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OBSTACLE DETECTING AND LOCATION TRACING SMART STICK WITH GEO FENCING FOR VISUALLY IMPAIRED

[1] K. Taruni,[2] K. Manjunadha Bhaskar,[3] G. Rohini, [4] K. Phaneendra,
[5] Ch. Gowri

[1,2,3,4] **Students,** Dept of ECE, Godavari Institute of Engineering and Technology (A), Rajahmundry, AP
[5] **Assistant Professor,** Dept of ECE, Godavari Institute of Engineering and Technology(A), Rajahmundry, AP

Abstract-When using the smart walking stick, the user is able to navigate with ease and do tasks with more comfort and ease. A normal stick does not detect obstacles, making it ineffective for the sight handicapped. Simply because a blind individual has no idea what kinds of stuff or things are shown to him or her. Our proposed blind stick features an attached Geo Fencing detector, a vibrator that will activate when an obstacle is detected with the help of ultrasonic sensor, and uses GPS to pinpoint the user's precise position. Using a mobile application, the GPS has been developed and programmed to provide some sense of the blind person's location. A software module called "Geo Fencing" utilizes satellite positioning system coordinates to create virtual fences. With our proposed blind stick, the user may feel the way around without having to rely on sight alone, and they can also identify any dangers in their path.

Keywords: GPS, Obstacles, Geo Fencing.

1. INTRODUCTION

A significant percentage of the world's population suffers from some kind of blindness. There are 285 million visually impaired persons in the globe, 39 million of whom are blind and 246 who have limited vision, according to the World Health Organization. The majority of the world's blind population, almost 90%, resides in the nations of development. Individuals with any remaining eyesight are not deemed blind. Having trouble seeing is a terrible affliction for the poor. They need assistance in walking outdoors and doing other everyday tasks; it is not uncommon to read about a blind person being injured while attempting to cross the street in the news. The family members worry excessively about their limited vision. As such, the suggested work illuminates a system that endeavours to liberate the blind from their condition and empower them to do their everyday tasks independently. It's a cane or stick that the visually impaired use to go about. But it is fully automated, easy to maintain, cheap and it is comfortable to use. Humans have always created tools and methods to facilitate and safeguard their everyday lives, whether for routine tasks like getting to and from work or more novel endeavours like taking to the skies. However, there are some impairments that hold people back from their progression and act as a barrier to their aspirations. Due, in part, to their inability to see, these folks have significant difficulty going about their everyday lives. They are restricted in their mobility, preventing them from going where they like or doing their duties without much difficulty. Trained canines are used to aid these people, but they

need a lot of upkeep and attention. Keeping the dog up and running now costs several thousand rupees per year. As a result, they are able to purchase less The conventional stick is of little value to those who rely on it. There are technologies already available, but they are too costly to acquire and maintain. Currently, our first priority is creating a prototype that can accurately represent their processes. Through the use of cutting-edge technology, we want to improve upon and modernise the "smart stick".

The term "Internet of Things" (IoT) is used to describe a network of interconnected computing devices, software, and other physical items that collect and share data through the Internet or other communication networks. The term "Internet of Things" has been called misleading since it implies that all gadgets must be linked to the global web while in fact all they require is to be part of a local area network and have unique identifiers. In his definition of IoT, Lewis writes, "The Internet of Things, or IoT, is the integration of people, processes, and technology with connectable devices and sensors to allow remote monitoring, status, modification, and assessment of trends of such things." Using the IoT, manufacturers may link together their wide range of gadgets that can sense, identify, process, communicate, act upon, and network. The Internet of Things may be utilized for industrial applications and smart production thanks to network control and management of manufacturing equipment, asset and situation management, or manufacturing process control.

The Internet of Things allows for the speedy production and optimization of new items and the timely fulfilment of customer orders. Web-connected smart devices with embedded systems including processors, sensors, and communication hardware make up what is known as a "Internet of Things" (IoT) ecosystem, which is responsible for gathering, transmitting, and acting upon data acquired from the surrounding environment. Through a connection to an IoT gateway or other edge device, data collected by IoT sensors may be shared and either transferred to the cloud for analysis or processed locally. These gadgets may share data with one another and take appropriate action based on the results of such conversations. Humans may engage with the devices, for example to set them up, give them instructions, or retrieve the data, but the gadgets mostly operate independently of humans.

