

# Smart Stick for Visually Challenged People

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**Abstract-** In this paper, we will make you familiar with a smart stick system for aiding blind people. The world has witnessed visually impaired people getting injured in accidents many times. There are approximately 2.2 billion blind people in the world as of 2021. Majority of them use a conventional white cane to aid in navigation. But one cannot identify the obstacles without touching them by their white cane. The proposed smart stick will help the visually impaired person by alerting them about the approaching obstacles like people and water during walking. The system acts like an artificial vision and alarm unit. The system consists ultrasonic sensor, vibrator, water sensor and the microcontroller.

They receive the sensor signals and process them to short pulses to the Arduino pins where buzzers, vibrator and voice alarms are connected. The proposed model is affordable and suitable of the visually challenged people.

**Key Words:** ATmega328P Microcontroller, Visually Challenged, Water Sensor, Vibrator, Buzzer, Smart Stick.

## 1.INTRODUCTION

There are about 285 million people who are visually impaired according to estimates from the World Health Organization (WHO) Prevention of Blindness and Deafness Programme. Out of which 39 million people are blind and 246 million suffer from low vision. 65 percent of visually impaired are over 50 years of age. Almost all of them use the ordinary white cane as a support while walking. The humans have made this ordinary cane more efficient with the help new age technology like Internet of Things (IoT). Arduino is an open source tool which develops computers that can sense and control more of the physical world than desktop computer.

## 3. PROJECT DESCRIPTION

### 3.1 Ultrasonic Sensor

As the name indicates, ultrasonic sensors measure the distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception.

The distance can be calculated as:

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

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.)

### 3.2 Microcontroller

Here we use ATMEGA328P-PU this is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. The ATmega328P is a single chip microcontroller created by Atmel in the megaAVR family. ATmega328 is commonly used in many projects and autonomous systems where a simple, low cost microcontroller is required. This ATMEGA328P-PU has rich instruction set with 32 general purpose working register.

### 3.3 Vibrator

A vibrator motor is included to enhance the overall feedback for the person who receives the warning against obstacles closeness in different formats of vibrations.

This type of DC vibration motors are used in mobile phones. It requires a voltage supply of 3V -5V with current around 125 mA. This type of motors can be programmed to control its speed by using the Pulse Width Modulation(PWM) method.

### 3.4 Water Sensor

Water sensors is used to detect the presence of water. The sensor sends out a notification to the owner of the home through a smartphone app, when Wi-Fi is enabled,. If the owner of the home will be out of town, family members, friends or other caretakers can be receive the notification of any kind of leak, so that further loss of water can prevented.

These kind of water sensors which are used in water tanks are expensive. Our objective is to detect water existence regardless its level. So, we used an alternative which is less expensive.

## 4.WORKING PRINCIPLE

The project demonstrated here shows the working of smart stick.

The project will work in following way:

The proposed model consist of ultrasonic sensor, Water sensor, Vibrator, Buzzer and an LED light. The ultrasonic sensor measure the distance between the person and the obstacle by using ultrasonic waves and measuring the time between emission and reception.

The water sensor detects the presence of water near the person. The microcontroller is the heart of the project. The signals from the water sensor and ultrasonic sensor are being sent to the microcontroller which activates the vibrator and the buzzer and the person will be alert.



Fig. 1: Working Model

## 5. RESULT

After we designed the smart stick, we tested the stick against certain obstacles like another person, puddles and water. We observed that the proposed smart stick is functioning well. We tested the stick in public by providing the stick to a visually impaired person and it helped him walk independently in the public.

Whenever he came across any obstacle the stick alerted him by vibrating and beeping, which was the purpose of our model.

## 6. CONCLUSION

This paper illustrates the difficulties faced by the visually challenged people. factors which compels the consumers to steal electricity. This paper illustrates the various successful and failed proposed techniques used to assist the blind people. New technologies are being invented every day. The progress in technologies never stops. The proposed model uses ATmega328P microcontroller, ultrasonic sensor, vibrator, buzzer and water sensor to detect the obstacles. The proposed model is affordable in price and suitable to hold since it is light in weight. Further developments can be done which can show the exact location of the obstacle and a photo sensor may also be added to detect light.

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