Smart Gloves for Visually Challenged

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Abstract **— This paper provides a review of research that helps visually impaired persons walk more confidently is recommended in order to assist them. A smart walking glove that informs visually impaired persons is suggested in the study to possible risks such as pits, allowing them to walk more safely. It describes how visually impaired persons can utilize a more user-friendly navigation tool. It comprises of a basic walking device with sensors that provide environmental data. Due to the incorporation of GPS technology and a microcontroller, their family members can easily monitor them. Ultrasonic sensor, controller, battery, vibrator and GPS receiver are used in this system. The main objective of these types of devices is to give blind individuals with an easiest and safest way to alleviate their daily challenges. The study's purpose was to develop a mobility aid for visually challenged persons. It was carried out in order to build a system that was small and required little or no user training. The main purpose of the study was to come up with a user-friendly design. Two independent software advances on mobility help employing ultrasonic sensors are described in this research. The sensor's signals identify impediments and alert the user by vibrating a motor.**

Keywords— Smart Gloves, Obstacle Detection, Fire Detection, GPS, Tracking, Alarm, Heart Rate Sensing.

I. INTRODUCTION

With the improvement of the living standards of the people, we have become so materialistic that we have forgotten how the physically disabled people live a tough life.Let us know some facts about Visually impaired persons. The term "visual impairment" refers to a loss of vision to the point that it presents problems that cannot be solved with common remedies like spectacles. Those with a disability are also included reduced capability to see, as they do not have access to glasses or contact lenses. Visual disorder is often defined as a finest corrected visual acuity of worse than either 20/40 or 20/60. The term sightlessness is used for complete or nearly complete vision loss. Without adaptive training and gear, a visual impairment may cause difficulty with everyday tasks such as reading and walking. Uncorrected refractive problems, cataracts, and glaucoma are the most common causes of visual defects worldwide. Near-sightedness, far-sightedness, presbyopia, and astigmatism are examples of refractive defects. The most prevalent cause of visual impairment is cataracts. A visual deficiency can also be caused by brain issues such as stroke, early birth, or trauma. These cases are known as cortical visual impairment. Showing for vision problems in children may improve future vision and educational success. Screening adults without signs is of uncertain assistance. According to the World Health Organization (W.H.O) almost 80% of the people are suffering from the partially blindness and full blindness. They suffer a lot to do their daily activities. Many researchers are going to develop the new technology to help the impaired people. The objective of this review “The Smart Glove for Blind” is to review and analyze a product which is very much beneficial to those people who are visually challenged and those who often have to depend on others. Smart Glove For Blind project is an innovation which benefits the blind people to move around and go from one place to another with speed and confidence by knowing the nearby obstacles using the help of the wearable glove which produces the ultrasonic waves which notify them with buzzer sound or vibrations. It allows the user those who are visually challenged to walk freely by detecting the obstacles. They only need to wear this product as a hand glove. This wearable device for blind does not need lot of exercise and efforts to use. One of the main peculiarity of this innovation is, it is affordable for all. This reduces the work on people who are assisting the blind. Furthermore, it also provides an opportunity for visually impaired persons to move from one place to another independently.

II. PROJECT METHODOLOGY

The proposed project “Smart Glove For Blind” consists of Arduino UNO, Ultrasonic module, WIFI and GPS module, Heart rate module, Fire sensor, Panic button, Power supply, Buzzer and Vibrator etc. The project model comprises of the user's right gloves. Here we have used HC SR04 Ultrasonic sensor to detect obstacle in front of the person within the range of 2cm-400cm. The Ultrasonic sensor is a transducer and is a combination of one transmitter and receiver paired as transceiver. The ultrasonic sensor delivers distance data to an Arduino, which analyses it before ordering vibration motors and a buzzer to create vibration and sound. When the object is close to the user, Arduino sends vibrate motor instruction to provide continuous vibration to the user. A flame sensor is a gadget that detects the presence of a fire or any other strong light source. We can detect infrared light up to a distance of 100cm with this sensor, which has a detection angle of 60 degrees.

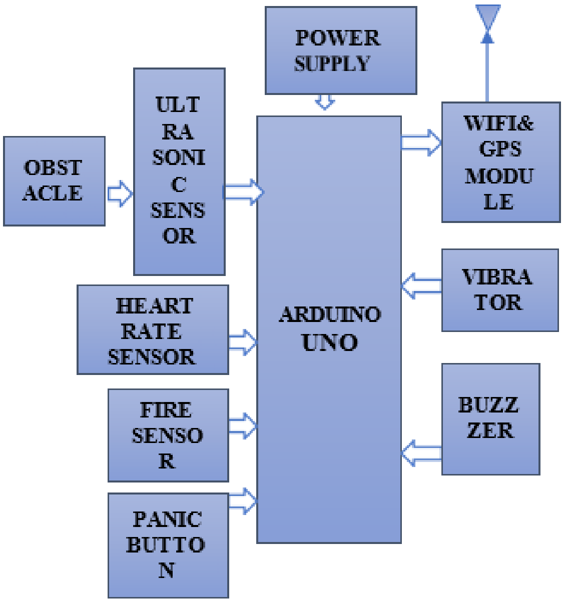

Figure 1: Block diagram of the proposed system

A red led flashes anytime a pulse is recognized by the heart rate sensor module, which employs an infrared led (IR) and a photo transistor to detect the pulse of the finger. On the light side of the finger, there will be a led, and on the opposite side, there will be a photo transistor. When the pulse rate changes, so does the resistance of the photo resistor.

