IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

VISUALLY CHALLENGED PEOPLE USING SMART WHITE CANE

S. JOTHEESHWARAN[1], M. KOWSALYA[2], M. SATHYAJOTHI[3], S. VISHNUPRIYA[4], R. SANDHIYA[5]

1 ASSISTANT PROFESSOR 2,3,4,5 UG SCHOLAR

BIOMEDICAL ENGINEERING AND MEDICAL ELECTRONICS ENGINEERING

PAAVAI ENGINEERING COLLEGE, TAMILNADU, INDIA

ABSTRACT

A smart blind stick that helps blind people by providing them with advanced technology. Visually impaired or blind people are facing many difficulties around them. Using a Raspberry Pi-based blind stick system to give them an artificial vision to detect obstacles and easy navigation through the system for them. The main contribution of this system is to deliver a low cost efficiency, good navigation efficiency and text to voice aid for the blind person that give an artificial vision by receiving information about the environments statics and dynamics objects. Thus, Smart Stick comes as a proposed solution to help blind people in their daily life without the help of others. In this project we proposed a solution for visually impaired people by using obstacle sensors in blind sticks. This blind stick system plays an important role and it's like a third eye for blind person. To provide a smart electronic help for blind individuals, a smart system concept has been designed. People who are blind or visually challenged have difficulty finding their way around. The Raspberry Pi-based system is designed to give artificial vision and object identification. In this project, we'll use the Raspberry Pi to create a smart system for blind people that includes a camera module and a switch. If someone is in distress, the Pi Camera recognizes and sends a message to that person through earphone. The system is made up of the voice output is controlled by TTS (Text to Speech). The suggested system identifies an object in their environment and gives feedback in the form of speech, warning messages sent by earphone. The overall goal of the system is to deliver a low-cost, high-efficiency navigation and text-to-voice aid for the blind that provides a sense of artificial vision by supplying information about the environment's static and dynamic objects.

Keywords: Obstacle Sensor, AI Camera, Voice Recorder, Speaker, Raspberry PI, Voice board.

1. INTRODUCTION

People with visually problems are those whose vision prevents them from comprehending even the most minute details. Many individuals with 6/60 or the optical range have each eye wide open or a longitudinal range of between and equal to 20 degrees. Visually impaired people live in a world where they are totally dependent on other people,and they are known to have hearing loss deafeningly deaf. It is impossible for those with sensory impairments to differentiate even the smallest information from that of healthy people[1]. Those who have a 6/60 or optical range either possess both eyes fully open, or have a lateral scope of no more than or equal to 20 degrees. They are referred to as being blind [2]. Worldwide information on visual impairment of the International Health Authority estimates there are 285 million individuals with this condition worldwide, including 39 million blind people. Eighty percent of persons over 50 are blind. The two primary reasons of eye damage are refractive errors that remain uncorrected (43%) and cataracts (33%), with cataracts being the main contributor to blindness (51%) as well. The most important aspect of human anatomy is eyesight since it supplies 83 % of the information about their

environment. [3] Persons who have certain conditions go through a lot of pain in order to live normal life. They allow yourself to be neglected and are mentally isolated. Their inability to function efficiently has a big effect on their ability to earn a living. Patients experience it as an illness that makes them lose faith in themselves. We therefore created a mechanism for persons with such conditions. Many inventors have developed aids for visually impaired people in recent years. The earliest and most traditional accessibility tools for the blind come with their own set of drawbacks. [4] Some inventions normally come with a special supply or navigation that the user can keep in their pocket while travelling outside. The numerous patterns will probably to confuse the client. There have been numerous attempts to create blind guards or obstacle sensors system utilized a small number of applications are made. It is therefore advised to build and produce a walking stick with all of these characteristics that is affordable for all those who need assistance, including real-time recognition of objects, voice guidance, navigation, and so on. The World Health Organization estimates that 285 million individuals across the world are visually impaired. There are an estimated 50 million blind persons worldwide who need independent mobility to work, go outside, interact into society, and perform all other everyday tasks.

