SMART SHOES FOR BLIND USING INTERNET OF THINGS: A REVIEW

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Abstract: This paper introduces a thought regarding managing the issues looked by blind people through smart shoes. Due to the blind people face many challenges especially when moving in public places. 285 million people are estimated to be visually impaired worldwide out of which 39 million people are blind and 246 have low vision [1]. Smart shoes will help a blind person to mover on independently with help of ultrasonic sensor to detect obstacles. In this paper presents various smart shoes for blind technology using Internet Of Things.

KEYWORDS

Visually impaired, Sensors, Obstacle detection, Smart Shoes

I. INTRODUCTION

People with visually impaired faced most of the challenges in the environment. The long Hoover Cane used by them is not advantages while walking and travelling. Using smart shoes for visually impaired people need not to be depending on others for mobility. The systems we have designed consist of sensors and vibrator for sensing the surrounding environment and giving feedback to the blind person. It is used as a safety device as well as navigation device. The electronic hardware will be fixed in shoes for users. User will wear the shoe and travel anywhere, and attached sensor will be sense obstacles near to the shoes alerts with the help of visually impaired people.

India contributes about 21% of the blind people over total population. In a million population, there are around 53 persons that are visually impaired, 46 thousand are having low vision and around 7000 have completely lose the vision [2].

Ages (in years)	Population (millions)	Blind (millions)	Low Vision (millions)	Visually Impaired (millions)
0-14	1,848.50	1.421	17.518	18.939
15-49	3548.2	5.784	74.463	80.248
50 and older	1,340.80	32.16	154.043	186.203
all ages	6,737.50	39.365 (0.58)	246.024 (3.65)	285.389 (4.24)

Fig 1:   Estimating the blind population

II. FEATURE OF SMART SHOE

- Generate electricity while walk
- Charge the phone on the go independently
- Health Tracker
- Obstacle detection for Blind
- Location Finder using GPS
- Auto detection
- Having feature to give indicate right path
- Less accident will be occurring from the blind people.
- Distraction free travel
- Automatic rerouting and alerts
- Various user controlled vibration pattern

III. TECHNOLOGY

Before, blind people use the hoover cane like smart stick as a tool for directing them when they move or walk. But presently develop the shoes which can be more efficient and user friendly, smart blind guidance system.

III.I OVERALL TECHNOLOGY

1. Smart assistive shoes

A smart assistive shoe for visually impaired people so they get rid of the shoes and make more independent. The shoes will detect the nearby the obstacles and simultaneously send a message to the receiver audio or vibration form [3].

Smart shoes alerts visually impaired people over objects which are coming between their ways and could help them in walking with less accident.

2. Integrated smart shoes

The integrated smart shoes aims at the development of an Electronic Travelling Aid (ETA) for visually impaired people that will help them to navigate safely. With help of Android application, wearable device is to be made help in navigating the path [4].

3. Li-Fi Based smart shoes

The Li-Fi technology can transfer the data with help of LEDs. It is a high speed wireless communication system, similar to Wi-Fi. This smart shoe that helps the visually impaired in navigation through voice commands which are conveyed through light source in the path [5].

The LiFi transmitter and the data are received through the LiFi receiver. The received data will contain information about data. Smart shoes that provides a stable navigation helps to alerts the visually impaired person over obstacles then to move independently.

