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A Research Paper on Smart Blind Stick

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Abstract: ***The main objective of this article is to assist blind persons who have no human needs. Notably, anytime a blind person needs help, a hand is always there for them. The blind people's safety or ability to accomplish their goals isn't always guaranteed when they utilise this stick. The person may not feel any potential obstacles in their route if they use the stick. Notably, anytime a blind person needs help, a hand is always there for them. In any case, there is no assurance that using this stick will protect persons who are blind. The person using the support of the stick doesn't sense any obstructions in their way, despite there possibly being any. Therefore, if the obstruction is too great or dangerous, the people could suffer harm. In this study, a blind stick is designed and created to aid the blind and provide them with a clear path. The system consists of an ultrasonic sensor attached to the user's stick. As the user moves the stick forward, the ultrasonic sensor and Arduino Mega mounted to the stick try to detect any impediments in their way. When the sensor detects an obstruction, the output of the receiver triggers, and the microcontroller can notice this change because the output of the receiver acts as inputs to the microcontroller. This device recognises what is in front of the user and replies by vibrating or by posing a question. After that, the person can walk around without being afraid. This device will offer the best solution for a visually impaired person's issues.***

I. INTRODUCTION

A very common disability among people all around the world is blindness. About 90% of blind or visually impaired persons live in underdeveloped countries. To walk and complete daily duties, they need assistance. The Smart Blind Stick is a low-cost, easy-to-maintain gadget that can be used manually or totally automatically. It is a state-of-the-art navigation and obstacle detection tool designed specifically for visually impaired people. With this tool, we provide an improved blind stick that uses cutting-edge technology to make it simpler for those with visual impairments to navigate.



Fig. 1. Smart stick Smart stick detects obstacles in front of the blind.

The blind stick is equipped with three ultrasonic sensors, an Arduino UNO, Bluetooth, a panic button, a navigation switch, a soil moisture indicator, and other components. The three ultrasonic sensors use ultrasonic waves to detect incoming impediments.

II. OBJECTIVE

The creation of a system that is less expensive but still has good functionality for blind people is the main objective of this project. Blind people can use this device to help them avoid obstacles like people and animals who share the same path. Additionally, it can tell them of the distance to any obstructions in their path.

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III. PROPOSED SYSTEM

Here, we propose an improved blind stick that, using cutting-edge technology, enables people with vision impairments to travel with ease. The blind stick contains an ultrasonic sensor in addition to built-in light and water sensors. The first stage of our proposed project involves the usage of ultrasonic sensors to detect imminent impediments using ultrasonic waves. In the future, we'll try to incorporate a GPS system into our blind stick project. We'll also try to make the stick foldable so it can be carried.

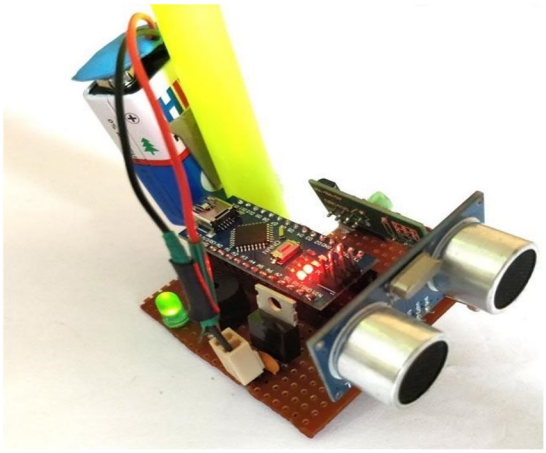


Fig. 2. Design of smart stick Smart stick detects obstacles in front of the blind.

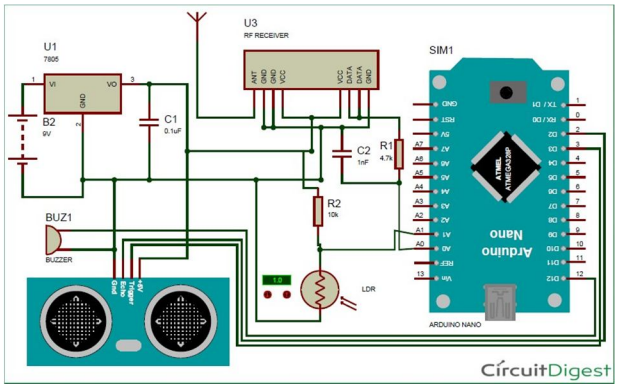


Fig. 3. Circuit diagram of smart stick Smart stick

IV. METHODOLOGY

The Atmega328 is an 8-bit, low-power CMOS microcontroller. An enhanced RISC architecture serves as its base. Utilised by the Arduino UNO board.

