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Multi-Feature Smart Blind Stick

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A B S T R A C T

Blindness disables a person from self-navigating outside or well-known environments. It affects their ability to perform several jobs, duties, and day-to-day activities. They are dependent on external assistance which can be provided by humans, dogs or special electronic devices for better decision making. The "Multi-Feature Smart Blind Stick" is an innovative Electronic Device designed to support visually impaired people in their everyday lives. With the help of this assisted device, individuals are provided with both safety and increased independence. The stick is furnished with various different sensors that help the user detect obstacles and alert them through audio instructions and vibrations. These are positioned strategically on the cane for effective guidance. Additionally, it's equipped with Wifi technology which is used to send emergency SoS messages to the Caretaker or guardian's mobile Phone in case of emergency, while also featuring a rechargeable battery for added convenience. It improves the quality of life for visually impaired individuals through its advanced technological features, which promote safety and mobility.

Keywords: Blindness, Navigating, Assistance, Safety

1. INTRODUCTION

285 million folks worldwide have some sort of visual impairment, with 84% having impaired vision and 16% being blind, according to the WHO (World Health Organization). The main challenge that blind individuals encounter is mobility. It takes them some time to fully understand about the happened because they are oblivious to what is happening around them. Due to their vision impairment, most blind people don't find any jobs. 940 million people will have some degree of visual loss by 2023, according to the WHO (World Health Organization). The environment in which we live is not ideal, and each person has unique difficulties throughout their lifetime. People who are visually disabled particular have trouble navigating their environment, which restricts their independence and freedom of movement. While technological developments have improved the lives of millions of people, they have not yet determined the issues experienced by the visually impaired. As such, engineers and scientists are continually seeking innovative approaches to help this population group overcome the hurdles they face. As the blind people are unable to live freely since they do not have a suitable job. When they are walking on the roadways, they eventually encounter many problems, such as obstacles, other people and manholes. Blind persons rely on their families and other people for movement and other needs. Their eyesight impairment affects their ability to engage in social activities and other activities. Despite the fact that various things have been proposed in the past, they nevertheless have some drawbacks. The short of of analyses and recommendations for vision-impaired perception may be the cause of these limitations.

Researchers have developed a variety of theories and studies to blind people in overcoming obstacles and alert the blind person in case of danger. After taking into account a numeral of earlier developments in helping the blind people, the execution of the plan was finished. According to Wearable Difficulty Finding Structure for Visually Impaired, the blind person is alerted of the obstacles in his path. One such initiative is the Multi-feature Smart Blind Stick Project, which seeks to build up a cutting-edge solution for folks with visual disabilities. The Smart Blind Stick Project is an amalgamation of advanced technology and the necessity of blind people to give them a better and efficient means of moving independently.

2. Literature Survey

This study [1], proposed a smart stick that employs infrared and ultrasonic sensors to identify impediments in its path. The parts of an ultrasonic sensor are the transmitter and receiver. The transmitter module transmits the ultrasonic waves to locate barriers within 4 meters. The receiver module detects the waves that are reflected from the obstacles. The receiver's impulses cause the vibrator motor to vibrate.
This study [2] , proposed methodology consisted of two ultrasonic sensors—one for detecting obstructions and the other for detecting holes—and an Arduino microcontroller. In addition to three buzzers and LEDs for the same reason, a moisture sensor is utilized to notify the blind in the process of detecting fire and stagnant water. The three steps of any control system are sensing, controlling, and actuating. The suggested system has several features and is made up of various components and scenarios. In the suggested methods, an Arduino microcontroller is used to create an ultrasonic sensor, an RF transmitter, and a GSM/GPS receiver. The Arduino microcontroller receives a +5v supply from a rechargeable battery.
In this study [3], the methodology proposed the use of jumper wires that are used to connect the components to the Arduino's digital and analogue pins. The suggested system includes the following properties and runs on an input voltage of 9V/12V. When it detects barriers of all sizes in the environment, it can sound the necessary auditory and vibratory alerts. It can inform the user when it detects moist or damp surfaces.
In this study [4], the system intended to perform the following action sequences, which involved determining the quickest path by asking the user for their destination, directing them to that location, and identifying any barriers in their path. Install a Blind guide on any mobile phone which supports GPS. A button on the stick should only be pressed once to start the programme. The source where the blind is currently located as well as the destination uttered by the blind are communicated to the centralized server by mobile device. Android's GPS may be used to find your present location, which is used as a basis for blind navigation. Following receipt of the source and destination details, the GPS creates the path, and the programme begins speaking to the blind.Voice output provides directions that should be followed. The blind is guided by the server till he arrives at his destination. Every time the blind asks for an instruction, a new shortest path is established from their current location to their desired goal.

In this study [5], the authors used a USB plug to connect the small microcontroller board known as Arduino to a computer.The Arduino board may influence its surroundings by controlling LCDs, speakers, motors, and GS modules. It can perceive the environment by receiving input from a series of sensors. Using "non-contact" technology, ultrasonic sensors are used to measure the distance between target materials or objects in the air. They are simple to use and measure distance without being harmed. The sensor's output signals are in analogue form, and the microcontroller converts the analogue signals to digital format and processes them. It is used to detect the obstacles in the current work and determine their precise distance.To acquire a nearly precise distance measurement, the inbuilt analogue to digital converter is calibrated.