There are varieties of severe disabilities, of that visual disorder is one among them, within which someone has to face several issues despite variety of technological advancements. Visual disorder could be a state of condition wherever the individual is unable to visualize and has no light-weight perception. [5] Visual disorder additionally refers to those that have therefore very little vision that they use alternative senses as vision substitution skills. Thus, the unsighted considers the one who has total vision loss or partial vision loss. According to associate degree eleven Gregorian calendar month 2017, report from the planet Health Organization (WHO), a calculable 253 million individuals live with vision impairment, out of that thirty-six million are entirely blind and 217 million have moderate to severe vision impairment. This means chronic eye diseases are the leading reason behind vision loss, which approximates eighty fifth. Out of the whole proportion of vision-impaired, eighty-one of individuals are aged fifty years or on top of, and also the remaining nineteen are individuals beneath the age of fifteen years. Most blind individuals belong to low financial gain or developing countries, with most in Africa and Asia. From recent statistics, it's expected that by the year 2050, the vision impairment proportion may triple thanks to speedy will increase in population and aging. By considering these factors (age and monetary condition), we have a tendency to tried to contour the problem outlined on top of, and that we designed a structure that's lighter in weight, cost effective, and not advanced in structure, in order that it's simple to hold and reasonable to most visually challenged individuals. In this fashionable technology era, the explosion of recent and innovative technology provides several opportunities for everybody to measure a lighter life. For blind people, several aids are developed by several researchers to supply associate degree freelance life. A number of them have several new options however are pricey, therefore most visually challenged person (VCP) cannot afford these sorts of devices. On the opposite hand, the less expensive aids have shortcomings of bound necessary options. Our projected device might not be attractive-looking, however our focus was to succeed in financially weaker VCPs so that they will use it and enjoy it. This projected device has bound options that are useful for VCPs in touring their surroundings severally. [6] The walking stick is embedded with 2 sorts of sensors, one to notice obstacles at the ground level, moreover as for higher body components from a definite distance. It's predetermined according to the VCP's convenience, in order that the user will avoid obstacles in time without collision. Mistreatment temperature device live temperature & vital sign sensor is employed to notice vital sign of the actual visually handicapped person. Additionally, the system is incorporated with a GPS module that receives the latitude and great circle of the VCP's location and sends it to information for future functions. Another APP is employed by the VCP that helps to contact folks or guardians simply and immediately in any emergency state of affairs. To recapitulate, VCPs, moreover as their folks, feel safe and relaxed, as they'll contact one another with none difficulties.

Our proposed project first uses Node MCU to track blind people's location using Google's Geo location API and this data is communicated with others by using an application software in smartphone created by using Android Studio. Whenever blind people met with an obstacle it would alert them by using vibration using ultrasonic sensors. The stick is interfaced with other features like LDR. The Smart Vision prototype is a small, cheap and easily wearable navigation aid for blind and visually impaired persons. Its functionality addresses global navigation for guiding the user to some destiny, and local navigation for negotiating paths, sidewalks and corridors, with avoidance of static as well as moving obstacles. [7] Local navigation applies to both in- and outdoor situations. In this project we focus on local navigation the detection of path borders and obstacles in front of the user and just beyond the reach of the white cane, such that the user can be assisted in centering on the path and alerted to looming hazards. Using a stereo camera worn at chest height, a portable computer in a shoulder-strapped pouch or pocket and only one

earphone or small speaker, the system is inconspicuous, it is nohindrance while walking with the cane, and it does not block normal surround sounds. The vision algorithms are optimized such that the system can work at a few frames per second. The need for growing a low-fee assistive gadget for the visually impaired and blind humans has improved with steady increase in their population worldwide. Blind Stick reduces the human effort and gives better know-how of the surrounding. Furthermore, it also gives an opportunity for visually impaired people to transport from one area to any other without being assisted by using others. The device also can be used in old age homes where vintage age people have difficulty in their day after day activities due to reduced vision. With this project, the intention to useful resource human beings in wants to "see" the surroundings. Since the sector of artificial intelligence is doing awesome progress now and functions like object detection is getting less difficult and computationally feasible, these features are implemented in the project. The project makes a specialty of object detection and type on pictures that are captured by the device mounted on a stick whose statistics can then be relayed to the person in approach of sound or speech.

