

# An Implementation Paper on Obstacle Detection System for Visually Impaired Person

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**Abstract:** Independence is very important for achieving dreams, goals and objectives in life however to realize this independence for impaired persons is incredibly difficult. It's terribly tough task for visually impaired persons to steer safely and with confidence while not serving to hands in urban or unknown environments. To boost the cane by adding outside navigation exploitation GPS, associate degree inaudible detector is placed in cane that detects the obstacle within the ground level and detective work hollow it'll facilitate the visually handicapped person by providing additional convenient means that of life. The most aim of this method is employed to change visually impaired persons to maneuver freely with constant ease and confidence as a quick-sighted individuals.

**Keywords:** Obstacle Detection, Pothole Detection, GPS Tracking, Ultrasonic Sensor, Visually Users.

## I. INTRODUCTION

Vision plays a significant role in gaining data of the encircling world. However, loss of vision makes it troublesome to measure a traditional way of life per the WHO i.e. World Health Organization, there square measure 285 million individuals within the world with visual defect, thirty-nine million of whom measure square blind, and 246 million with low vision regarding ninetieth of the world's visually impaired individuals board low-income settings. The amount of blind individuals has been projected to double by 2020. Historically, a white cane is employed as a walking aid for visually impaired individuals. White canes square measure cheap, light-weight, and might find obstacles on the bottom. However, a white cane suffers from the subsequent 3 elementary shortcomings.

1. It needs the user's constant activity and acutely aware efforts to actively scan the encircling atmosphere.
2. The stick will solely find obstacles up to the knee level. Hence, the user cannot find raised obstacles, like scaffoldings and transportable ladders. This poses a collision danger.
3. The stick will solely find the obstacles that square measure at a distance of one from the user giving very little time to require any preventive actions.

Guide dogs might also assist visually impaired people to avoid obstacles in their travel path. However, guide dogs need coaching and absolutely trained guide dogs square measure terribly expensive. Additionally, it's difficult task for a visually impaired person to worry befittingly for an additional physical object. Moreover, special coaching is needed for visually impaired individuals to handle and lookout after the guide dogs, that is troublesome. To improve the quality and speed of someone with visual impairments, many researchers introduced electronic travel aids (ETAs). These ETAs square measure out this in numerous forms, like hand-held devices, good canes, and wearable systems. However, acceptance of obtainable ETAs is kind of low among visually impaired individuals. This doesn't imply that visually impaired individuals square measure resistive to technological aids; rather it asserts the necessity of additional analysis to boost on the usability and satisfactoriness of ETAs. Safe and freelance quality continues to be a challenge for visually impaired individuals.

## 2. LITERATURE SURVEY

Mohammad Hazzaz Mahmud, Rana Saha, Sayemul Islam [1] proposed a wise Walking Stick that is Associate in Nursing Electronic Approach to help Visually Disabled Persons. Their device may be a microcontroller based mostly machine-driven hardware which will assist a blind to discover obstacles ahead of him/her promptly. The hardware consists of a microcontroller PIC16F690 incorporated with ping echo sounder device, proximity device, wet detector, a GH311 supersonic obstacle device, a small beeper motor and extra instrumentality. The simplicity of the planned style makes it straightforward to use by a person and at identical time the price of producing such sticks is unbroken low. The facility consumption of the planned stick is low and may be operated simply.

O. O. Olakanmi [2] proposed a flat walking aid for visually impaired exploitation unhearable sensors network with voice steering. The projected methodology enforced a network of unhearable sensors capable of police investigation the direction and position of obstacle(s). The performance and practicality square measure improved by the addition of alert lightweight, and voice steering signal that is relayed to a miniature telephone receiver. Hardware employed in the implementation of the system square measure ISD 2590 voice record/playback chip, PIC16F887 microcontroller, unhearable sensors, transformer, and speakers (headset and loudspeaker).

