to go through the right way with the help of the headphones and google mapping technology.

## X. REFERENCES

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