

Article

Smart Stick using iBeacon for Visually Impaired Person

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A B S T R A C T

The visually impaired community depends on seeing people for a significant amount of info and assistance. This project, explores the ability of iBeacon technology to support visually impaired people though circumnavigating in the open. Testing exposed that the current iBeacon system coupled with the necessary Bluetooth technology, provides voice notification that can be used for assistance for blind people. Interviews with industry experts revealed that the weaknesses have been overcome internationally by blending Bluetooth with other technologies. Hence, that iBeacons have great potential as an assistive tool for visually impaired people.

Keywords: iBeacons, Ultrasonic Sensor, Visually Impaired Person

Introduction

An assessed 285 million people worldwide have a visual impairment that cannot be corrected with traditional glasses or contact lenses. Of these 285 million, almost 40 million are completely blind. Research has assessed that eighty to eighty five percent of our perception, learning, cognition and activities are mediated through vision. Being unable to access all the same information as sighted people puts the millions of blind people around the world at a major disadvantage. What is a simple task for a sighted person can be very difficult for someone who is blind, and blind people need assistance in many aspects of their lives? According to the World Health Organisation (WHO) statistics, around 30 billion people are blind on the earth. These visually-impaired are those unfortunate people who are completely or partially suffering with eye sight issues.^{1,2}

This project proposes to design and develop an Intelligent Stick for easy usage and navigation in public places. In our project, we investigate a relatively new technology called iBeacons. An iBeacon is a small device that broadcasts information via Bluetooth. The beacon shares its unique

identification number, and nearby device with Bluetooth enabled can use this number to and the corresponding information. The Intelligent stick is integrated with ultrasonic sensor. First uses ultrasonic sensors to detect^{3,4} difficulties ahead using ultrasonic waves. The benefit of our project is that the Visually impaired community be contingent on sighted people for a important amount of info and help. This project, explored the ability of iBeacon technology to support blind people though circumnavigating out-doors it can detect any difficulties with the help of ultrasonic sensors. Thus, it will help blind people when they are walking outside from their home.

Literature Survey

S.Gangwar (2011) intended a smart stick for visor which can give initial warning of an difficulties using Infrared (IR) sensors. After identifying the difficulties, the stick alerts the visually impaired persons by means of vibration signals. Though, the smart stick intensive individual for difficulties detection but it is not supplementary for emergency purposes wanted by the blind. And also, the IR sensors are not actually well-organized enough because it can

perceive only the adjacent difficulties in short distance.⁵

Shruti Damhare and A. Sakhare (2011) intended an artificial vision and object uncovering with real-time assistance via GPS to deliver a low cost and well-organized direction finding aid for blind which gives a sense of artificial vision by providing information about the environmental scenario of static and dynamic objects around them.⁶

G. Naveen Balaji (2017) This arrangement provides an safe navigation for the visually impaired, deprived of any manual guidance. This delivers a user-friendly system for both indoor and outdoor navigation. The idea future usages smart watch as a navigation device which is wearable and inexpensive. All the topographies of the smart watch can be used by using screen reader.⁷

Mariam Rehab (2017) This article suggests an ultrasonic-based intellectual walking stick for the visually impaired theme which detects difficulties and water with a dissimilar sound of buzzer for each type of difficulties. The difficulties detection accuracy was found to be 90.00% accurate using confusion matrix. The remote control for locating the walking sticks when inappropriate recorded 88.75% Accuracy.⁸

System Architecture

The system architecture shows the block schematic of the system. It shows the various levels of the system and their individual functionalities. The system architecture is an event way of representing the working of a system. The system shows that iBeacon tags are permanently placed at places like police station, telephone booth, bus stand etc. System that we are going to develop is carrying by the blind person which is developed using Raspberry pi, ultrasonic sensor and headphone. iBeacon tag continuously transmits packets. When blind person comes in range he/she receive voice notification.

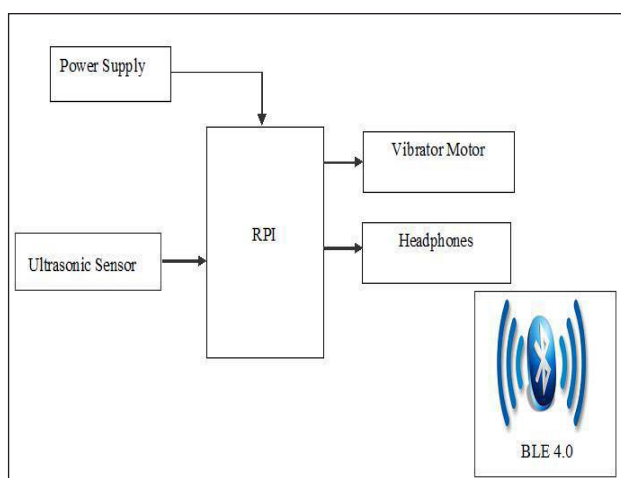


Figure 1. System Architecture of An Intelligent stick using iBeacon technology

Prototype Models of the Project

Prototype is a working model of software with some limited functionality. The prototype does not always hold the exact logic used in the actual software application and is an extra effort to be considered under effort estimation. Prototyping is used to allow the users evaluate developer proposals and try them out before implementation. It also helps understand the requirements which are user specific and may not have been considered by the developer during product design.