The Internet of Things encompasses digital control systems that automate process controls, operator tools, and service information systems to boost the safety and security of plants. Predictive maintenance, statistical analysis, and measurements are just some of the ways in which the Internet of Things may be used in asset management to boost uptime. Smart grid integration with industrial management systems allows for more efficient use of energy. Connected sensors perform a wide variety of tasks, including data collection, automated control, plant optimization, health and safety monitoring, and more. As an Internet of Things (IoT)-based initiative, our project prioritizes the security of the visually handicapped.

The smart stick is an electronic variant of the standard walking staff, which is used to detect ground impediments including holes, stairs, and uneven surfaces.

The classic white cane can be purchased for next to nothing, is easily folded up, and may be carried in a pocket.

The conventional white cane has certain major drawbacks, including the need for extensive training before it can be used properly.

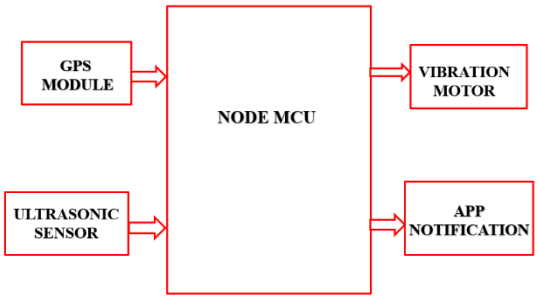
Those who lack sight face significant challenges in their day-to-day activities. A lot of work has gone into reducing the barriers that blind individuals face while trying to do things independently. Because of this motivation, we put out the idea of and built an intelligent blind stick. The intelligent walking cane is designed to help the visually impaired avoid dangers and arrives at their destination safely. Many different types of walking sticks and other gadgets are available to help people with mobility issues go about their homes and other interior spaces. Our proposed blind stick incorporates Geo-Fencing technology, a vibrating alert system that activates when an obstacle is detected, and GPS tracking that allows a user's precise position to be determined. The GPS system has been developed

and coded in a way that allows it to provide some sense of location data to a mobile app for use by the visually impaired. A software module called "Geo Fencing" utilizes satellite positioning system coordinates to create virtual fences. Therefore, our proposed blind stick aids in both guiding the blind person to safety and allowing them to avoid potential dangers.

2. METHODOLOGY:

The methodology is the overarching approach to doing research, detailing the steps to be performed and the specific techniques to be used. Information regarding the blind and visually handicapped has been gathered from every possible source for our research. The data collected was put to good use in the creation of our Modern Blind Stick project. As such, we suggest a technologically enhanced "blind stick" that would make it possible for those with vision impairments to move about with relative ease. Our proposed blind stick has a geofence connected, a vibrator to alert the user of an impending collision, and uses a built-in GPS to pinpoint the user's precise position. Using a mobile application, the GPS has been developed and programmed to provide some sense of the blind person's location. A software module called "Geo Fencing" makes use of global positioning system coordinates to establish physical boundaries.

The blind stick has a geofencing position tracker and ultrasonic sensor. To avoid collisions, our plan calls for



ultrasonic sensors to scan the road ahead and pick up on any impediments they encounter. The sensor reports any obstructions to NodeMcu. After collecting this information, it determines whether or not the barrier is within a safe distance. There will be no effect from the circuit if the barrier is too far away. Sends an alarm to the blind if the barrier is nearby. Thus, our proposed blind stick aids in both guiding the blind person to safety and allowing them to avoid potential dangers.

