A

PROJECT REPORT

On

"SMART STICK ASSISTANT"

Submitted by

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(ACCREDITED BY NBA)

SIPNA COLLEGE OF ENGINEERING &TECHNOLOGY

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SANT GADGE BABA AMRAVATI UNIVERSITY

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SIPNA COLLEGE OF ENGINEERING &TECHNOLOGY, AMRAVATI

CERTIFICATE

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has satisfactorily completed the project work towards the **Bachelor of Engineering** Degree of Sant Gadge Baba Amravati University in **Computer Science and Engineering** discipline on the topic entitled **"SMART STICK ASSISTANT",** during the academic year 2019-20 under my supervision and guidance.

Date: / /2020

Prof. Mr. S.B. Rathod
Guide

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Project Approval Sheet

Project Entitled

"SMART STICK ASSISTANT"

By

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Mr. RUSHIKESH A. CHAVHAN

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Is approved for the degree of

Bachelor of Engineering

In

Computer Science and Engineering

Of

Sant Gadge Baba Amravati University

Internal Examiner:	**External Examiner:**
Name:	**Name:**
Date:	**Date:**

Acknowledgement

A moment of pause, to express a deep gratitude to several individuals, without whom this project could not have been completed.

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Submitted by

Akshay A. Bardiya
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ABSTRACT

The man has been suffering with many diseases. Visually challenged people are blind people who are very common and difficult to deal with in their way. The main aim of this paper is to the visually challenged people with a better navigation tool. This smart walking stick is more sophisticated than a traditional walking stick. It uses a microcontroller to detect an obstacles in front, left, right side, and also directs up-down to a person. It is based on ultrasonic sensors for distance measurement property. For obstacle indication, there is voice playback module which helps to mention a direction of obstacles around a visually challenged person by sensors. Along with this a receiver and a chargeable battery are placed on a stick to make it durable. This smart stick also include LDR which helps to detect a light in a dark area's.

1. INTRODUCTION

1.1 Theory:

Visually impaired or blindness is the inability to see anything. Some are called as visually challenged, even though they can see a little bit. In all the world, blindness is mostly caused by malnutrition and diseases of people. Because of diseases or accidents the people became visually impaired. The World Health Organization (WHO) estimates that 80% of visually impairment is either preventable or curable with treatment.285 million people are estimated to be visually impaired worldwide. Up to 2014, 39 million are visually impaired and 246 have low vision. This is an area of progress over the last 20 years.

Blindness may affect a person's ability to perform many jobs, sports and academics in day to day life. In this project we provide a smart electronic travel aid navigation tool for vision loss people .The developed stick provides an accurate detection of obstacle and guiding a person .Microcontroller is a small and low cost single chip computer. It is used to control the other electronic device and an interfacing unit. Ultrasonic sensors are in systems which evaluate targets by interpreting the reflected signals. Measuring the time between sending and receiving an echo the distance of an object can be calculated. The Global Positioning System is a space based radio navigation satellite system owned by USG. The GPS system provides a critical positioning capability to all users around the world. There are 24 satellites in space developed by United States. A remote controller is component of an electronic device used to operate the device wirelessly from the distance. In existing system, there is some missing feature for vision loss people. The buzzer is ON when an obstacle is detected by an ultrasonic sensor. In this system, buzzer is used for varies environment.

1.2 Objective:

The main objective is to help visually challenged people to navigate with ease using advance technology. In this technology controlled world, where people strive to live independently, this project proposes an ultrasonic stick for blind people to help them gain personal independence. Since this is economical and not bulky, one can make use of it easily.

1.3 Proposed System:

In propose system, we propose a voice based ultrasonic walking stick for visually challenged people. The ultrasonic sensor gather a data about the environment and extract the visual information from the data. This visual information is then transformed into an audio signal to recognize the environment information through the voice based audio. The voice playback module is used to record a voice along with this headphone also included for visually impaired people. The user can detect an obstacles by connecting a stepper motor. A motor rotates the ultrasonic sensor in two types with steep angle 90 degree. The sensor can detect front side, left side, and right side obstacles.