R. Sheth, S. Rajandekar, S. Laddha and R. Chaudhari [3] proposed sensible White Cane that could be a subtle and Economic Walking Aid. Their planned stick is intended to find obstacles which can facilitate the blind to navigate carefree. Their device is formed of parts like ATmega328PU microcontroller, four HC-SR04 supersonic sensing element Modules, Sound IC-APR33a3, Vibration Motor, headphones and battery. Audio feedback. Their technique alerts users by pre-recorded sound messages and a tactual feedback in kind of vibrations. The stick will find pits, potholes, downfalls, stairs (up and down), low lying and knee level obstacles and even those on top of the waist. Their system could be a moderate budget steering aid for the visually impaired. The whole electronic equipment in conjunction with the battery cubicle is hidden at intervals the stick thereby decreasing the chance of injury to the circuit and creating the device less large. The system provides ON/OFF switch, vibration feedback and also the audio jack on the handle itself.

E. J. Chukwunazo and G. M. Onengiye [4] the authors designed and enforced a microcontroller primarily based quality aid for visually impaired folks. Their planned stick consists of special detection sensors integrated to AT89C52 microcontroller for receiving, process and causation signals to the device. The system was designed, programmed with programming language and tested for accuracy and checked by the visually impaired person. The hardware used consists of AT89C52 microcontroller, sensors (Ultrasonic, water, and light-weight dependent resistance, LDR), and alarm. Their quality aid designed for blind folks is cheap, reliable and simple to control. It reduces stress for folks aiding the blind and provides comfort to blind throughout walking. The system consists of associate degree supersonic sensing element for obstacle detection, a water sensing element for water detection in slippery areas and a lightweight dependent resistance for dark detection. Every sensing element is differentiated from each other through pattern of sounds. The value effectiveness of the planned resolution ends up in compromises in performance.

G. Prasanthi and P. Tejaswitha [5] proposed the detector assisted stick for the blind individuals. The most objective of this style is to develop associate degree application for blind individuals to observe the objects in numerous directions, detection pits and manholes on the bottom to create liberated to walk. Their projected methodology utilizes multiple sensors with options to observe the obstacle for collision shunning, and to observe objects all told direction. Another detector is placed close to the lowest tip of the walking follow observe pits on the bottom. It integrated these sensors to the play chip and voice record. The model was modelled mistreatment Pro/E creo 5.0 Software. The hardware parts utilized in the planning area unit ATmega8 microcontroller, sensors, power offer unit, Servomotor, Buzzer, Voice record and reproduce device, and speaker. It's straightforward, cheap, configurable, and straightforward to handle intelligent guidance device.

### 3. BLOCK DIAGRAM

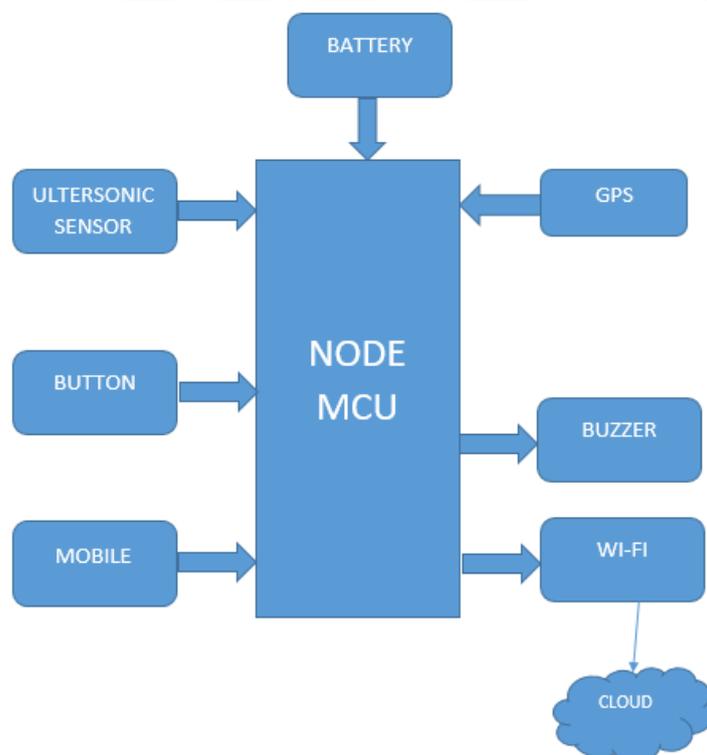


Figure. 1. Block diagram

In our project we have a tendency to area unit exploitation NodeMCU that plays major role in blind stick. The NodeMCU are often high-powered via the USB affiliation or with Associate in Nursing external power offer. the facility supply is chosen mechanically. External (non-USB) power will come back either from Associate in Nursing AC-to-DC adapter (wall-wart) or battery. one amongst the most elements of cane is unhearable sensing element that is integrated with blind stick and it detects the obstacles. Our planned project initial uses unhearable sensing element to find obstacles ahead exploitation unhearable waves. On sensing this obstacle the sensing element. Passes the information to the microcontroller. The microcontroller then

