INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT (IJSREM)
VOLUME: 07 ISSUE: 03 | MARCH - 2023 IMPACT FACTOR: 7.185 ISSN: 2582-3930

Smart Cane for Visually Impaired People Using Arduino

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ABSTRACT

In this high-tech period, technology has made it possible for everyone to live a comfortable life. But physically challenged people to need to depend on others in their daily lives, which eventually makes them less confident in strange terrain. But presently, the explosion of innovative technology provides numerous openings for them to live joyfully without feeling like a burden. So, in this proposed system, a hyperintelligent device is represented for visually challenged people to safely guide them to their destination without facing any difficulties. It is composed of an Arduino, a global positioning system (GPS), ultrasonic and other probative detectors, and a GSM.

KEYWORDS

Visually impaired, Global Positioning System, Global System for Mobile Communication, Arduino, Ultrasonic sensors, Innovative technology.

1. INTRODUCTION

Currently, many people suffer from visual impairment. It is one of the biggest issues mankind is facing at the moment. Frequent backing is needed for them to be suitable to perform day-to-day tasks. Eyesight plays a major part in collecting the majority of the information from the real world, and that information will be reused by the rain. Visually disabled people suffer nuisances in their daily and social lives. Blindness or visual impairment is a condition that affects numerous people around the world. This situation leads to the loss of the precious sense of vision. Worldwide, millions of people are visually impaired, and numerous of them are blind. The demand for assistive bias is and will continue to be constant. There are numerous navigation systems and tools available for visually impaired people. The eyeless person truly requires a related object.

In today's advanced hi-tech world, the need for independent living is recognized, particularly in the case of visually disabled people, who face the main problem of social restriction. They suffer in strange surroundings without any homemade aid. Visual information is the basis for most tasks, so visually disabled people are at a disadvantage because necessary information about the terrain isn't available. With the recent advances in inclusive technology, it's possible to extend the support given to people with a visual impairment.

1.1 OBJECTIVE

The main goal of this proposed system is to help visually impaired people overcome many limitations in independent mobility and navigation. So, this proposed system helps the visually impaired detect obstacles that are in their way and gives alert messages when obstacles are detected. With the use of a push-button, the emergency contact, known as "smart cane," which is controlled by Arduino,

will be informed of the visually impaired person's current location in case of an emergency. The long cane known as a "smart cane" is used to navigate and avoid hazards on the road by those who have low vision or visual loss.

1.2 SCOPE

The scope of this proposed system is to help those who are blind or visually impaired by using a smart cane with ultrasonic sensors embedded in it. There, ultrasonic sensors are used to detect obstacles, and Arduino is used to locating an emergency.

2. RELATED WORK

Si.No	Title	Year of Publication	Author	Description	Uses
1.	Arduino-based Smart Walking Cane for Visually Impaired People	2020	Malti Bansal, Saurabh Malik, Mohit Kumar, and Nikita Meena	The smart walking cane can detect obstacles with the help of an ultrasonic sensor. It can also recognize the presence of water with the help of a water sensor attached at the bottom of the cane; the alert for the same will be given by the sound from the speaker.	The cane is lightweight and has a rechargeable battery which adds flexibility and convenience.
2.	Smart Cane for Visually Impaired	2018	Sukriti Sudhakar	The smart cane is embedded with light and water sensors, along with an ultrasonic sensor. These ultrasonic sensors use ultrasonic waves to detect obstacles ahead. The sensor passes this data to the microcontroller, which processes this data and calculates if the obstacle is close enough.	The system detects obstacles and alerts the blind person via buzzers, and it can be easily used for navigation.
3.	Smart Electronic Cane for the Assistance of Visually Impaired People	2019	Mohammad Ashfak Habib, Sidratul Salat	The system detects various obstacles and danger signs automatically. Three ultrasonic sensors were used for recognizing front, right, and left obstacles. Danger sign detection is a novel feature of the proposed system and it was done through a camera and template matching procedure. It gives audio evaluation to its users through a buzzer and a headphone.	The competence of the system to assist its users was evaluated with five blindfolded healthy subjects in a controlled test environment.
4.	Smart Cane for Assisting Visually Impaired People	2019	Nandini A V, Aniket Dwivedi, Nilita Anil Kumar, Ashwin T S, Vishnuvardhan V, Ram Mohana Reddy Guddeti	The system processes signals and alerts the visionless people over any obstacle, potholes, or water puddles through different beeping patterns. It senses the light intensity of the environment and brightens the LED accordingly. These are accomplished by incorporating two ultrasonic sensors, a moisture sensor, an LDR sensor, and an Arduino Nano microcontroller.	Using suitable sensors like Light Dependent Resistor sensor, Water sensor, Ultrasonic sensors, and GSM Module, connected to Arduino Nano microcontroller, we were able to successfully design and implement a smart cane that can be used by those who are visually impaired

					when they commute.
5.	Smart cane for the visually impaired based on IOT	2019	Sankari Subbiah, Ramya.S, Parvathy Krishna. G, Senthil Nayagam	The smart cane is designed with an obstacle detection module, heat detection, water detection, light detection, pit, and staircase detection using an InfraRed (IR) sensor, GPS (Global Positioning System), and GSM (Global System for Mobile) which helps them to achieve his/her daily tasks with ease.	This helps in detecting the object in front of the user and is intimate about what the object is. This system also recognizes the object and sends information about the object to the user through a headset.