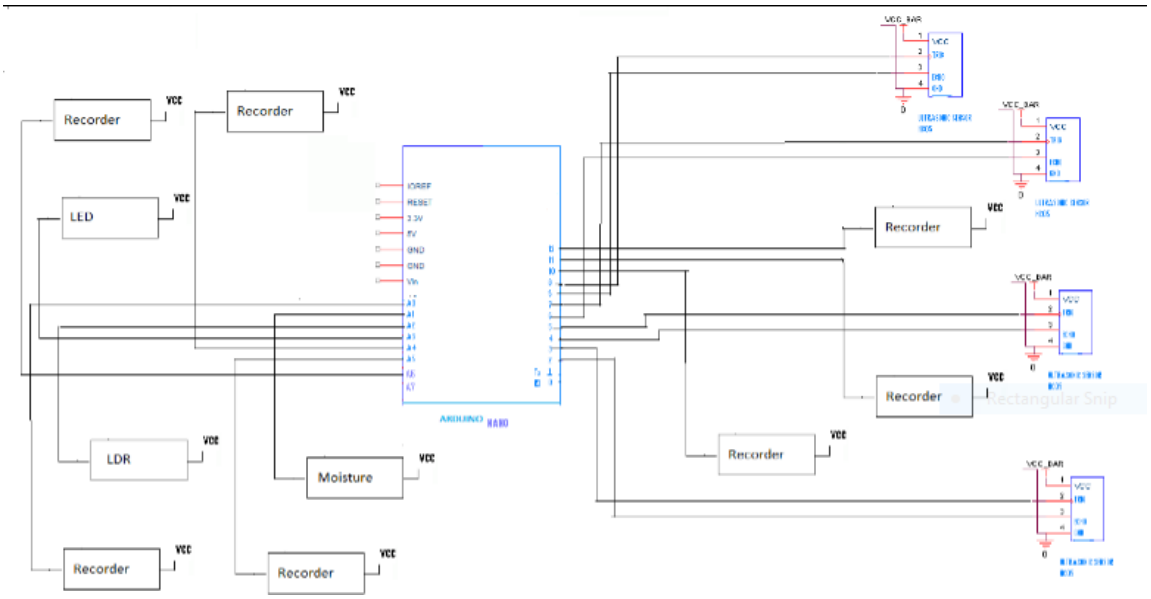

Figure 1. Circuit Diagram of Proposed Work

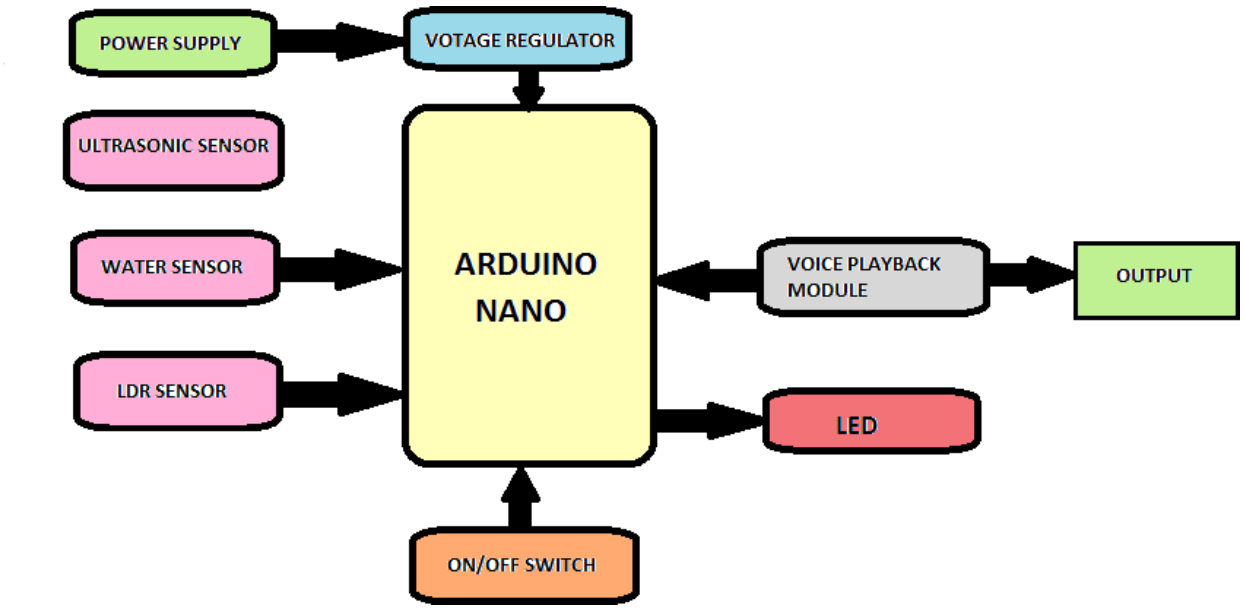

Figure 2. Block Diagram of System

1.4 Literature Survey:

According to a report by World Health Organization (WHO) and International Agency for Prevention of Blindness (IAPB) [1] nearly 285 million persons around the world are visually impaired. However a more astonishing fact is that out of these 285 million people, 39 million people are completely blind. It is not a herculean task to comprehend the amount of hardship which is inflicted upon these innocent souls. Even, many children are blind since birth and we must remember the fact that these children have a very long life ahead of them. Their lives can be improved 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. The purpose of this blind stick would be to make blind people more independent.

The ability to live without being controlled by any action, judgment and any outside factors including any opinions and regulations is defined by the term Independent. But in reality physical movement for travelling or simply walking through a crowded street pose great challenge for a visually impaired person. This aims to design an artificial navigating system with adjustable sensitivity with the help of ultrasonic proximity sensor and a GPS module to assist these blind persons to walk fearlesssly and independently in both indoor and outdoor environment. This system can detect any type of upcoming obstacles and potholes using the reflection properties of ultrasound. 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 in moving and allowing them to perform their work easily and comfortably. The blind person cannot recognize what is the size of that object and how far is he from the object. So, it is

difficult for blind person to move here and there. The smart walking stick supports Object recognition and output comes mainly in the form of Voice output. In Smart Walking Stick, we detect the object with the help of a camera. The stick measures the distance between objects and Smart Walking Stick by Ultrasonic sensor. When the objects or obstacles come in range of the ultrasonic sensor, the speaker tells Name of obstacle in front of the stick. Images will be captured using a camera and the camera is connected to the Raspberry Pi. If any obstacle comes in front of blind person, he can know about the obstacle by hearing the sound generated by the head phone. 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 gives good results in detecting obstacles in front of the user [3].