Ultrasonic sensors: An ultrasonic sensor works by producing ultrasonic waves, which the item being measured then reflects back in order to provide a distance measurement based on time and speed. This item contains three ultrasonic sensors, which are positioned on the front, left, and right sides of it. The supply voltage is 5 volts, and the total current usage is 15 mA. The ultrasonic signal's greatest range at 40k Hz is 200m. Range minimum: 0.1 metres.

Voice commands are provided based on the quantity of soil moisture measured by a soil moisture detector. It is used to estimate the volumetric water content of the soil by using its electrical resistance, dielectric constant, and interaction with neutrons as proxies for its moisture content.

Our main piece of hardware is the Arduino Uno, an ATmega328-based microcontroller board. The Arduino UNO is made up of 14 digital input/output pins, 6 analogue inputs, a USB connector for power, and a reset button. The microcontroller is supported by everything that is necessary.

It only requires a USB or battery connection to a computer to start up.

Features include: Arduino boards are relatively inexpensive when compared to other microcontroller platforms, such as 8-bit microcontrollers and Internet of Things applications.

1) The programming environment and user interface of the Arduino Software (IDE) are clear and uncomplicated.
2) Windows, Mac OS X, and Linux are all compatible with the Arduino Software (IDE).
3) Open source materials are made available for Arduino software, enabling programmers from around the world to contribute.

Bluetooth - Bluetooth is used to create networks of personal computers. It is possible to build a personal area network using this wireless technology standard. The IEEE standard for Bluetooth is called IEEE 802.15. The constructed network is utilised for data exchange over brief wavelengths and within a predetermined operational range. Bluetooth is utilised to link the Android phone to the Smart Blind Stick.

The IR sensor makes it simple to locate small obstacles like pits, steps, or stones because it is located on the lower side of the stick. The Arduino will issue a voice command whenever the IR sensor has detected any minor obstructions on the ground and has transmitted a signal to it International Journal of Engineering Science and Computing, March 2018 16250 http://ijesc.org/. It will also enable the buzzer, enabling it to warn a blind person of any obstructions on the ground.

Water sensor: A water sensor is positioned at the bottom or base of the stick to prevent accidents caused by slick, wet surfaces.

An electrical signal generated when the water sensor makes contact with a damp surface activates the Arduino controller. A verbal order is issued for moist surfaces, and a buzzer is activated to warn against a wet floor.

Transducers, or buzzers, are tools that convert electrical energy into mechanical energy. Buzzers operate in the lower portion of the 20 Hz to 20 kHz audible frequency range. An auditory electric oscillation signal is converted into mechanical energy in the form of audio waves to do this. This study uses a buzzer to warn a blind person of barriers by emitting sound proportionate to the obstacle's distance.

GPS and GSM System - When a GSM modem gets a message, the microcontroller processes it using the saved keyword. It will then get the stick's location from the GPS modem and send it to the GSM modem so that it may respond to the sender. When the emergency button on the stick is pressed, the microcontroller receives the location data from the GPS modem and transfers it to the GSM modem, which then sends SMS messages to all the registered phone numbers on the microcontroller. The GPS will update the location of the stick, and it will automatically save that information in the microcontroller's EEPROM memory.

If the microcontroller receives the word "codeword" (it is set) from the GSMmodem, it will transfer the last location from the EPROM to the GSM modem, which will send an SMS message with the person's position to the designated number. Additionally, the microcontroller will send the most recent position stored in the EEPROM to the GSM modem for transmission to all saved phone numbers if the emergency button is quickly depressed.

V. ADVANTAGES

1) The navigation system will help them with voice instructions, making it simple for blind people to navigate wherever they choose around the world.
2) It will be able to recognise challenges faced by blind people.
3) The device's panic button will be its most important feature; when a blind person presses it, the panic button will broadcast their location to a predetermined person.
4) The system will be transportable and compatible with different blind sticks.
5) After promptly identifying soil moisture, the moisture detector will also provide the blind person with guidance.