4. Haptic shoe for Blind

A haptic shoe gets signals from a GPS enabled smart phones that allows the visually impaired peoples to walk independently, giving directions and alerting to obstacles. With the help of a proprietary app loaded to a GPS enabled smart phone, the user can connect with shoe via Bluetooth and interact with the app to set a destination.
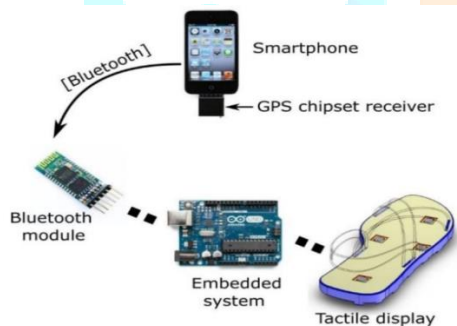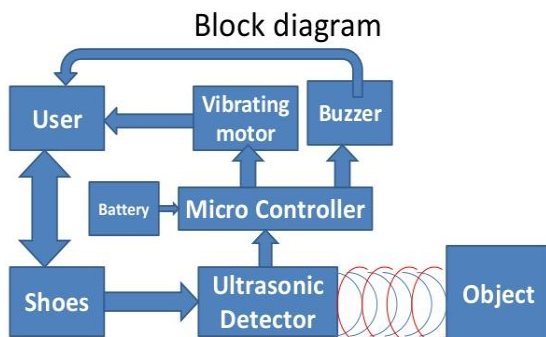

IV.BLOCK DIAGRAM

Figure 2: Block diagram smart shoes for blind people

V. HARDWARE DESCRIPTION

1. Arduino NANO Board

The Arduino Nano is a very small, breadboard friendly board based on the ATmega328P (Arduino Nano 3.x). It has more less the similar functionality of the Arduino Duemilanove, but in a various package. It lacks only a DC power jack, and works with a mini-B USB cable instead of a standard one.


2. Ultrasonic Sensor

Ultrasonic level sensors the distance is measured by using ultrasonic waves.   The sensor receives an ultrasonic wave and emits the wave reflected back from the target. Ultrasonic level sensors measure the distance target by calculating the time between the reaction and emission.

The ultrasonic sensor consists of a transmitter and receiver which are available as separate unit embedded together as single unit.   The above image above shows the ultrasonic transmitter and receiver.
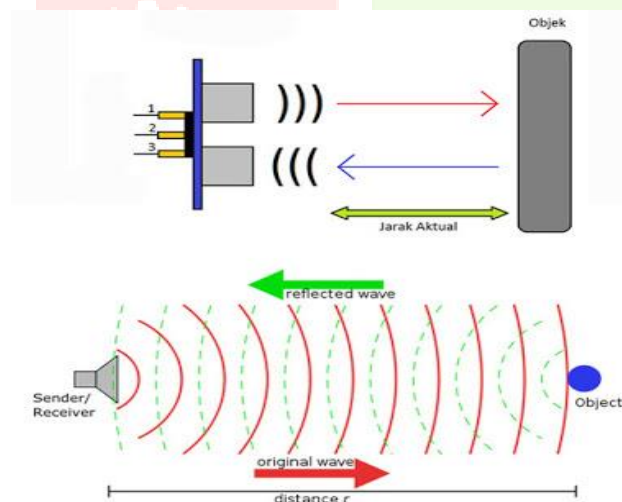

3. Buzzer

A Buzzer is an audio signalling device. There are many types of buzzer and here 5V passive Buzzer is used, which is used to create the sound.

4. Vibrator motor

This tiny motor produces vibrations by spinning an eccentric shaft at over 900 RPM when power at 1.5V. It is intended for operation around 1.5V, and polarity is not important that is, the motor can run CW or CCW.

The main purpose of this vibrator motor is to alerts the user from receiver the call by without sound and vibrating. These motor are applicable for different categories like pager, handsets, cell phones, bluetooth etc.
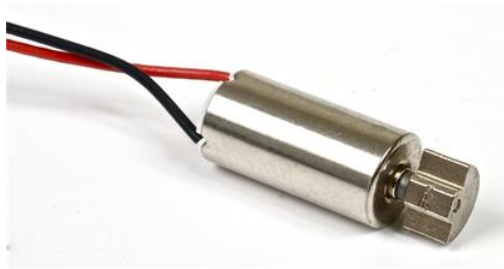

5. Bluetooth

The Bluetooth module can receives and transmit the data wirelessly by using two device. The Bluetooth module can receive and transmit the data from a host system with the help of the host controller interface.

The Bluetooth is the similar technology, which is used to connect one electronic device to another, without the usage of any wires and cables. It is a wireless technology to send and receive data between two devicef.

