



Design and Development of a Smart Visually Impaired Stick for the Visually Impaired

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3.1 Components

Abstract- Smart-Stick helps visually impaired people navigate their surroundings safely by using ultrasonic sensors, water sensors, voice recorder modules, vibration motors, and an Arduino UNO microprocessor. The article highlights the system's goal and approach. The article's conclusion thanks the project's contributors and discusses how the system might affect visually impaired. quality of life.

Keywords-Arduino, Ultrasonic Sensor, Obstacle Detection

- Ultrasonic sensor to detect obstacles.
- Arduino UNO (microcontroller)
- Voice module for conveying the directions to the visually impaired person.
- Water Sensor
- Vibration Motor

I. INTRODUCTION

The Smart-VI-Stick is a sophisticated technology meant to help visually impaired people with their daily mobility. In order to give users real-time information about their surroundings, it makes use of cutting-edge technologies like water sensors, voice recorder modules, and ultrasonic sensors [4]. While the speech recorder module offers verbal directions regarding the direction and alarm of the object, the ultrasonic sensor may detect barriers and compute their distance from the user [3]. The embedded water sensor can identify the presence of water and warn the user to stay away from it.

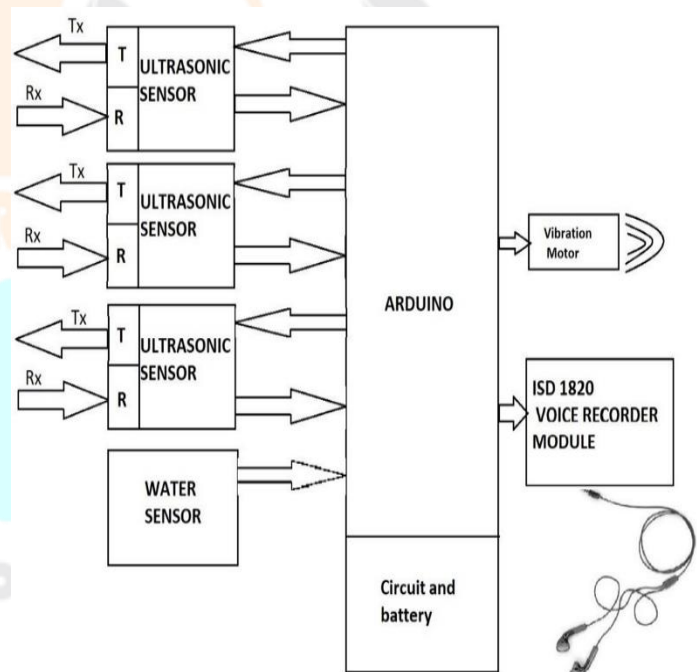
II. Objective

This system's major goal is to provide visually impaired people with a safe path to travel [2]. Additionally, it allows visually impaired users to navigate both interior and outdoor environments.

III. Methodology

The methodology is described here with the given block diagram in fig.1 before methodology it is better to list the component and after it use and working of all components is mentioned [5].

3.2 Block Diagram



Block Diagram

Fig. 1

3.3 Ultrasonic Sensor

Ultrasonic sensor works well for close obstacles unlike

laser ones, when an object is so close the laser sensor (less than 15 cm or set according to need) can't get an accurate reading [5]. Moreover, it should be noted that radar sensors can easily detect near and far obstacles with equal perform once, but their medium accuracy doesn't allow them to detect small obstacles[13].

3.4 Water Sensor

Water sensor is use to detect the water and generates the signal for the processing of it in Arduino. Then Arduino generate the signal to form an alert sound/signal via buzzer or vibration motor [6].

3.5 Vibration Motor

This is the type of DC vibration motors used in mobile phones. It requires a voltage supply of 3V to 5V with current around 125 mA [9]. This type of motors can be programmed to control its speed by using the PWM (Pulse Width Modulation) method. The PWM signal is generated from the TMR2 timer via interrupt control on RC2 and RC1 pins to gate this PWM to active the vibration.[1] The diameter of the motor is 0.5 cm and the thickness is 2.5mm [10].

3.6 ISD 1820 Voice Recorder Module

You can record and playback audio messages using the ISD1820 Voice Recorder Module, which is a compact and simple recording tool. The module is made up of a small integrated circuit (IC) with a microphone, speaker, and memory built in. The inbuilt speaker or an external speaker can play back the 20-second audio recording that can be made [7]. The module is relatively easy to use, with only a few buttons to regulate the recording and playback operations, and it may be supplied by a 3-5V DC power supply [11].

3.7 Arduino UNO

A microcontroller board called the Arduino Uno is based on the ATmega328P microcontroller [12]. For creating interactive electronics projects, it is one of the most well-liked and widely utilized development boards. The board includes a 16 MHz quartz crystal, 6 analogue inputs, 14 digital input/output pins (of which 6 can be used as PWM outputs), a USB connection for programming and power, an ICSP header, and a reset button. Either an external power source or a USB connection can power it [9].

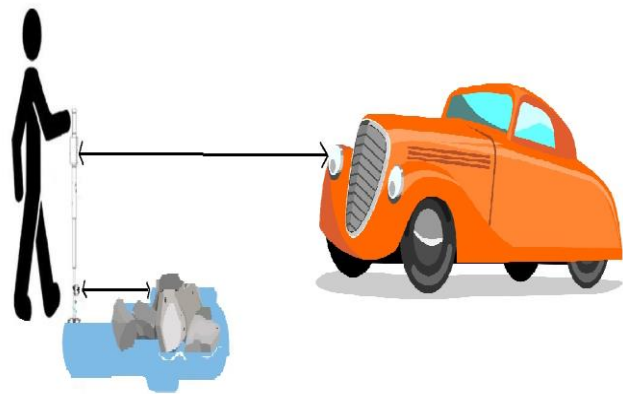


Fig. 2

IV. Construction and Working

A Smart-VI-Stick is a useful tool created to assist people who are visually impaired or visually impaired in securely and independently navigating their surroundings [15]. The device may detect impediments and give feedback to the user, enabling them to move around their environment with increased ease and confidence [14]. These sensors and technologies include ultrasonic sensors, vibrating motors, and water sensors. A microcontroller, ultrasonic sensors, vibrating motors, a voice module, and water sensors are among the parts used to build a Smart-VI-Stick. A Smart-VI-Stick improves the mobility and quality of life of those who are visually impaired.

V. CONCLUSION

The system is created specially for the for the visually impaired people. This technique makes it simple for visually impaired people to walk both inside and outside [10]. It aims to fix the issue that stands in a visually impaired person's way. It also examines the security of those who are visually impaired. This paper analyses the current visually impaired-friendly electronic system [14].



Fig. 3

VI. Future Scope

The Smart-VI-Stick might have even more sophisticated capabilities like cameras (AI-camera to identify the known relative of person and to loudly say his/her name), GPS, and machine learning algorithms to assist users navigate their environment even more precisely [10]. It might also be connected with other devices like smartphones and connect to the internet to give users even more information about their surroundings and to enable greater connectivity with the outside world [14].

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