ISSN: 2278-4632
Vol-12 Issue-09 No.02 September 2022

# MODREN BLIND STICK BY USING SUITABLE SENSORS

**P.Yamuna[1], K.Gayatri[2], S.Meena[3], S.Hemanth Kumar[4], T.Hemanth[5], V.Rafi[6], A.Pooja[7],K.Sailaja[8]** Department of EEE JNTUA College of Engineering Pulivendula, 516390, Andhra Pradesh, India : rafijntuacep@gmail.com

**Abstract:**
The study focus on a simple method of detecting the obstacle and route by using an Ultrasonic sensor that can detect a hole or stair with maximum range about 2 meters. As we can see, blind people are having their trouble to do their life routines because they can't see even single things. With our idea, we want to help this kind of people to live their life freely. This modern blind stick has a several feature that surely can help this blind people to navigate routes and detect an obstacle that surely can make their life routines easier. The user just need to use the blind the normal blind stick, the different is , blind people can detect a hole or stair more faster and easily . Besides that, guardian or parent also can locate the location of the stick user using Global Positioning System (GPS) and Global System for Mobile Communication (GSM) module. In order to overcome the problem of visual impairment, I have come up with a solution called smart blind stick. To aid blind people by smart stick with sensor and produces a sound wave when it senses an obstacle.
**Key words:** Arduino UNO R3, Relay module, LED, Buzzer, Ultrasonic sensor, GSM Module, GPS Module, LDR Module.

## 1. INTRODUCTION:

Nowadays, visually impaired person suffer from serious visual impairments preventing them from travelling independently. Accordingly, they need to use a wide range of tools and techniques to help them in their mobility. One of these techniques is orientation and mobility specialist who helps the visually impaired and blind people and trains them to move on their own independently and safely depending on their other remaining senses. Recently, many techniques have been developed to enhance the mobility of blind people that rely on signal processing and sensor technology.

According to the literature, the mainly classified into two major aspects: sonar input (infrared signals, or ultrasonic signals). The way these devices operate just like the radar system that uses ultrasonic fascicle or sonar to detect the obstacle of fixed and moving objects. The distance between the person and the obstacles is measured by the time of the wave travel. However, all existing systems inform the blind of the presence of an object at a specific distance in front of or near to him. Information about the object characteristics can create additional knowledge to enhance space manifestation and memory of the blind. To overcome the abovementioned limitations, this work offers a simple, efficient, configurable electronic guidance system for the blind and visually impaired persons to help them in their mobility regardless of where they are, outdoor or indoor.

The originality of the proposed system is that it utilizes an embedded vision system of three simple ultrasonic sensors and brings together all reflective signals in order to codify an obstacle through PIC microcontroller (Arduino UNO R3). Hence, in addition to distance the proposed guidance system enables the determination of two main characteristics of the obstacle which are material and shape. Furthermore, to assist in tracking the location, this modern blind stick utilizes GPS to determine the location and send it via SMS to locate the location of the user Modern Blind Stick.

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| Work | Year | Gap/Improvement Required |
|---|---|---|
| Develops a modern blind stick with sensor and some other components | 2019 | Some modifications should be done and increase its work much better |
| The improved version of other but much expensive | 2019 | Much expensive |

## 2. LITERATURE SURVEY:

Blindness is a very common disability among the peoples throughout the world. According to the World Health Organization (WHO) 285 million people are visually impaired worldwide, 39 million are blind and 246 have low vision. About 90% of the world's visually impaired live in developing countries [1]. To be classed as blind, there is a total loss of vision. Low vision cannot be corrected by visual aids such as glasses and contacts [2]. For the indigents blindness is a curse.

They need help to walk outside and all other daily essential works. So the proposed work glows a system that tries to remove the curse of blindness and make them self dependent to do their daily chores. It is a walking stick, normally used by the blinds. But it is fully automated, easy to maintain, cheap and it is very comfortable to use [3].

The smart cane is an alternative to the common/traditional walking stick, which is a purely mechanical device used to detect ground obstacles, including holes, steps, uneven surfaces, and other things that may pose a danger. The traditional white cane is inexpensive and very lightweight and small, which makes it foldable able to fit in a pocket.

Though useful, the traditional white cane has some critical setbacks, including the fact it takes hard training for one to be able to use them effectively. This is a significant "hidden" cost.

Further, it only conveys a limited amount of information and allows a limited range of motion because the user can only scan the small area ahead of him/her and objects can only be detected through contact.

This can be inconvenient to a traveler and those around him/her, for instance, if one is traveling in a crowded street. In the case of guide dogs [4], albeit these can be capable guides for the blind, they need extensive training.