6. IR Sensor

A passive infrared sensor is an electronic sensor. It measures infrared radiating light from objects in its field of view. IR Sensor can measure the heat of an object as well as detect the motion. It is also used for detection of water in the path.
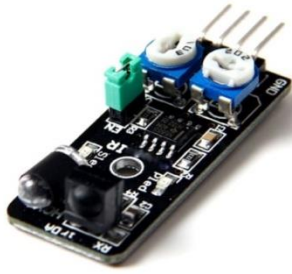
7. Water sensor

The water sensor is an easy to use tool for detecting water. It can act as a simple switch, where the switch is normally open and when there is water, the switch closes.

8. Battery

Battery is a power source of our circuit. It is connected with the microcontroller.

VI. LITERTURE SURVEY

S N O	TITLE	AUTHOR	JOURNAL	OVERVIEW OF PAPER	METHODS USED	ABSTRACT THEAM	ACCURACY RESULT OBTAINED	FUTURE WORK
1	Smarts Assistive shoes For blind	Ariba Khanam Anuradha Dubey Bhabya Mishra	International Journal Of Advance Research in Science and Engineering (IJASE)	Introducing the smart assistive shoes for blind people which will help them in their needed activities. The shoes will detect the nearby obstacles and simultaneously send a message to the receiver in audio and vibration form. The ultrasonic sensor detect the obstacles for blind people. The arduino microcontroller keeps the pulling the ultrasonic sensor and provide the feedback via vibrator.	Arduino for sensor testing	This paper presents an idea dealing the problems faced by visually impaired individual through assistive device in form of shoes. The shoes will be detect the nearby obstacles and continuously send a message to the receiver in audio and vibration form	The ultrasonic sensor has been fully utilized on order to advanced the mobility of the blind.	Future work will be focused image acquired by using web camera and NI camera helps in identification of object as well as scans the entire instances for the presence of number objects in the path of the blind person

| 2 | Design and Development of a Prototype Rehabilitative Shoes for the Blind | Ziad O.Abu-Faraj

Elie Jabbaur

Paul Ibrahim

Anthony Ghaoui | Institute of Electrical and Electronics Engineers | Each shoes is mounted with three pairs of ultrasonic transducers placed on aspect of the toe cap so as to detect ground level obstacles of different heights as well as ground pits and holes.

Additionally, design considerations mitigated the effects of ipsilateral and contralateral foot swing, ground level detection, stair climbing and descent as well as others impediment that might be perceived as obstacles.

The corresponding tactile outputs are provided by three miniature sized vibrating motors embedded within the collar of the shoes. | Medical malleolus for the medical transducers.

Calcaneous for the central transducers.

Lateral malleolus for the lateral trans ducers. | Each shoes is mounted with three pairs of ultrasonic transducers placed on aspect of the toe cap so as to detect g ground level obstacles of different heights as well as ground pits and holes. | Instrumented with the smart shoes, underwent an entensive training session, whereby each sensor was independently triggered and the corresponding tactile output was acivited. | Navigational guidance or way finding is addressed.

User friendliness and cosmesis are addressed.

Route recall. |
| 3 | Smart | Shlesha | Internationa | Smart shoe is | Dijkstra's | Now a day, | When an | Main goal |

	Shoes: A Safe Future for the Blind	Khursade Malavika Karunan Ibtisam Sayyad Saloni Mohanty	l Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)	one such wearable system designed to provide directional information to the visually impaired. Now a day, android mobile is commonly used by everyone. With help of android application, wearable device is to be made to help in navigation path. Sensors attached with the hardware will sense obstacles and vibrators will vibrate for left and right turn through path. A buzzer will be used for alerting the user that obstacle is nearing blind.	shortest path algorithm Obstacles detection algorithm	android mobile is commonly used by every one. With help of android application, wearable device is to be made to help in navigation path.	obstacles comes in contact with the sensors, the distance is calculated, from the sensor and the obstacles. If obstacles is in the predefined range of 15-20 cm, it is detected and the buzzer starts beeping.	of this paper to provide a navigation assistance for this visually impaired, in future Bluetooth speaker, its used to get the location coordinate from mobile phone by using GPS.
4	Li-Fi Based Smart Shoes for Blind	Shanthi M Madhu Meena M.K Kadiravan R Kowsalya R.J	International Journal of Engineering Science and Computing	Smart shoes that helps the visually impaired in navigation through voice commands which are conveyed light source in their path.	Differential Global Positioning System. (DGPS) Radio Frequency Identification Tags	This paper proposes a smart shoe that helps the visually impaired in navigation through voice commands which are conveyed	The Li-Fi module produces LED which transmit data to the shoe module. The Li-Fi receiver at the shoe detects this signal and the	The smart shoes uses the most reliable source, light to communicate data to the visually impaired.