Fig 1: System Architecture

3. RESULTS:

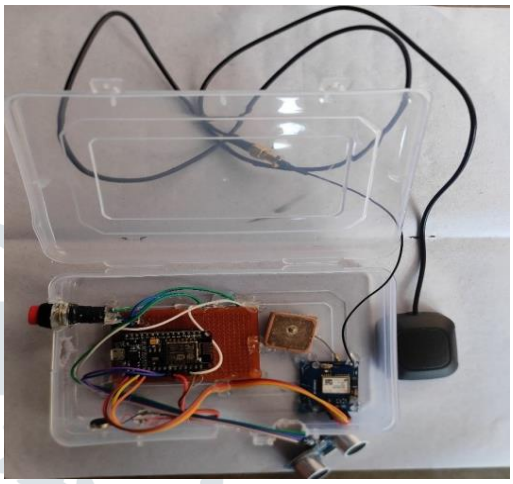


Fig 2: The location tracing obstacle detection blink stick with geofencing equipment

The fig. 2 is the equipment that is designed for the location tracing obstacle detection blink stick with geofencing for the blind person. The stick consists of the emergency button that is used in case of the blind person emergency . This equipment can be attached to the stick for the blind person safety and monitoring.

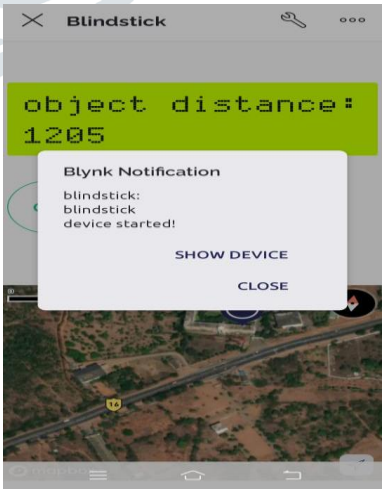


Fig 3: Blynk app notification when the device started

The fig. 3 is the alerting or the notification that is received by the blind person's guardian when the blind person starts the kit and takes the kit with him. The fig. 4 shows the homepage of the blynk app where the customized changes can be made

Fig 4: Blynk App Homepage

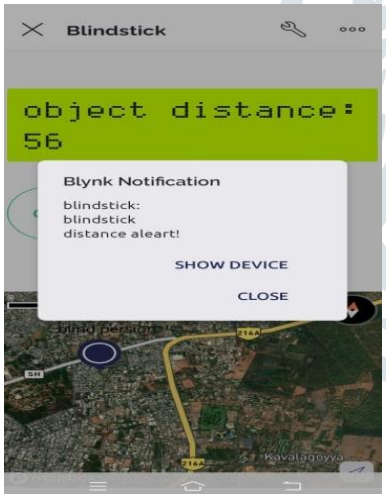


Fig 5: Blynk App page where the blind person can be traced

The fig. 5 is the screen where location tracing along with the blind persons position is visible when the kit is on and the person is moving. Here in this screen, we can see the object distance along with the distance of the blind person when he is out of fence.

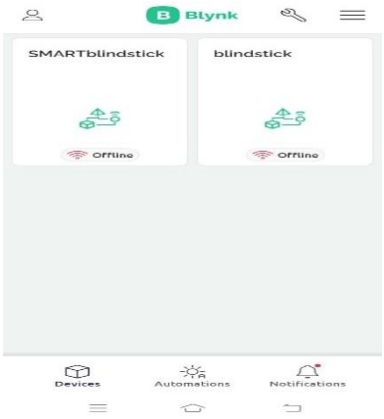


Fig 6: Customized notification for object distance

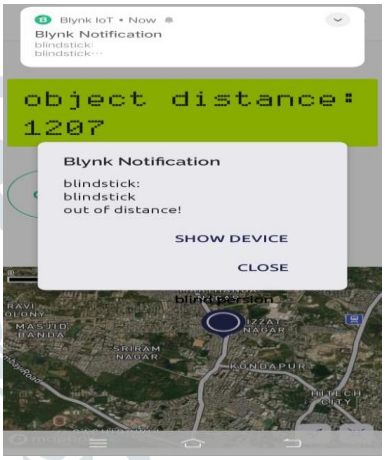


Fig 7: Another customized notification for object distance

The fig. 6 is the notification that is shown when the blind person encounters an obstacle that is less than the limit that is given. The fig. 7 is another way of giving the customized message for the guardian. The kit has a vibrator that vibrates upon the detecting the obstacle