Moreover, a fully trained guide dog can cost anywhere from $12,000 to $20,000, which is quite high, considering that their useful life is only about five years.

This project was developed by (M.H. Mahmud, R. Saha and S. Islam). The author proposes a function of a microcontroller that has code protected so its security bridge cannot be override except the vendor or owner. It produces different Pulse Width Modulation (PWM) based on the sensors output to operate pager motor. The author focused on the easy way to use the stick and it's maintained, cheap and it is very comfortable to use for blind people. The author approach with subsystems fundamentally sensor based with integral scheme is designed with a circuitry fundament on a PIC microcontroller. The power consumption is low and can be operated easily. The stick is very economic over the conventional one. The Smart Stick acts as a basic platform for the coming generation of more aiding devices to help the visually impaired to navigate safely both indoor and outdoor. It is effective and affordable. It leads to good results in detecting the obstacles on the path of the user in a range of three meters. This system offers a low-cost, reliable, portable, low power consumption and robust solution for navigation with obvious short response time.

M.H. Mahmud, R. Saha and S. Islam (February 2015) The author convinced a stick which allowed a sighted assistant to steer the Guide Cane remotely. A sightless subject would then walk with the

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Guide Cane, "steered" by the assistant radio-control joystick. The author focused on how to steer the stick so the sensor head is mounted on a steerable with two unpowered wheeled steering axle. The author approach with the ultrasonic sensors that detect any obstacle in a 120o wide sector ahead of the user. Using UM's previously developed, patented obstacle avoidance technique called "Vector Field Histogram" (VFH) in combination with UM's patented "Error Eliminating Rapid Ultrasonic Firing" (EERUF) method for firing the sonars, allows for travel at fast walking speeds.[2]

Johann Borenstein and Yoram Koren (April 21-27) The author propose that voice can being consequently activate by microcontroller when detect any obstacle to warn the sightless subject. The author approach using with a 40 KHz signal sent out by the ultrasonic transmitter. This will be reflected back to the ultrasonic receiver in case there is an obstacle along the pathway of the stick, and this activates one of the input pin of the microcontroller. Once this happened, the microcontroller will consequently activate the voice recording microchip which then gives the relevant output via the speaker. The author focused on how to make the voice guidance as a platform to ease and help the sightless subject.

Olakanmi (August 2014)The author convinced the Global Positioning System (GPS) is to identify the position and orientation and location of the blind person any of those solutions rely on GPS technology. The author focused on the GPS to make use of the data stored to compare with the destination location of the user. By this it can trace out the distance from the destination and produce an alarm to alert the user in advance. The author conclude The proposed combination of various working units makes a real-time system that monitors position of the user and provides dual feedback making navigation more safe and secure. The author approach with Microcontroller that intergrated using Global Positioning System(GPS).

Dambhare, Shruti and A.Sakhare (2011)The author conviced the proposed that LDR gives a very high resistance value ranging up to 2MΩ and in the day time or when there is sun light it give a low resistance ranging to 100Ω and sometimes below. From the voltage divider network at day time the voltage from the LDR is lower there by making pin 2 lower than pin 3 of the comparator giving an output voltage of 0V and at night the VLDR is high making pin 2 greater and the comparator output 5V. The author focused on how LDR can function on white cane with the proper circuit. The system consists of an ultrasonic sensor for obstacle detection, a light dependent resistor for dark detection. Each sensor is differentiated from one another through pattern of sounds.

## 3. COMPONENTS USED IN THIS SYSTEM:

### Arduino UNO R3:

The Arduino UNO R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be use as PWM outputs and 6 can be used as computer program. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics. The R3 is the third and latest revision of the Arduino UNO.

### Relay Module:

Relay Module is an electrically operated switch that can be turned on or off, letting the current go through or not, and can be controlled with low voltages, like the 5V provided by the Arduino pins. Controlling a relay module with the Arduino is as simple as controlling any other output.

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**Light Emitting Diode (LED) :**

A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor.[5] White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

**Buzzer:**

A buzzer is a small yet efficient component to ad 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 PCB which makes this a widely used component in most electronic applications. This Buzzer can be used by simply powering it using DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply.

**Ultrasonic Sensor:**

The HC-SR04 ultrasonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1" to 13 feet. The operation is not affected by sunlight or black material, although acoustically, soft materials like cloth can be difficult to detect. It comes complete with ultrasonic transmitter and receiver module.

**GSM Module:**

A GSM Module is basically a GSM Modem (like SIM 900) connected to a PCB with different types of output taken from the board – say TTL Output (for Arduino, 8051 and other microcontrollers) and RS232 Output to interface directly with a PC (personal computer). The board will also have pins or provisions to attach mic and speaker, to take out +5V or other values of power and ground connections. These type of provisions vary with different modules.