					(RFID)	through light sourced (Li-Fi) in their path.	controller plays this data through the speaker.	These was a routine bench test of all system component in terms of their operability, accuracy, reliability.
				The RFID reader detects all information stored on the tag, it is then analyzed and the data retrieved is transmitted to a control unit that translates the information into Braille code. The ultrasonic sensor is used for obstacle detection The IR sensor is used for detection of water in the path. The receiver receives this flicking light and converts it into electrical signal. The signal is then converted to binary data which recognized as audio signals. Thus navigation done using Li-Fi.				
5	Smart Navigat ional Shoes for the Blind Person	Saylee Begampur e Renuka Deshmukh	Internationa l Journal of Innovative Research in Electrical, Electronics, Instrumenta	Android is a working system created google for portable system. It depends on the linux bit and	Dijkstra's Algorithm	With help of android application, wearable device is to be made to help in	The shoes sync up with a Smartphone app that uses maps and vibrate to tell users when	In future scope we will focused Bluetooth speaker, its used to

		Sheetal Chotaliya	tion and Control Engineering	intended for touch screen, for example, cell phone and tablets.		navigation path.	and where to turn to reach their destination.	get the location coordinate from mobile phone by using GPS.
		Shubham Sirsat		The system is implemented in shoes we used a battery for power supply.		The IR sensor is utilized for obstacle detection in the project that the obstacle is distinguished out and about then buzzer will turn ON.		
				Bluetooth is used to get the location coordinate form mobile phone by using GPS setting from mobile.				
				The shoes sync up with a Smartphone app that uses maps and vibrate to tell users when and where to turn to reach their destination.				
				The control unit gives vibration according to the route coordinates in shoes to indicates the blind person.				
6	Smart Assistive Shoes and Cane: Soulmates for the	Shubham Rastogi Pankaj Sharma Parth dhall	International Journal of Advanced Research in Electronics and Communication	The technology proposed in the paper serves as a solution for visually impaired people. The smart shoes	Radio Frequency Identification (RFID)	The smart shoes that alerts visually impaired people over obstacles coming between their	The system has been used to receive data from the sensing devices, two connected to the shoe to	In future, longfitudinal research would be required to judge if the smart

	Blind People	Rishav Agarwal Shristhi Thakur	Engineering	that alerts visually impaired people over obstacles coming between their ways and could help them in walking with less collision. IR sensor connected to the module and the voltage level depending upon the status of the IR sensor are transmitted to the micro-controller and as per the data collected an appropriate alerting the blind person about the surroundings. The arduino lily controller receives the input from the above sensors, executes and decode it and again select the appropriate saved voice messages and command to the speaker.		ways and could help them in walking with less collision. A shoes that could communicate with the user through voice alert and pre-recorded message.	detect objects at the ground. Then, as per the information received by the micro controller, it provides an acoustic feedback to the user.	shoes would be able to augment their conventional way of mobility, thereby make them independent after prolonged used.
7	Designing Smart Shoes for Obstacle	Vikram Singh Parmar Krishna Sai Inkoolu	International Federation for Information Processing	The smart shoes presented in this paper explores the potential of tap in alerting users about the	Depict distribution Formula of user age and level	The smart shoes by evaluating it from (a) ratio Of obstacles identified total	The result showed that the users were able to detect 89.5% obstacles out of all	Future work will be focused enhancing the performance of the