processes this **knowledge** and calculates if the obstacle is **shut** enough. If the obstacle **isn't** that **shut** the circuit **will** nothing. If the obstacle is **shut** the microcontroller sends a **proof** to sound a buzzer. The alert button is **fastened in a very** stick and **just in case** of any emergency the **management** unit **can** receive the signal and it sends the message to the **members of the family** with a **facilitate** of GSM module **that** is connected in processor unit.

3.1 Node MCU:



Figure.2. NodeMCU

As the operational voltage vary of ESP8266 is 3V to a few .6V, the board comes with a LDO **electrical device to remain** the voltage steady at 3.3V. **it'll dependably offer** to 600mA, that **have to be compelled to** be over enough once ESP8266 pulls **the utmost quantity** as 80mA throughout RF transmissions. The output of the regulator is **to boot** broken resolute one **all told the edges** of the board and **labelled** as 3V3. Power to the ESP8266 NodeMCU **is provided** via the on-board MicroB USB **instrumentality**. it's total seventeen GPIO pins broken resolute the pin headers on either **facet** of the event board. The ESP8266 NodeMCU **choices two** buttons. One marked as RST **assail the best** left corner is that the **electrical switch, utilized in truth** to reset the ESP8266 chip. **the alternative** FLASH button on **rock bottom** left corner is that the transfer button used whereas upgrading **code**. The board includes CP2102 USB-to-UART Bridge Controller from semiconductor Labs, that converts USB signal to serial and permits your **portable computer** to program and communicate with the ESP8266 chip.

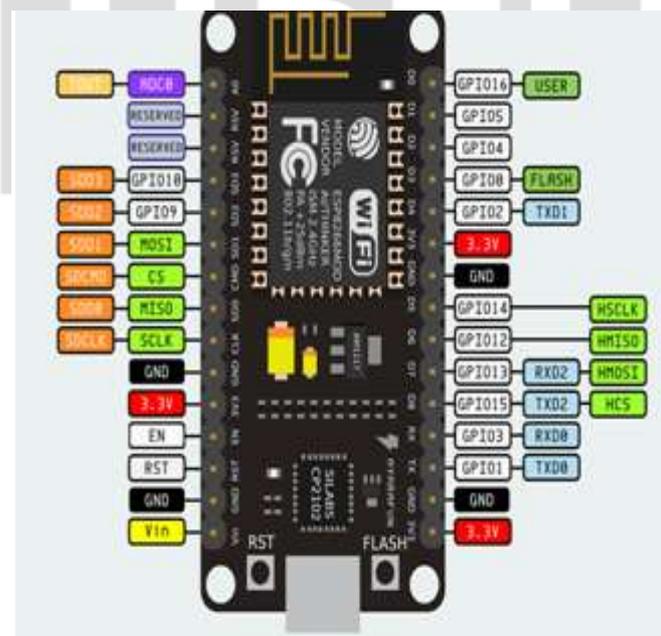


Figure.3. Pin Diagram of NodeMCU

### 3.2 ULTRASONIC SENSOR Ultrasonic Ranging Module HC - SR04:

Using IO trigger for a **minimum of 10us** high level signal, The Module **mechanically** sends eight **forty kilocycle** and **sight whether or not there's** a pulse signal back. IF the signal back, through high level, time of high output IO **period is that the time from causation unhearable** to returning.



Figure.4. Ultrasonic sensor

Test distance = (high level time × velocity of sound (340M/S) / 2,

**Wire connecting direct as following:**

- 5V Supply
- Trigger Pulse Input
- Echo Pulse Output
- 0V Ground

### 3.3 GLOBAL POSITIONING SYSTEM

The Global Positioning System, additionally called Navstar GPS or just Navstar could be a world navigation satellite system &#40;GNSS&#41; that gives geolocation and time info to a GPS receiver altogether climatic conditions, anyplace on or close to the planet wherever there's associate unlogged line of website to four or additional GPS satellites. The GPS system operates severally of any telecommunication or net reception, although these technologies will enhance the quality of GPS positioning info. The GPS system provides vital positioning capabilities to military, civil, business users round the world. The GPS idea relies on time and also the noted position of specialized satellites. The satellites carry terribly stable atomic clocks that ar synchronous with each other and to ground clocks.