There is a large group of people who have difficulties in their daily routine work due to losing their eyesight. Walking with confidence is one of them which may have different challenges in different environments/countries. We have considered Indian context where outdoor environments are often clustered and noisy. Keeping these challenges in mind, a new smart stick is developed which is capable of detecting obstacles of any height in front or slightly sideways of the person. The stick gives a fair idea about the distance and the location of obstacles through vibration in hand and audio in the ear of the person. The wireless connection has been set up using Bluetooth between the earphone 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 have been conducted in different environments by different people to observe the accuracy of the stick and results are quite encouraging. [4]

Kher Chaitrali S et al., (2013), presents the visually impaired have to face many challenges in their daily life. The problem gets worse when they travel to an unfamiliar location. Only few of the navigation systems available for visually impaired people can provide dynamic navigation through speech output. In this paper, we propose a navigation device for the visually impaired which is focused on providing voice output for obstacle prevention and navigation using infrared sensors, RFID technology, and android devices. The device has proximity infrared sensors. RFID tags are installed into public building and also integrated into blind person's walking stick. This device is connected to an android phone through Bluetooth. An android application is designed which gives voice navigation based on RFID tags read and also updates person's location information on the server. One more application is designed for family members to access the blind person's location through the server whenever needed. It aims to solve the problems faced by the blind people in their daily life. The system also takes measures to ensure their safety [5].

1.5 Scope of the Project:

- The ultrasonic sensor is used to detect the presence of obstacle and calculates the distance between the source and destination.
- Light sensor is used to detect the presence or absence of light.
- Moisture Sensor is used to detect the moisture (something Water or liquid) present on the surface.
- Used to detect the little object i.e. stone or something present in front of the blind person.
- Light Sensor is useful at night. It alerts the people in the surrounding area that a blind person is walking and to allow apace so that the blind person can walk easily.