3. EXISTING SYSTEM

The existing system consists of devices or assistance like a white cane for helping them detect obstacles and travel to places, pet dogs, and smart devices like a vision torch for blinds. However, there were numerous limitations and issues with the existing systems in the white cane; it was easily broken or cracked. The white cane may become entangled in the pavement break and other objects. since the pet canine's cost is vast and it needs a lot of practice.

4. PROPOSED SYSTEM

The function behind this blind stick is that it is used for a special purpose as a sensing device for blind people. It is used extensively to detect entities using an ultrasonic sensor. If any object is present, the ultrasonic sensor detects it by measuring the distance between the object and the user, sends the data to the Arduino, and gives an alert message. If the user is in an emergency situation, he needs help, so when the person pushes the button, the alert message "emergency location" will be sent to the emergency contact number through the GPS module.

5. ARCHITECTURE

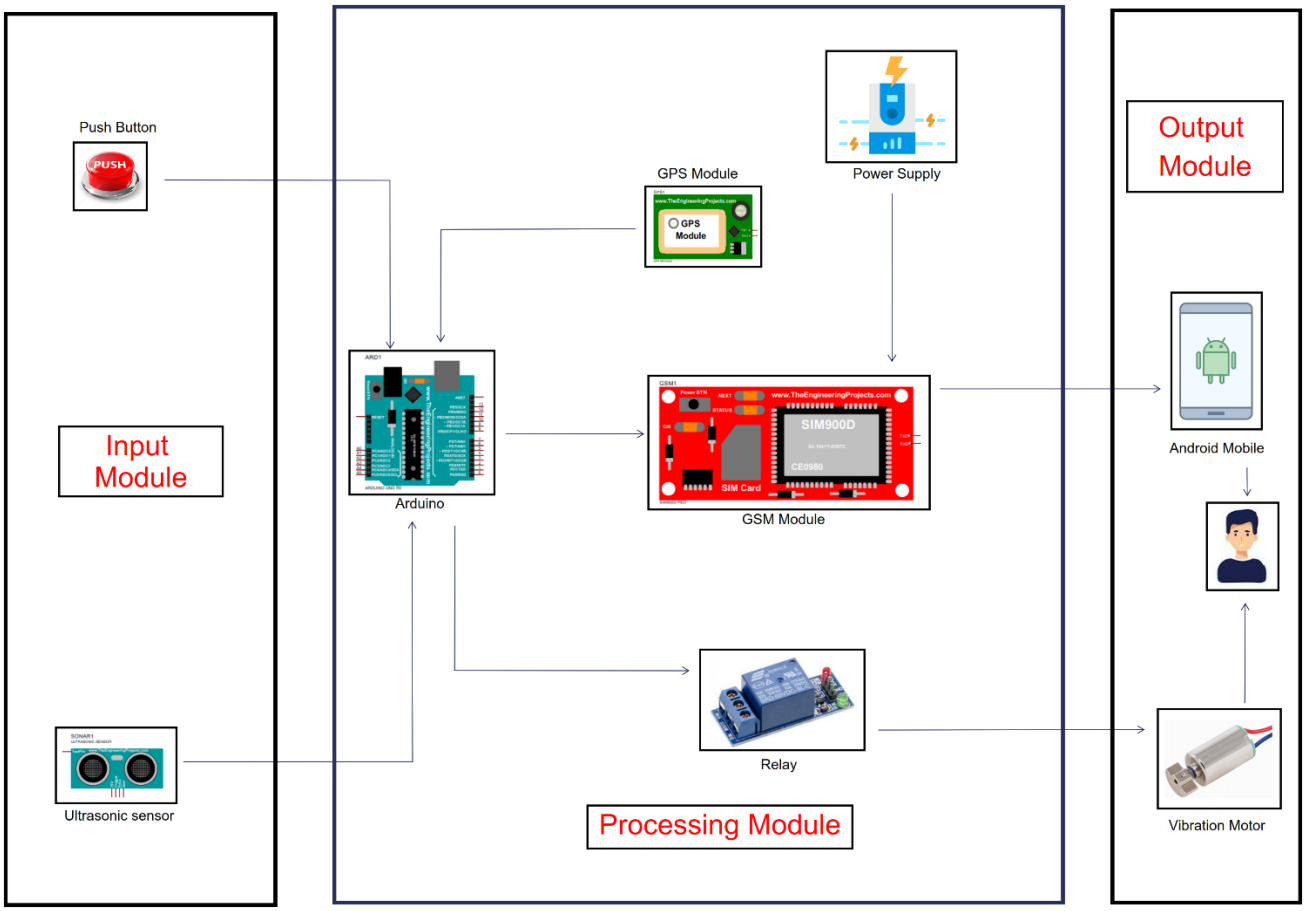

FIG NO 5.1 ARCHITECTURE OF THE PROPOSED SYSTEM

INPUT MODULE:

There are two input modules. One of the modules is the push button, which is the user's input given by pressing the button; another is the ultrasonic sensor, which is the input given to the Arduino; it is a continuous input given to the Arduino by the ultrasonic sensor.