VI. DISADVANTAGES

1) Before utilising the device, the blind person must have received training.
2) The device is unable to identify objects.
3) Because the technology is unable to distinguish between persons and objects, it will simply recognise it as an impediment.
4) Doesn't provide defence against dangers coming from above or below the head

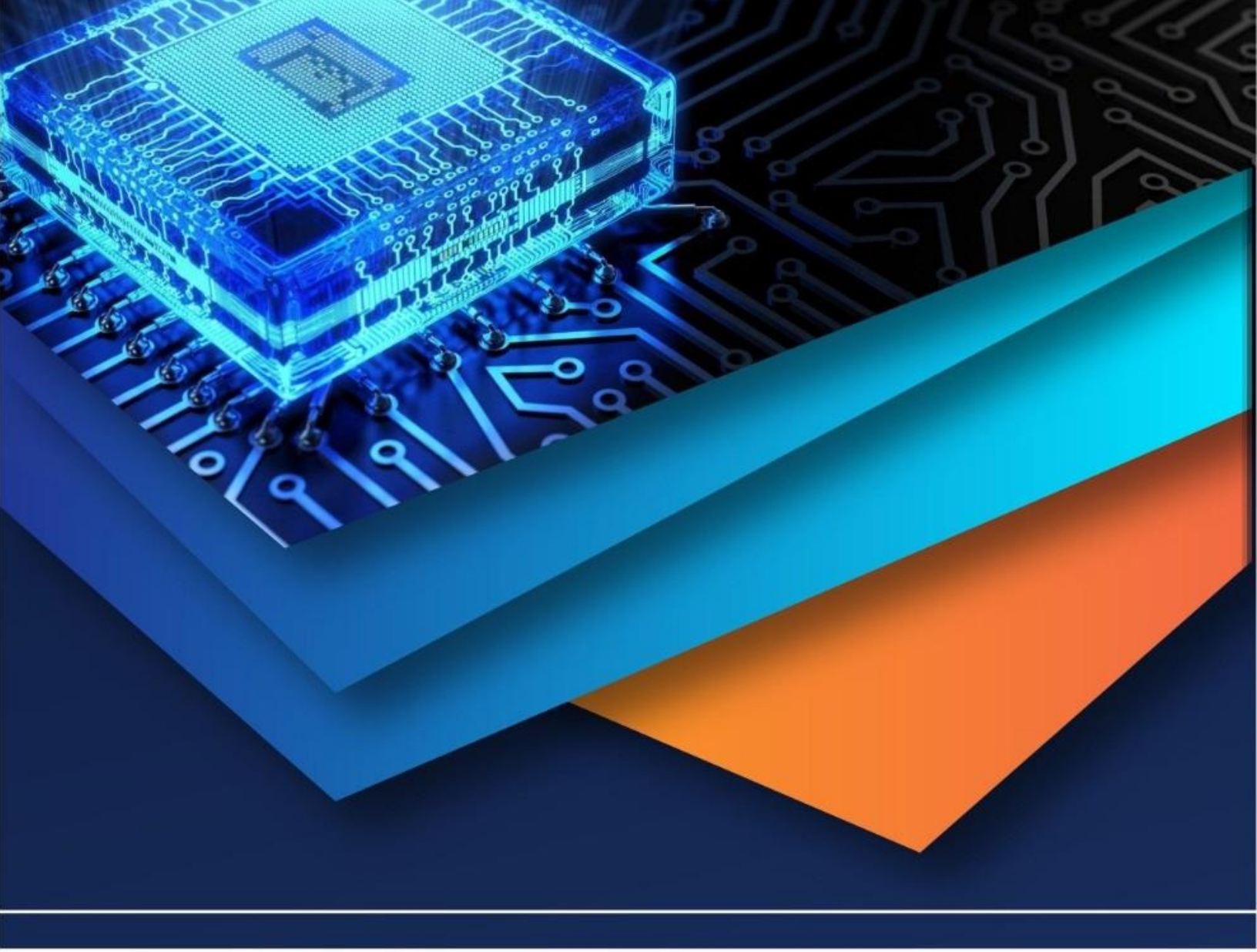
VII. CONCLUSION

The Blind Walking Stick has now been modified into a version that may be used to guide the blind. It tries to deal with the issues that blind people deal with on a daily basis. Additionally, the framework takes the required actions to guarantee their safety. This project will benefit every visually impaired person on the planet, making it simpler for them to move anywhere they need to go. It was done to at least somewhat aid the blind in moving forward. It is utilised to boost security and assist those with disabilities who cannot work on the development.

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