3. Methodology

The proposed methodology consists of multiple sensors like obstruction sensor, fire sensor, water(moisture) sensor for obstacle detection and alert the user while they walk on the path. This system consists of PIC 16F72 Microcontroller which is responsible for handling the entire system. It consists voice processor module along with the speaker to give voice based outputs and alert the user. It has a fall sensor to attach to the blind person's shoulder so that whenever the person falls down the alert messages can be sent to care taker's mobile through the wifi modem which is embedded on the stick

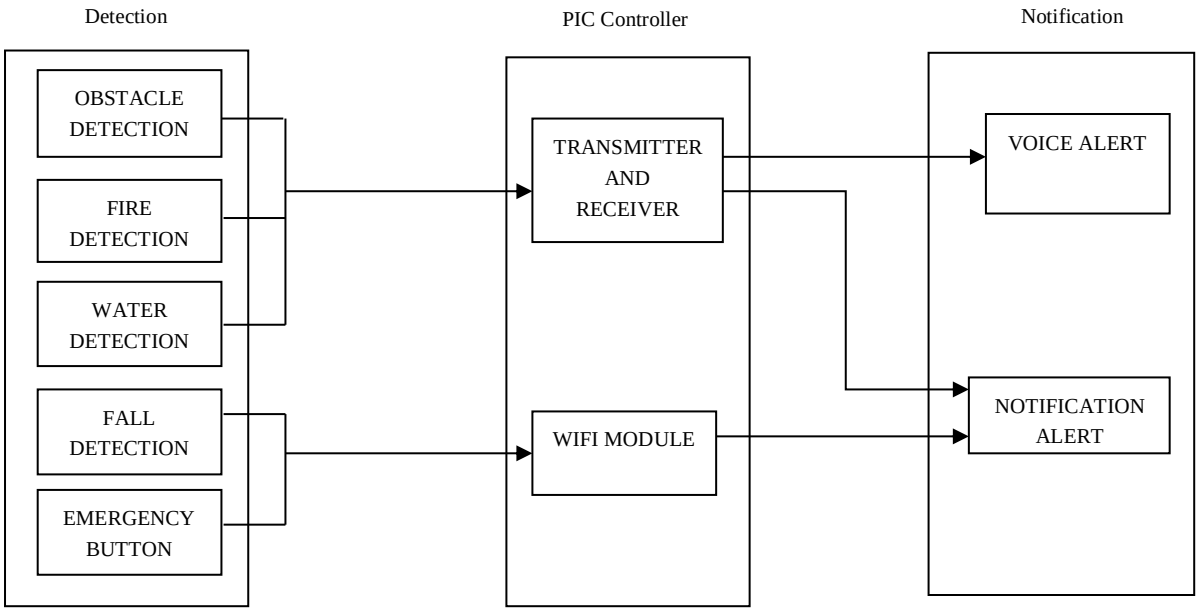

Fig 3.1 Block Diagram

The HCSR04 Ultrasonic sensor consists of receiver and transmitter, the transmitter module transmits the ultrasonic waves to identify the obstacles within the specified range. The receiver module receives the signal and it will bounce back to the sensor. It calculates the time travelled and speed of the sound

to calculate the distance. If any obstacle is within the specified range then the PIC controller sends the signal to the voice processor to alert the user that there is a obstacle ahead. The stick also consists of help button, by pressing the button the surrounding people will be notified that the blind person is in trouble. This Iot based Multi feature smart blind stick helps the blind people in making their life independent on others and navigate easily without any external help**.**

4. Result

Figures show a simple and easy to use Multi-feature smart stick that helps blind people to move freely wherever they wish to. It is financially cheap and can be mass delivered for use by outwardly impeded individuals. The framework was tried to affirm its functionality and unwavering quality, yet in addition to approve its effectiveness. The framework parts tried were the Ultrasonic Sensor and the moisture Sensor.

The ultrasonic sensor was used to detect the obstacles that were on its path of travel. The detection range for obstacle identification was set to 3 m, and if any of the obstacles were within range then they were identified as obstacles.

The moisture sensor is mounted at the bottom of the stick so that it could sense the moisture surface in the wetty areas around the user. During the testing the moisture sensor was able to detect the moist surface and give the result as expected.

Figure 4.3 shows the message that is sent to the care taker's mobile via the wifi modem and the guardian can see the alert messages on their mobile application interface.

Figure 4.1 Blind Stick

Figure 4.2 Sensors Connection

5. Conclusion

In conclusion, the Multi-feature Smart Blind Stick Project has been successfully developed to help visually disabled individuals with mobility and independence. The project not only helps the blind to detect obstacles on their path, but also guides them with convenient features such as GPS tracking and voice commands to guide them in unfamiliar surroundings. By making use of sensor technologies and IoT, this project has proven designate a very promising step towards enhancing the lives of the visually impaired. this project will continue to evolve and improve, and help more individuals with visual impairment to achieve greater autonomy and freedom.

The device is a blend of a few other working sub-frameworks which together screens the ecological situation of static and dynamic items and gives important criticism shaping visually impaired route more exact, completely safe. It is economical, uses little power, and responds quickly. It is light weight in use and can be carried easily.

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