One of the biggest problems faced by the visually impaired is navigating from place to place, be it indoors or outdoors. Further, the adverse conditions of the roads make it even more difficult for them to walk outdoors. [8] They have to be alert at all times to avoid consequences like colliding with stable or moving obstacles, ascending or descending staircases, slipping down wet terrain. Also, at times they may be in distress and might want tosend an alert message to their relatives or friends about their where about. These problems of blind people can be addressed with the intervention of technology. The proposed solution employs the Internet of Things (IOT) paradigm to provide a medium between the blind and the environment. Several sensors can be used to detect anomalies like obstacles, staircases and wet terrains respectively. The prototype discussed here is a simple, sophisticated and affordable smart blind stick equipped with various IOT sensors and modules. Also, this solution provides a way to send a message about the where about of the user to the concerned people. Adding to the above, a software application is designed to help the acquaintances of the blind to manage the stick's configuration ex: add or delete phone numbers to which alert messages have to be sent. Misplacing the stick indoors can also be a substantial issue. Within the framework of the development of a widely applicable assistant system for the blind, we achieved recent advances in the interactive localization accuracy of objects within indoor environments. This was accomplished by combining data from cameras and from local inertial sensors with 3D model building information.

2. LITERATURE SURVEY

JISMI JOHNSON ET AL., (2021), PRESENTS THE SMART WALKING GLOVES HELPS BLIND PEOPLE IN MOVING AND ALLOWING THEM TO PERFORM THEIR WORK EASILY AND COMFORTABLY.

The blind person cannot recognize what is the size of that object and how far is he from the object. So, it is difficult for blind person to move here and there. The smart walking gloves supports Object recognition and output comes mainly in the form of Voice output. In Smart Walking Gloves, we detect the object with the help of a camera. The gloves measure the distance between objects and Smart Walking Gloves by Ultrasonic sensor. When the objects or obstacles come in range of the ultrasonic sensor, the speaker tells Name of obstacle in front of the gloves. Images will be captured using a camera and the camera is connected to the Raspberry Pi. If any obstacle comes in front of blind person, he can know about the obstacle by hearing the sound generated by the head phone. The smart walking gloves is very useful for the visually impaired persons for their safety and freedom from the other persons at all the time. The developed system gives good results in detecting obstacles in front of the user.

K. RAMARETHINAM ET AL., (2021), PRESENT THE PROJECT IS TO PROVIDE THE NAVIGATION INFORMATION VIA AUDIBLE MESSAGES AND HAPTIC FEEDBACK TO THE VISUALLY IMPAIRED PEOPLE HELPING THEM TO IMPROVE THEIR MOBILITY INDEPENDENTLY.

The system with portable self- contained feature that allows the blind people to travel through familiar and unfamiliar environment. The proposed system consists of hardware and software. In this system the Braille capacitive touch screen enables a user-friendly communication with the systems. All the operations can be made with this touch screen. The major components are the GPS receiver and path detector used for receiving the current position and finding the current position and finding the shortest path to the destination. The navigation process of the system will start once the user gives the destination as

voice command. The system is provided with an emergency button which will trigger an SMS that will send the present location of the user(GPS coordinates) to a remote phone number asking for help, in case emergency. In addition, the device provides user information needed, in audio format, including time, calendar, object color, alarm, obstacle detection, navigation direction, ambient light and temperature conditions.

KHER CHAITRALI S ET AL., (2021), PRESENTS THE VISUALLY IMPAIRED HAVE TO FACE MANY CHALLENGES IN THEIR DAILY LIFE. THE PROBLEM GETS WORSE WHEN THEY TRAVEL TO AN UNFAMILIAR LOCATION.