**GPS Module:**

The heart of the module is a NEO-6M GPS chip from u-blox. It can track up to 22 satellites on 50 channels and achieves the industry's highest level of sensitivity i.e. -161 dB tracking, while consuming only 45mA supply current. The u-blox 6 positioning engine also boasts a Time- To First-Fix (TTFF) of under 1 second. One of the best features the chip provides is Power Save Mode(PSM). It allows a reduction in system power consumption by selectively switching parts of the receiver ON and OFF. This dramatically reduces power consumption of the module to just 11mA making it suitable for power sensitive applications like GPS wristwatch. The necessary data pins of NEO-6M GPS chip are broken out to a "0.1″ pitch headers. This includes pins required for communication with a microcontroller over UART.

**Light Dependent Resistor (LDR) Module:**

The LDR Sensor Module is used to detect the presence of light / measuring the intensity of light. The output of the module goes high in the presence of light and it becomes low in the absence of light. The sensitivity of the signal detection can be adjusted using potentiometer.

## 4. EXISTING METHODOLOGY:

The methodology is the general research strategy that outlines the way in which research is to be undertaken and among other things, identifies the methods to be used in it. These methods, described in the methodology, define the means or modes of data collection or, sometimes how a specific result is to be calculated. For our project the information about the visually impaired people has been collected throughout every source that leads to our project. All of this information has been used to do our project which is Modern Blind Stick.

In ensuring the Modern Blind Stick can be done appropriately, a project planning by using Gantt charts has been prepared. In this Gantt chart, schedule of plan and subsequently report progress within the project environment has been stated clearly. Initially, in this project, the scope is defined with the appropriate methods for completing the project are determined.

ISSN: 2278-4632
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The smart stick for the blind as the name suggests is a device for the visually impaired to guide the user to respective destination and avoiding to collide with the obstacles. It uses two ultrasonic sensors HC SR 04 to detect the depth below or the obstacles in between. Along with that it uses Arduino as the main controller. And 1sheeld as the Bluetooth interface between the controller and smartphone. Whenever there is any obstacle in front. The sensor will detect the distance from the obstacle and send to the controller. The controller will then convert in audio format.

**FLOW CHAT:**

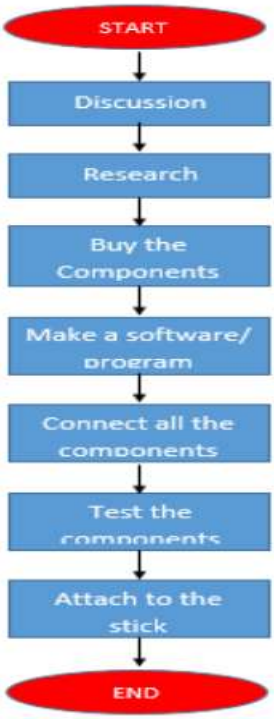


**Fig : 1.1: flow chat of existing methodology**

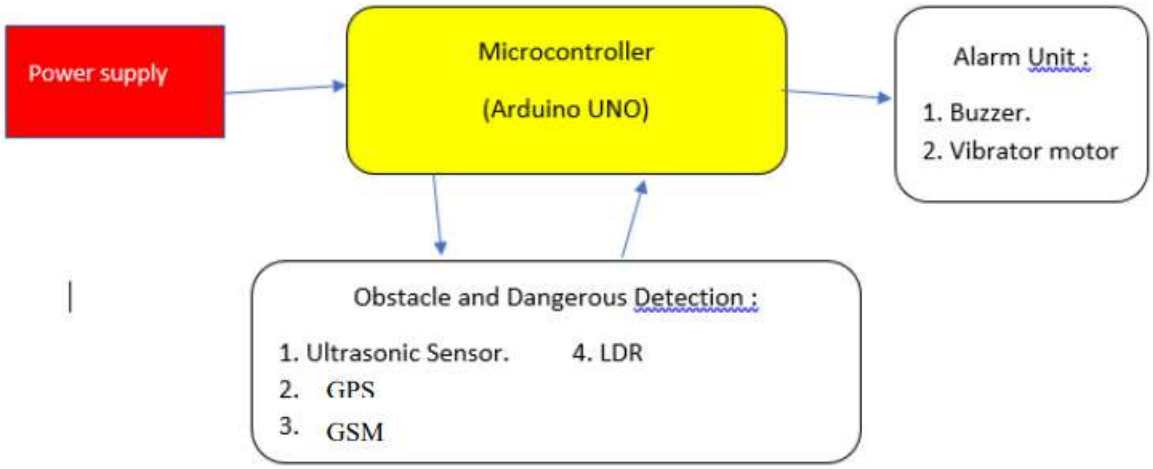


**Fig : 1.2: Block diagram of existing methodology**

**5. PROPOSED METHODOLOGY:**

We here propose an advanced blind stick that allows visually challenged people to navigate with ease using advanced technology. The blind stick is integrated with ultrasonic sensor along with light