PROCESSING MODULE:

There are two main features in this project: one is obstacle detection; when the input is given by the ultrasonic sensor that is based on input data and the obstacle is detected, the Arduino turns on the vibration motor relay; another feature is the location sender; when the user pushes the location sender button, the Arduino gets the location from the GPS module, and with the help of the GSM module, it sends the location details to the specified number (emergency contact) that is given by the user.

OUTPUT MODULE:

When the relay is turned on, the vibration motor starts vibrating for a certain time, and the location message sent by the GSM module will send a message to the specified number with location details.

6. RESULT

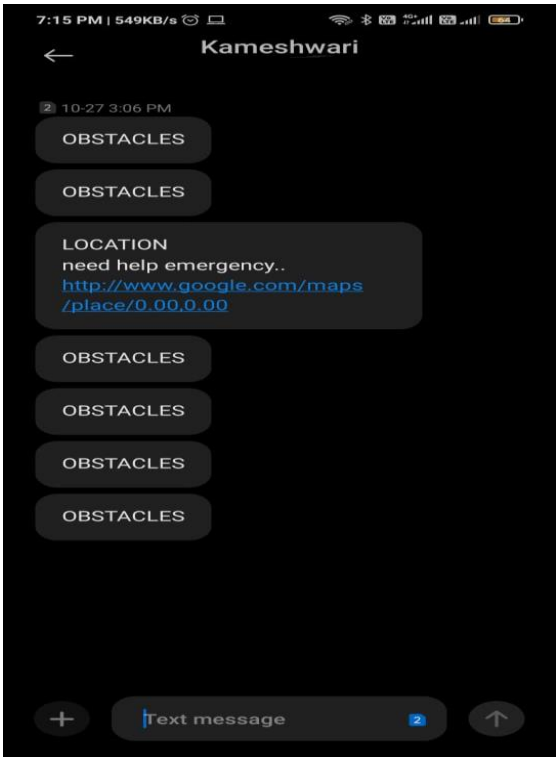

FIG 6.1 ALERT MESSEGES

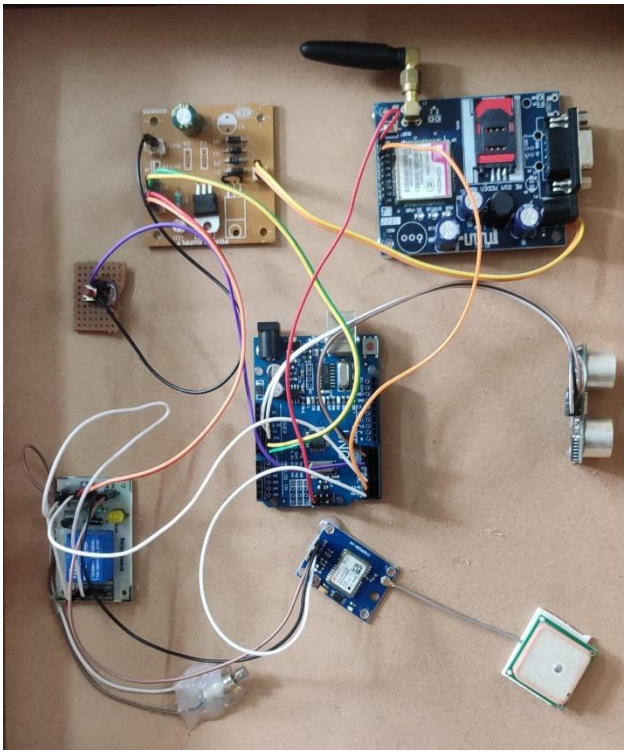

FIG 6.2 OVERVIEW

7. CONCLUSION

The eyeless population may step in or out without any help while exercising this smart eyeless stick as the stick has colorful functions distance of handicap discovery. The design of Smart Cane for the Blind Using Arduino is designed to produce a system using Ultrasonic detectors, and a GPS module. It would help a visually disabled person navigate through a public place singly. The proposed system tries to exclude the faults in the former system. It aims to break the problems faced by visionless people in their diurnal life. Also, the system employs safeguards to protect them. The design of Smart club for the Blind using ultrasonic detectors and GPS is of great benefit to eyeless people when it comes to independent mobility.

ACKNOWLEDGMENT

The authors would like to thank Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya (SCSVMV) Deemed to be a university for supporting this work.

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