Only few of the navigation systems available for visually impaired people can provide dynamic navigation through speech output. In this paper, we propose a navigation device for the visually impaired which is focused on providing voice output for obstacle prevention and navigation using infrared sensors, RFID technology, and android devices. The device has proximity infrared sensors. RFID tags are installed into public building and also integrated into blind person's walking gloves. This device is connected to an android phone through Bluetooth. An android application is designed which gives voice navigation based on RFID tags read and also updates person's location information on the server. One more application is designed for family members to access the blind person's location through the server whenever needed. It aims to solve the problems faced by the blind people in their daily life. The system also takes measures to ensure their safety.

JINI.S ET AL., (2020), PAPER PRESENTS THE ARCHITECTURE AND IMPLEMENTATION OF A SYSTEM THAT WILL HELP THE VISUALLY IMPAIRED PEOPLE TO NAVIGATE USING GPS TECHNOLOGY.

The system provides artificial guidance to the visually impaired through known paths, that is the path for navigation has to be already stored in the microcontroller. The current latitude and longitude values of the user are obtained using GPS. These values are continuously compared with the already stored value in the microcontroller. Thus, helps the blind in navigation. The goal is to create a portable, simple and less costly system that will allow user to travel through familiar and unfamiliar environments without the aid of guides. Also, it provides voice recognition to detect obstacles. The obstacles are detected using three ultrasonic sensors, which are placed on the left, right, and front positions of the blind. The commands and messages are played back to the blind via APR9600 voice playback IC. The keypad used in system allows the user to select the desired locations to which he/she wishes to go. Keypad consists of 12 keys where each key represents a location. Blind selects the key using Braille language. The paper focuses on the development and evaluation of a Navigationsystem that makes use of Global Positioning System, voice and ultrasonic sensor for obstacle detection.

A. SHAHAB, F. SHAFAIT, AND A. DENGEL, (2020), SENSOR ASSISTED STICK FOR THE BLIND PEOPLE DESCRIBES ABOUT A WEARABLE EQUIPMENT WHICH CONSISTS OF A LIGHT WEIGHT BLIND STICK AND THE OBSTACLE DETECTION CIRCUIT IS BASED ON A SENSOR.

It is mainly developed to help the blind person to move alone safely from one place to another and to avoid any obstacles that may be encountered which may be either fixed or mobile, and thus it may help to avoid accidents. The main component for the working of this system is the infrared sensor which is used to scan a predetermined area around the blind person by emitting-reflecting waves. The reflected signals are received from the objects are used as inputs to the ATMEGA microcontroller. The microcontroller is then used for determining the direction and distance of the objects around the blind person. The main objective of this is to provide an application for blind people to detect the obstacles in various directions, detecting pits and manholes on the ground to make free to walk.

3. COMPONENT DESCRIPTION

Power Supply Unit
Filters
Regulator
Rectifier
Obstacle Sensor
Hc-Sr04 Ultrasonic Sensor
Speaker

Raspberry Pi
HDMI (High-Definition Multimedia Interface)
Camera Module
Installing an Operating System
Preparing n SD Card f or Your Raspberry Pi
Setting Static IP Address to Raspberry Pi
Adding Proxy Setting to Raspberry Pi
Lighted Server

4. WORKING PRINCIPLE

It also offers a camera-based assisted reading system to assist blind people in readingtext labels and product packaging from everyday things. The text that the user needs to read is collected as an image and sent to the image processing platform using a small camera. OCR tesseract is used to recognize the text on the acquired image. The e- speak algorithm converts the detected text into vocal output. The system is lightweight and portable, thanks to a built-in battery backup. It will provide them with a safer atmosphere as well as a sense of independence, allowing them to enjoy a more regular life. The Raspberry Pi 3b+, voice command module, moisture sensor unit, and ultrasonic sensor unit are all used in this smart navigation system stick. The voice command module is the highlight since it gives customers with dependable voice command support.