### 3.4 GLOBAL SYSTEM FOR MOBILE COMMUNICATION

Global System for Mobile Communication (GSM) is a global customary that describes the digital cellular network protocols utilized by mobile phones. GSM is employed for transmission mobile voice, knowledge services and short message services. The key options of GSM technology is that the users ar given top quality signal and speech channels at terribly reasonable rates. The GSM network is formed 3 elements. The Mobile Station, Base Station and Mobile Services change Centre (MSC). during this paper the knowledge regarding the actual client are going to be sent to EB through GSM. Then, the patron needs to offer the requisition to EB for creating the electrical fuse coming back into traditional with the assistance of NodeMCU through GSM. It additionally provides compatibility, multitasking and speed benefits over Code Division Multiple Access (CDMA).

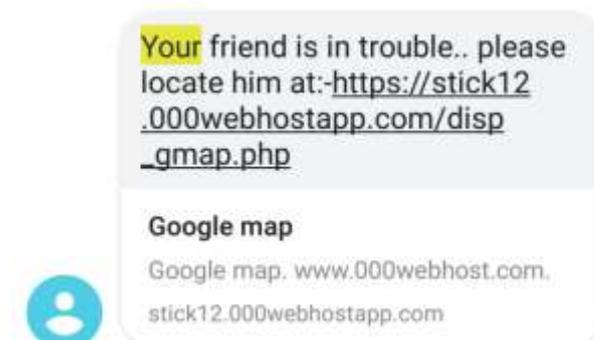
## 4. Result

### 4.1 Obstacle Detection

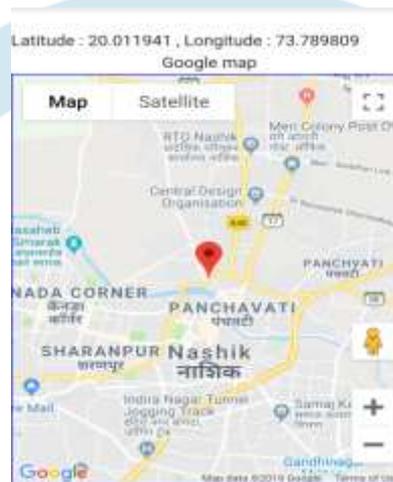
When any obstacle detected our system convey the vocal message like obstacle detected at right, front left.

### 4.2 Panic Alerts

In some things person feels that he/she in insecure surroundings. then we offer one feature as a switch, one that is in peril, he/she simply got to press that switch then mechanically message can generate and receive by accountable persons or their relatives as shown in figure Panic Alerts.



**Figure.5. panic Alert**



**Figure.6. Blind person's current location sent by message**

#### 4.3 Outdoor Navigation

By exploitation Google map we are able to give the out of doors navigation to the stick holder and navigate person wherever he/she would like to travel. Persons needs to travel explicit place he/she has got to place current location and destination. On that our system will navigate vocally and denote the directions, wherever to show and wherever to prevent once made the Destination.

#### 5. CONCLUSION

The aim of this study, the look and implementation of a sensible walking stick for the blind has been accomplished. The good Stick acts as a basic platform that's useful for the visually impaired to navigate firmly each indoor and out of doors. it's economical and cheap. It results in smart quality ends up in detection the obstacles on the trail of the user in an exceedingly vary of 3 meters. this method offers a reliable, low-cost, low power and moveable consumption and vigorous resolution for navigation with short interval. It's light-weight in weight even if the system is hard-wired with sensors and few different parts. In further, this method may be increased via wireless property between the system parts, thus, growing the vary of the supersonic detector and implementing a technology for crucial the speed of approaching obstacles. Visually impaired blind folks altogether developing countries were on high of priorities. The device created is just capable of detection wetness and obstacles. Neither the character of the obstacle be detected exploitation device nor the holes. As a result, a stronger device may be created exploitation Arduino Uno, supersonic sensors and different devices that create use of audio commands to alert the user of what's within the path of movement. A vibrator can also be accessorial for simple use and convenience. more modifications in future may be accessorial to enhance the performance of the system.

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