	Detection: Empowering Visually Challenged Users Through ICT			obstacles in front through a novel method of providing feedback mechanism. It detect obstacles in a customizable range of up to 2m by making use of an ultrasonic sensor and providing the feedback to user through a tapping mechanism at the foot-arch. There are two buttons are available for this smart shoes. **Power button:** This button is used powering the system on and off. **Mode Button:** The footwear can be used in any of the two mode using the mode button when it is pressed the buzzer present in the system indicates current mode.		obstacles encountered, (b) distance of obstacles apprehension and (c) response time.	encountered obstacles with mean response time of 3.08s. Users average distance of obstacle apprehension was 108 cm in regular mode and 50cm in the crowd mode.	system and reducing the load on the user by adding the camerato guide. Image acquired by the web camera and NI cameras helps in identification of objects as well as scans the entire instances for the presence of number of objects in the path of the blind.
8	Smart Assistive Shoes and Cane:	S.D. Asha Mahesh K. Raj Supriya	International Journal of Engineering Science and Computing	This system is intended to provide overall measures object	Assistive Technology (AT) Radio	Smart shoes that alerts visually impaired people over	After receiving the input form the shoe module via	In future, longfitudinal research would be

	Solemates for the Blind People	M.V.S.S.N.K. Pushpa Latha P.Gowri T.Sonia B,Nani		detection and send information related to blind people. This project aims at the development of an Electronic Travelling Aid(AID) to help the blind people to find obstacle free path. This ETA is fixed to the shoe. When the object is detected near to the shoe alerts them with the help of vibratory circuit and also in advancement with help of speakers or headphone that is voice command with help of android application. IR sensor which detects the presence of the obstacles in the direction and sends the command to the controller the detection of object in the direction.	Frequency Identification(RFID)	obstacles coming between their ways and could help them in walking with less collision. When the object is detected near to the shoe alerts them with the help of vibratory circuit and also in advancement with help of speakers or headphone that is voice command with help of android application.	Bluetooth module, the arduino lily receives the input, decodes it and select the appropriate saved voice message and commands to the speaker which give indication to the user of the obstacles in the respective direction.	required to judge if the smart shoes would be able to augment their conventional way of mobility, thereby make them independent after prolonged used.
9	Smart Shoe for Visuall	Saloni Mohanty Malavika	International Journal of Advanced Research in	Electronic component is fixed in shoes of	Dijkstra's shortest path algorithm	The system propose detects the nearest	Sensor will detect obstacles and vibrator will	Future work will be focused enhancing

y Impaired	Karunan Ibtisam Sayyad Shlesha Khursade	Computer and Communication Engineering	user. User will wear shoes for easy, mobility. Sensors will sense obstacles, vibrators will vibrate for left and right turn through path. When sensors will detect any obstacles, user will be informed through android system being used by the user. Bluetooth connection is provided through which mobile and electronic part can be connected. The system propose detects the nearest obstacle via an ultrasonic sensor system and sends back feedback to inform blind person about its location.		obstacle via an ultrasonic sensor system and sends back feedback to inform blind person about its location. When sensors will detect any obstacles, user will be informed through android system being used by the user	vibrate according direction. The Bluetooth connection is provided through which mobile and electronic part can be connected.	the performance of the system and reducing the load on the user by adding the camerato guide. Image acquired by the web camera and NI cameras helps in identification of objects as well as scans the entire instances for the presence of number of objects in the path of the blind.
1 0	Design of Arduino based Shoe for Blind with Wireless	Mohammad Hassan M.D. Atqur Rahman Shakeb Alam	International journal of electrical, electronics and data communication	There are broadly three stages involved in the design of the proposed blind shoe: **Input stage:** Ultrasonic	Arduino IDE coding	The shoe enable both partially and totally blind person to self navigate in an unknown environment. The proposed shoes comes	The shoe can be used for nearly 3-4 hour once the rechargeable battery gets fully charged. The obstacles detection range can be	In future work we will focused GPS. Its also added for motoring visually impaired