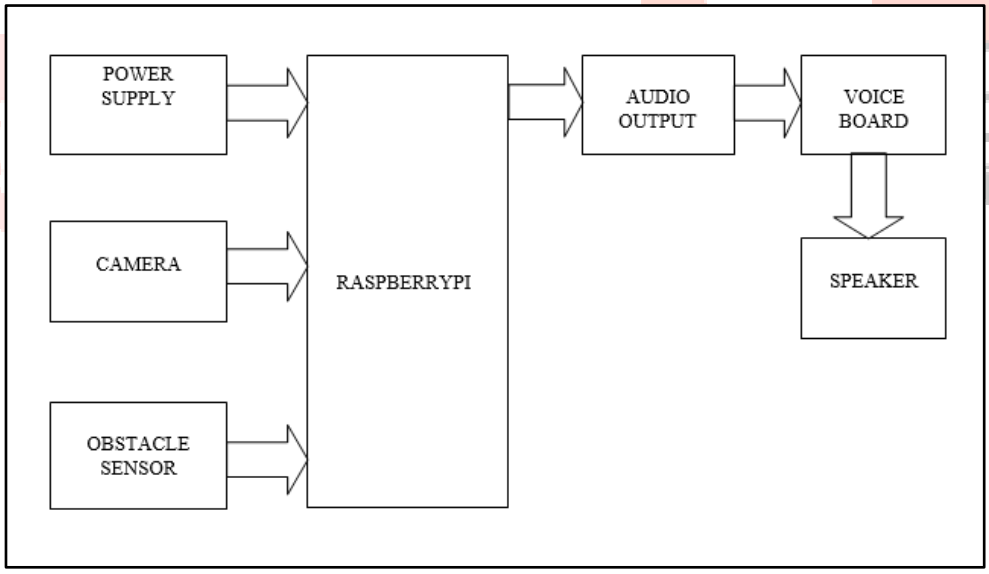
The proposed walking stick configuration involves a raspberry pi system that acts as the central processing unit.

Infrared sensor is used for obstacle avoidance and pothole detection.

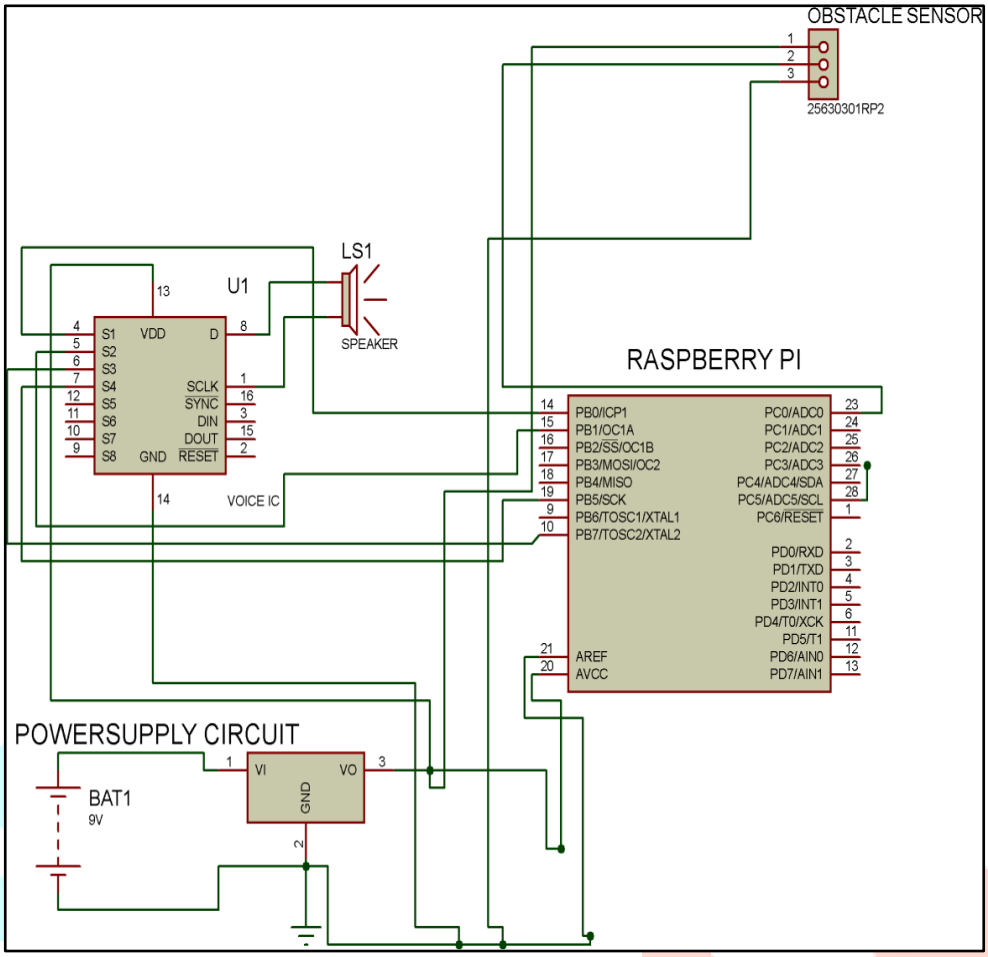
A voice is played through the speaker when an obstacle is encountered which helps in alerting the blind person and allows enough time to change their path.