The Prototyping Model is a Systems Development Method (SDM) in which a prototype (an early approximation of a final system or product) is built, tested and then reworked as necessary until an acceptable prototype is finally achieved from which the complete system or product low energy proximity sensing by transmitting a universally unique identifier picked up by a compatible app or operating.

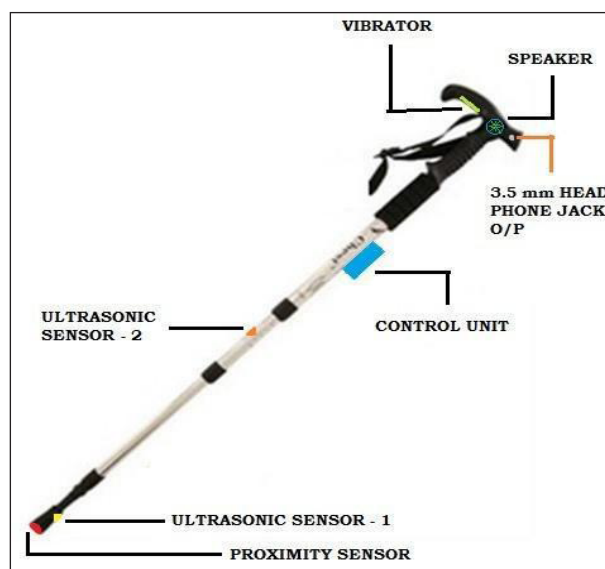


Figure 2. Intelligent Stick

The prototyping model of our system is as shown in figure . As our system is about intelligent stick that we are going to develop is carrying by the blind person which is developed using raspberry pi, Ultrasonic sensor and headphones' project explored the ability of iBeacon technology to assist blind people while navigating outdoors. We investigate a relatively new technology called iBeacons. An iBeacon is small device that broadcast information via Bluetooth. iBeacon tags are permanently placed at places like police station, telephone booth, bus stand etc. Whenever the blind person comes in range, he/she receives the voice notification. The beacon share its unique identification number, and nearby device with bluetooth enabled can use that number to and they corresponding information. The Intelligent stick is integrated with ultrasonic sensor to detect difficulties ahead using ultrasonic waves.

Device Specification

iBeacon

iBeacon is a protocol industrialized by Apple and presented at the Apple Worldwide Developers Conference in 2013. iBeacon-compatible hardware transmitters characteristically named beacons a class of Bluetooth low energy (BLE) devices which transmit their identifier to adjacent portable electronic devices. The knowledge allows Smartphones, tablets and other devices to achieve actions once in near proximity to an iBeacon. iBeacon is founded on Bluetooth system. iBeacon differs as of approximately other location-based knowledges as the distribution device (beacon) is only a 1-way Smartphone detecting an iBeacon transmitter.



An assortment of iBeacons from different vendors transmitter to the in receipt of Smartphone or receiving device. An iBeacon placement contains of one or more iBeacon devices that communicate their individual unique identification amount to the local area. Software on a in receipt of device might then look up the iBeacon and achieve numerous functions, such as informing the user. Region monitoring is imperfect to 20 regions and can function in the contextual.

The distance (between transmitting iBeacon and receiving device) is considered into 3 distinct ranges: Immediate: Within a few centimeters.

Near: Within a couple of meters

Far: Greater than 10 meters away

The maximum range of an iBeacon transmission will be contingent on the location and placement, obstacles in the situation and where the device is being stored. Standard beacons have an assessed range of 70 meters. Extended range beacons can reach up to 450 meters. The frequency of the iBeacon transmission be contingent on the conformation of the iBeacon and can be altered using device specific methods. Ultrasonic Sensor

Ultrasonic Sensor

An ultrasonic sensor is an instrument that events the distance to an object by means of ultrasonic sound waves. An ultrasonic sensor performs a transducer to send and receive ultrasonic pulses that relay info about an object's proximity. High-frequency sound waves respond from limitations to harvest dissimilar echo patterns. The features of the Ultrasonic sensor include the following:

- **Clear object noticeable**

Then ultrasonic waves can reply on glass or liquid surface and return to the sensor head, even see-through targets can be noticed.

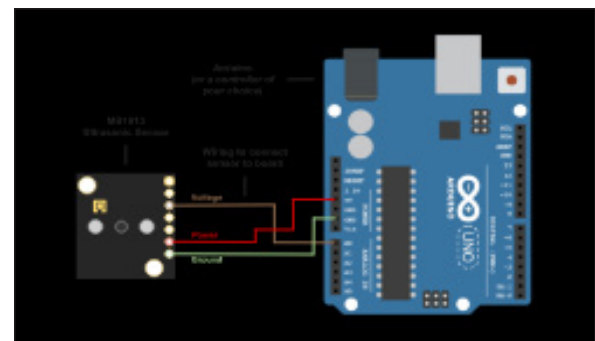
- **Resistant to mist and dirt**

Discovery is not responded by gathering of dust or dirt.

- **Complex shaped objects detectable**

Attendance detection is steady even for targets such as mesh trays or springs.

Hook Up Controller



Conclusion

From this we are concluding that this device will help the Visually impaired person be more alert about Difficulties using the Vibration and Voice. This project is mainly for the Visually impaired peoples to avoid Difficulties and get the information about the nearest places through the voice notification. Our model confirms one item that is manufacture the commission of wandering of a blind person informal and contented. The stick is too actual light and handy to transmit. Likewise, the components or parts that we hand-me-down in the stick are also effortlessly obtainable and fewer in cost.

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