Charging				sensor, the sensor is uses to detect obstacles in the path of blind person. **Control stage:** The micro controller is programmed in such a way that it will sends a required trigger signal to the two vibrating motor and a buzzer whenever error is found to be beyond the tolerance range. **Output stage:** The vibrating motor which will act according to signal receive by microcontroller. The buzzer is also there that sound when water sensor detect the presence of water. The GPS tracker have been used to send a SOS message on mobile, whenever the blind person breached the restricted area.		with feature such as obstacle detector sensor, water sensor, wireless charging, GPS tracking.	set just by making a small change in the program.	movement and to track the position.

VII. ADVANTAGE

1. Auto Detection.

2. Having feature to give the indicate right path.

3. Simple to use.

4. Less accidents will be accrued form the blind people.

5. This system is applicable for both the indoor and outdoor environment.

6. Automatic rerouting and alerts.

7. A reliable technology providing a voice feedback as per the surrounding.

8. The GPS tracker which will send the coordinate of the blind person position on mobile, the coordinate can be then used the track the position of google map.

9. User friendly system.

10. Navigation Assistance while travelling.

VIII. DISADVANTAGES

1. Less mechanical strength.

2. In water circuit will damaged.

IX. CONCLUSION

The main focus of this paper is the various **smart shoes for blind** technologies and their techniques. The smart shoes uses the most reliable source, light, to communicate data to the visually impaired. In future work will be focused on the enhancing the better performance of the system and reducing the load on the users.

X. REFERENCE

[1]. Ariba khanam, Anuradha Dubey, Bhabya Mishara, " A Smart Assistive Shoes for Blind People", International Journal of Advance Research in Science and Engineering, Volume No.07, special issue No .01, April 2018.

[2]. S.D. Asha Mahesh, K.Raj Supriya, M.V.S.S.N.K. Pushpa Latha, P. Gowri, T.Sonia, B. Nani, " Smart Assistive Shoes and Cane: Solemates for the Blind People", International Journal of Engineering Science and Computing, Volume 8 Issue No.4, April 2018.

[3]. M. Madhu Meena, M.K. kadiravan, R. Kowsalya, R.J. Lokharaj, "Li-Fi Based Smart Shoe for Blind", International Journal of Engineering Science and Computing, Volume 9 Issue No.3, March 2019.

[4]. Ziad O. Abu-faraj, Paul Ibrahim, Eile Jabbour, Anthony Ghaoul, "Design and Development of a Prototype Rehabilitative Shoes and Spectacles for the Blind", 5th International Coference on BioMedical Engineering and informatics, 978-1-4673-1184-7/12/$31.00, 2012.

[5]. Saylee Begampure, Renuka Deshmukh, Sheetal Chotaliya, Shubham Sirsat, " Smart Navigational Shoes for the Blind Person", International Journal of Innovative Research in Electrical, Electronics, Instrumentation and control Engineering, Volume 6,   Issue 4, April 2018.

[6]. Shlesha Khursade, Malavika Karunan, Ibtisam Sayyad, Saloni Mohanty, "Smart Shoes: "A Safe Future for the Blind", International Journal of Innovative Research in Computer and Communication Engineering", Volume No.6, Issue 5, May 2018.

[7]. Saloni Mahanty, Malavika Karunan, Ibtisam Sayyad, Shlesha Khursade, "Smart Shoes for Visually Impaired", International Joural of Advanced Research in Computer and Communication Engineering, Volume 6, Issue 11, November 2017.

[8]. Shubham Rastogi, Pankaj Dhall, Rishav Agarwal, Shristhi Thakur, "Smart Assistive Shoes and Cane: Solemates for the Blind People", International Journal of Advanced Research in Electronics and Communication Engineering, Volume 6, Issue 4, April 2017.

[9]. Vikram Singh Parmar, Krishna Sai Inkoolu, "Designing Smart Shoes for Obstacle Detection", Empowering Visually Challenged Users Through ICT", International Federation for Information Processing, 97-68-3-319-6768, August 2017.