Water sensor is used to detect the presence of water and provide an alert in time for path change so as to avoid slipping.

BLOCK DIAGRAM

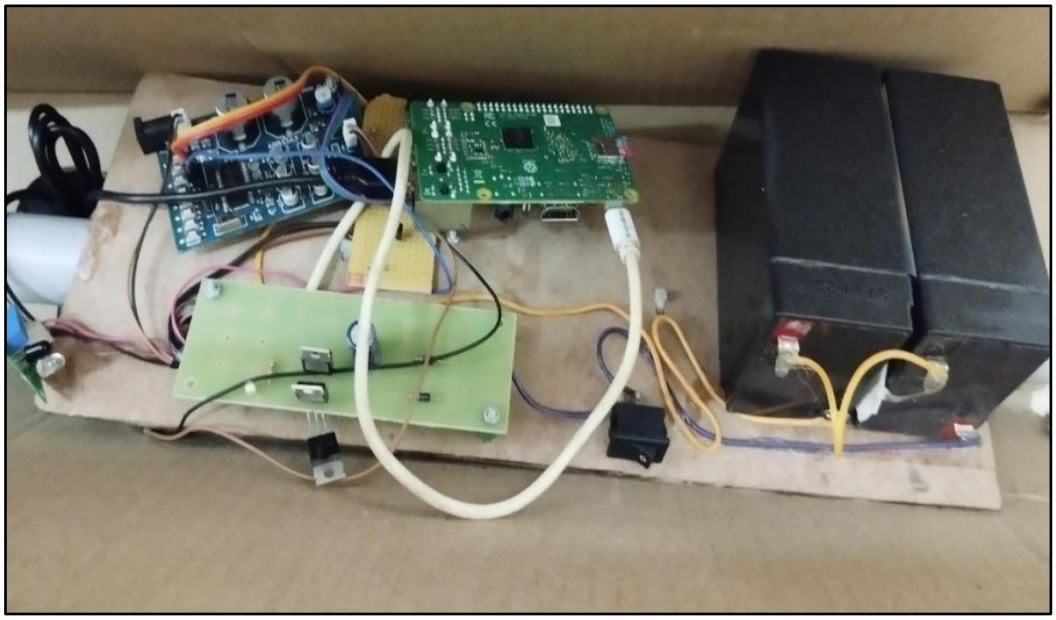


CIRCUIT DIAGRAM



5. RESULT

Blind individuals are going to benefit from a smart walking stick developed with the highest accuracy. An individual with physical disabilities who has received training is given by the smart stick. Travel alone from one location to another location the stick can help, might also be regarded as a crude method of providing blind vision with meaning. It decreases reliance on sticks persons who are blind when directing the members of another familial unit, walking around with friends and dogs proposed combinations real time prototypes of several systems that detects user task condition and offers two responses to help safer and improved navigation. Smart sticks find obstructions or items in front of the blind individuals and provide feedback in form of providing voice message. Every time an impediment is detected, the blind person hears a voice instruction warning them of the impending danger. The Smart Blind Stick will give the instruction in the form of vocal message, When the obstacle is pre-defined.