2. HARDWARE REQUIREMENTS

2.1) 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 where automation is an essential part of the system. It comes with an operating voltage of 5V, however, the input voltage can vary from 7 to 12V. Arduino Nano Pinout contains 14 digital pins, 8 analog Pins, 2 Reset Pins & 6 Power Pins. Each of these Digital & Analog Pins are assigned with multiple functions but their main function is to 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

2.2) Ultrasonic Sensor's:

Ultrasonic sensor is used to detect the object in front of the person. HC-SRC04 ultrasonic sensor has 4 pins-ground, vcc, trigger and Echo. It ranging 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 sends ultrasound waves at high frequency and receive back the signal.

The distance can be calculated with the following formula:

Distance L = 1/2 × T × 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

2.3) Voice Playback Module:

This module detects the user spoken word through a microphone or a speaker. It will alert the person it they 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 can record as well as fixed voice playback, recording content uploaded and a variety of control modes can be chosen. It has a great advantage in the duration time of recording and cost performance.

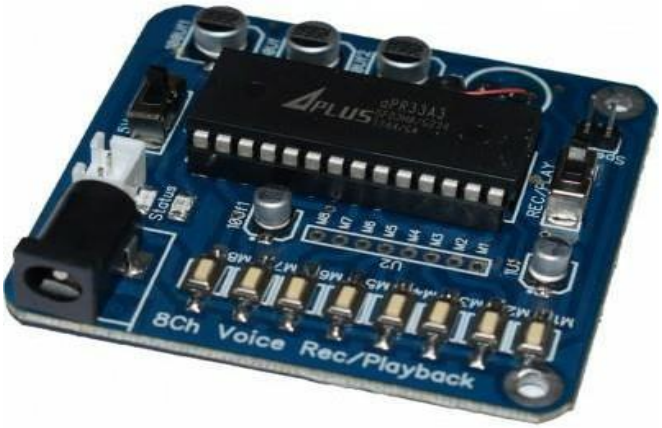

Figure 5. Voice Rec/Playback

2.4) 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.

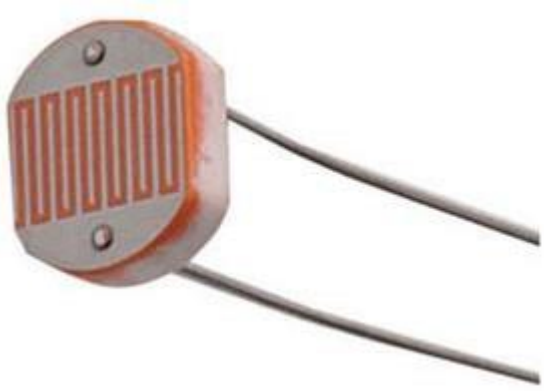

Figure 6. LDR Sensor

3. WORKING

3.1) Proposed Work:

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.

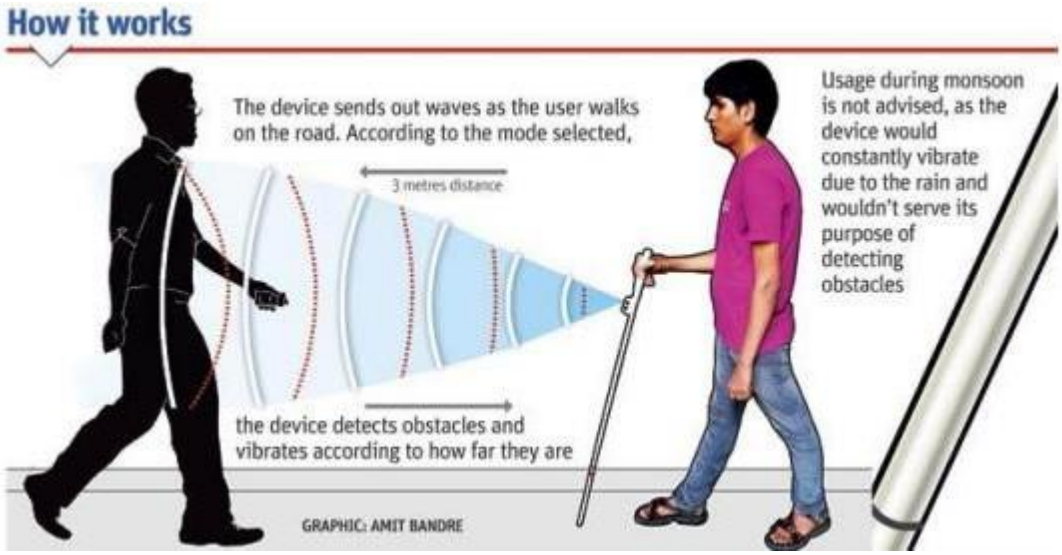

Figure 6.Working of Smart Blind Stick

The Blind Stick is integrated with ultrasonic sensor along with light 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 microcontroller. The microcontroller 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 microcontroller sends a signal to sound a buzzer. It also detects and sounds a different buzzer