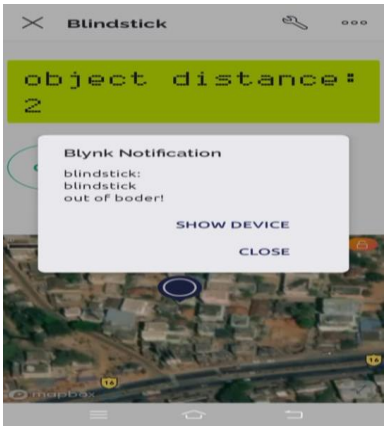


Fig 8. customized notification when the person is out of geofence

The fig. 8 is the notification that is received when the blind person crosses the geofenced area. In this situation a notification is send there by making the guardian alert and updating the position of the blind person

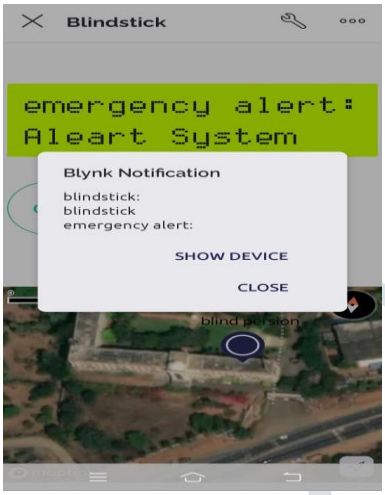


Fig 9: Emergency alert when person is in danger

The fig. 9 is the emergence alert that is received when the blind person is in danger. The kit has an emergency alert button which when pressed by the blind when he is danger the customized emergency alert is send to the guardians

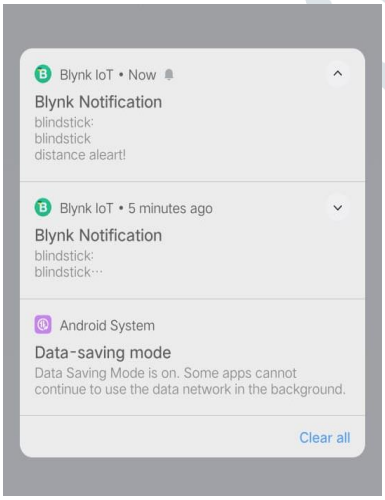


Fig 10: The notifications are visible on lock screen also

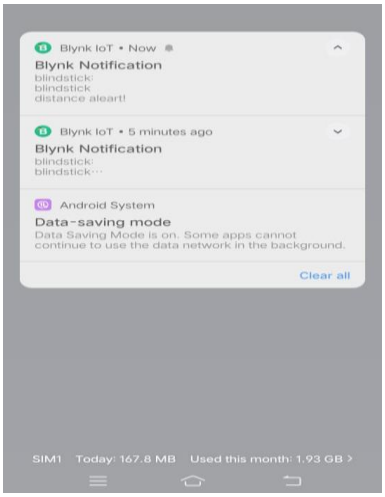


Fig 11: Another example of notifications are visible on the lock screen

The fig. 10 and fig. 11 show that the notifications of the blynk app are visible on the lock screen also. There is no lock screen restriction for the app. Thus, when the device is started, an obstacle is detected the notifications are visible on the lock screen of the mobile.

4. CONCLUSION:

According to the results of the study, the geo-fencing and location-tracing-and-obstacle-detection-integrated blind stick is an excellent tool for guiding visually impaired individuals around their environments. The employed mobile app alerts the guardians in order to assist in issuing the warning signals. These specific messages aid the blind in overcoming their own challenges. The stick's built-in emergency button notifies caretakers when the blind person is in danger, allowing them to intervene.

FUTURE SCOPE:

The stick may be connected with a wide range of future technologies, such as earbuds that allow the visually impaired individual to hear warning signals sent during obstacle detection in high-traffic locations. The ultrasonic sound sensor and the speech module are in this example. Earbuds allow one to listen to the device's voice instructions. An individual's vitals may be tracked and monitored in case of an unexpected

mishap thanks to an upgrade of the heart pulse system to a location-tracking blind stick.

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