6. CONCLUSION

In this project described an epitome system to scan written communication and hand-held objects for serving to the blind people. To extract text regions from advanced backgrounds, we have got projected a totally distinctive text localization formula supported models of stroke orientation, and edge distributions. The corresponding feature maps estimate the worldwide structural feature of text at every element. Projected feature maps of an image patch into a feature vector. An adjacent character grouping is performed to calculate candidates of text patches prepared for text classification.Associate model is used to localize text in camera-based footage. OCR is utilized to perform word recognition on the localized text regions and work into audio output for blind users. Throughout this analysis, the camera acts as input for the paper. As a result of the Raspberry Pi board is high-powered the camera starts streaming. The streaming data square measure attending to be displayed on the screen victimization interface application. Once the item for text reading is placed earlier than the camera then the capture button is clicked to supply image to the board. Mistreatment Tesseract library the image square measure attending to be converted into data, and conjointly the data detected from the image square measure attending to be shown on the standing bar. In this project we pre-defined the certain objects and it will give the information in the form of vocal message.

7. REFERENCE

[1] Oguz Ekim, P., Ture, E., Karahan, S. and Yenilmez, F., 2021. A Smart Glove for Visually Impaired People Who Attend to the Elections. SN Computer Science, 2(4), pp.1-12.

[2] Mavarkar, P.R. and Mundargi, Z.K., 2021. Real Time Smart Blind Stick using Artificial Intelligence. Indian J. Artif. Intell. Neural Netw, 1, pp.9-13

[3] Fauzul, M.A.H. and Salleh, N.D.H.M., 2021, January. Navigation for the Vision Impaired with Spatial Audio and Ultrasonic Obstacle Sensors. In International Conference on Computational Intelligence in Information System (pp. 43-53). Springer, Cham.

[4] Khan, A. and Khusro, S., 2021. An insight into smartphone-based assistive solutions for visually impaired and blind people: issues, challenges and opportunities. Universal Access in the Information Society, 20(2), pp.265-298

[5] Rachburee, N. and Punlumjeak, W., 2021. An assistive model of obstacle detection based on deep learning: YOLOv3 for visually impaired people. International Journal of Electrical & Computer Engineering (2088-8708), 11(4).

[6] Reyes Leiva, K.M., Jaén-Vargas, M., Codina, B. and Serrano Olmedo, J.J., 2021. Inertial measurement unit sensors in assistive technologies for visually impaired people, a review. Sensors, 21(14), p.4767.

[7] Olomowewe, A.T., Joseph, E.O., Hussein, S.U., Thomas, S., Chukwu, M.C. and Akah, P., 2021, July. Design and Implementation of a Wearable Device for Obstacle Detection and Warning. In 2021 1st International Conference on Multidisciplinary Engineering and Applied Science (ICMEAS) (pp. 1-4). IEEE.

[8] Bouteraa, Y., 2021. Design and Development of a Wearable Assistive Device Integrating a Fuzzy Decision Support System for Blind and Visually Impaired People. Micromachines, 12(9), p.1082.

[9] Kunta, V., Tuniki, C. and Sairam, U., 2020, June. Multi-functional blind stick for visually impaired people. In 2020 5th International Conference on Communication and Electronics Systems (ICCES) (pp. 895-899). IEEE.

[10] Pathak, A., Adil, M., Rafa, T.S., Ferdoush, J. and Mahmud, A., 2020. An IoT based voice controlled blind stick to guide blind people. Int. J. Eng. Invent, 9, pp.9-14.