ISSN: 2278-4632
Vol-12 Issue-09 No.02 September 2022

and water sensing. Our proposed project first uses ultrasonic sensors to detect obstacles ahead using ultrasonic waves. On sensing obstacles the sensor passes this data to the arduino Uno. The arduino uno then processes this data and calculates if the obstacle is close enough. If the obstacle is not that close the circuit does nothing. If the obstacle is close the arduino Uno sends a warning in the form of voice. It also detects and sounds a different buzzer if it detects water and alerts the blind. The stick also includes the vibrator.if the obstacle is close the arduino uno sends a warning through vibration. Water detection is done by water sensor. One more feature is that it allows the blind to detect if there is light or darkness in the room. The system has one more advanced feature integrated to help the blind find their stick if they forget where they kept it. A wireless RF based remote is used for this purpose. Pressing the remote button sounds a buzzer on the stick which helps the blind person to find their stick.

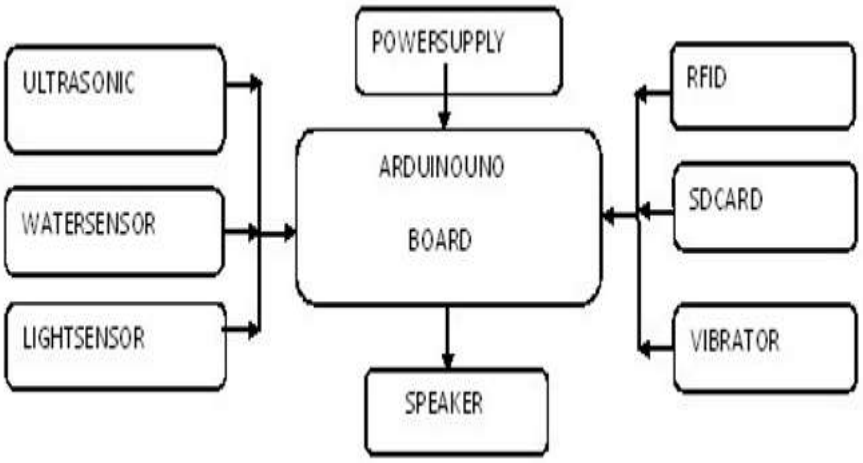


**Fig : 1.3: flow chat of proposed methodology**

## 6. CONCLUSION:

In the end of our study, we can conclude that our project can reduce the number of risk and injuries for the visually impaired person when walking at public. Nowadays, even at young age experience the visually impairment. This thing cannot be taken so lightly as they know how much risk could it be. If the number of risk and injuries increasing rapidly, the kid or the person will loss their spirit to walk independently. The Modern Blind Stick acts as a basic platform for the coming generation of more aiding devices to help the visually impaired to navigate safely both indoor and outdoor. It is effective and affordable. It leads to good results in detecting the obstacles on the path of the user in a range of two meters. Though the system is hard-wired with sensors and other components, it's light in weight. Further aspects of this system can be improved via wireless connectivity between the system components, thus, increasing the range of the ultrasonic sensor and implementing a technology for determining the speed of approaching obstacles. This paper conclude that our project are useful to the visually impaired person and family or guardian that have visually impaired kids. This project helps the visually impaired person to walk at the public more easily and safely. With our safety features, we can reduce the risk of the visually impaired walk in public. Therefore, we creating this project is to help the visually.

## 7. FUTURE SCOPE:

The future scope of the existing smart stick, guides the visually impaired person in his navigation independently in an efficient manner ensuring the person’s safety.

- The Braille input device gives the blind person an uncomplicated method to provide the destination address for navigation.

ISSN: 2278-4632
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- The programmable wheels would steer the stick away from the obstacles and also leading the blind person towards the destination.
- Internet of Things is a trending concept which can increase the benefits of the smart stick by allowing one stick to communicate with another smart stick (or mobile , PCs) nearby to utilize the functionality of the other stick when one stick's functionality breaks down.
- .In order to run this integrated set of hardware we can use solar panels as an alternative to the battery. The use of solar panel occurs to be more advantageous as it uses sunlight, the easily available renewable resource of energy, to get recharged.

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