if it detects water and alerts the blind. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today.98 percent of all microprocessors are manufactured as components of embedded systems. With general-purpose counterparts are low power consumption, small size, rugged operating ranges, and low per-unit cost. This comes at the price of limited processing resources, which make them significantly more difficult to program and to interface with. However, by building intelligence mechanisms on the top of the hardware, taking advantage of possible existing sensors and the existence of a network of embedded units, one can both optimally manage available resources at the unit and network levels as well as provide augmented functionalities, well beyond those available.

4. ADVANTAGES

- The system enables the blind people to move with the same ease and confidence as slighted people.
- Accurate detection of objects.
- The System can be used for indoor and outdoor navigation.
- Detects obstacles and alerts blind peoples through vibration alert and speech output
- Provides Auto detection of objects.
- Dig information with the indication signal along with voice.
- Simple to use and low cost.
- The main aim of the system is to provide an efficient navigation aid for the blind persons which gives a sense of vision by providing the information about their surroundings and objects around them.

5. APPLICATIONS

- To assist the blind people, a smart waking 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 Water or liquid) present on the surface.
- Used to detect the little object i.e. stone or something present in front of the blind person.
- Light Sensor is useful at night. It alerts the people in the surrounding area that a blind person is walking and to allow apace so that the blind person can walk easily.
- It uses two ultrasonic sensors to detect the depth below or the obstacles in between

6. 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 smart stick with the mobile application that will guide blind people's to go through the right way with the help of headphones and google mapping technology.
- All about our research we take care about one problem that is visual disability. To make a solution we did this low cost project. We believe that this project will spread all around society and convert disable to able. This is our hope, to consider this stick as smart eye for the visual impairments.

7. RESULT

- 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.
- If this stick comes in contact with water then moisture sensor detect it and gives a alarm.
- Arduino nano, they are acted as input pins when they are interfaced with sensors, but if you are driving some load then use them as output.
- Ultrasonic sensor is used to detect the object in front of the person.
- Voice playback module, this module detects the user spoken word through a microphone or a speaker.
- LDR sensor, it alerts people about the presence of blind person to let him to pass the way.

8. CONCLUSION

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.

It is necessary that visually impaired people get access to an efficient and comfortable object in order to live their daily life comfortably. The advantage of the system lies in the fact that it can prove to be a low cost solution to millions of blind person worldwide.

9. REFERENCES

[1] World Health Organization (2013). Universal eye health. A global action plan 2014-2019.

[2]A. Sen, K. Sen and J. Das, "Ultrasonic Blind Stick for Completely Blind People to Avoid Any Kind of Obstacles," 2018 IEEE SENSORS, New Delhi, 2018, pp. 1-4.

[3] Jismi Johnson, NikhalRajan P, Nivya M Thomas, Rakendh C S, Sijo T Varghese, "Smart Walking Stick for Blind", International Journal of Engineering Science Invention Research & Development; Vol. III, Issue IX, pp. 557-560, March 2017

[4] S. Sharma, M. Gupta, A. Kumar, M. Tripathi and M. S. Gaur, "Multiple distance sensors based smart stick for visually impaired people," 2017 IEEE 7th Annual Computing and Communication Workshop and Conference (CCWC), Las Vegas, NV, 2017, pp. 1-5.

[5] Kher Chaitrali S., Dabhade Yogita A., Kadam Snehal K., Dhamdhere Swati D., Deshpande Aarti V., "An Intelligent Walking Stick for the Blind," International Journal of Engineering Research and General Science Volume 3, Issue 1, January-February, pp.1057-1062, 2015

[6] Research paper published named "Smart Stick Assistant" with ID IJSRDV8I40304 has been published in international journal for scientific Research and Development Journal, IJSRDV8I40304, Volume 8, Issue 1, July, 2020.