GPS&WIFI modules are used to track the exact location of the blind person and it will send location via SMS to dear ones whose contact details are pre stored.

The Arduino keeps a live radio link with the panic button and is always on the lookout for coded signals. When the panic signal code is received from the remote, the controller activates the buzzer and sends a text message to the designated person.

III. Literature Review

Anisha M R et.al [1], developed a first-generation prototype model of the glove has been created. We were able to devise a workable solution. that will benefit everyone after analysing the difficulties in society. The smart glove can translate gestures into text. The text message can be sent with the movement of fingers. Because crossing busy highway roads is very tough for the visually challenged, they are often restricted to their homes. An obstruction sensor is embedded inside the glove. When something passes in front of the visually challenged person, the buzzer is turned off. The additional feature in the smart gloves is a heart rate sensor. This sensor can be used to measure heart rate of the person.

The elderly and people with heart problems will benefit from this function. Therefore it is easy for them to go for heart checkup. This technology is genuinely unusual in that it merges many sensors into a glove, allowing it to do a variety of functions. The smart glove is simple to operate and will not interfere with a person's daily activities.

N.K. Srivastava and Satyam Singh [2], proposed a document, which tries to address the challenges that visually impaired people experience on a daily basis. A prototype of a hand glove is addressed in this work, with the goal of reducing problems to some extent. Obstacle detection, image to text and subsequently text to voice, and object identification are just a few of the characteristics of this glove that assist blind people in navigating without the assistance of others. Experimental Results confirm its accuracy and show that blind people may utilise it in their daily lives.

Tanay Choudhary, Saurabh Kulkarni and Pradyumna Reddy [3], has suggested an approach, which offers a fresh means of communicating with deafblind people. This device also allows for simultaneous one-to- many broadcasting, which is very handy in a classroom setting. Because of the glove's translation capabilities, it is feasible to communicate with those who do not comprehend Braille. This reduces the requirement for deafblind people to have personal interpreters. As a result, it makes it easier for deafblind people to interact with the rest of society, increasing their independence and, eventually, empowering them. Integration of our text-to-sensory based braille technology with e-books through the development of an app might let deafblind users 'feel' entire volumes, for example.

Although the existing glove is pleasant to wear, reducing its thickness and incorporating changes with new design methodology and stretchy printed circuits makes it very challenging use in future. This technology can do full-duplex real-time transmission and translation. In an experimental study, deafblind persons will be used to assess the system's usability and learning curve.

Oliver Ozioko, William Taube et.al [4], proposed that Deafblind folks can now use a smart tactile communication glove. This simple gadget was created to allow deafblind persons to speak with mobile device users autonomously, allowing them to have more access to information and communication technologies. The smart glove that has been created has the potential to allow this crucial group of individuals to study and play games as well. The gadget can only be used for English alphabets, numerals, and commonly used special characters at the moment.

Future development will include accented and other extra characters, such as Cyrillic and Greek alphabets, as well as appropriate testing of the device with actual end-users. There are also plans to incorporate verbal input and output, as well as the ability to converse with others.

Vidyullatha Akkaraju et.al [5] The Smart Hand for the Blind project's proposed objective is to aid blind persons in walking and estimating distances between obstacles. The Arduino UNO, vibrating motor, and ultrasonic sensor are the main components of this project. Based on the results of the trial, there are a few benefits and drawbacks to this endeavour. The usage of ultrasonic sensors was one of the project's benefits. When it senses obstructions, this sensor is extremely sensitive and will react quickly. Aside from that, the cost of developing this product was modest, and blind individuals could afford it. The ultrasonic sensor utilised in this experiment had a disadvantage in that it could only detect obstructions, not show their shape. Furthermore, this assistive glove is solely for blind persons to utilise.

Devashish Pradeep Khairnar, Rushikesh Balasaheb Karad et.al [6] proposed technology provides an efficient option for assisting those who are visually impaired. The system is more practical and easier to use since it contains various components and a straightforward design. The technology promises to aid visually impaired people by not only detecting but also recognising barriers in their environment and delivering relevant information such as kind and distance from the obstacle. Indoor navigation and live location sharing modules let the user moves through both familiar and unfamiliar interior spaces. The preliminary data show that the system is easy to use, effective, and safe, and that it accomplishes all of the goals for visually impaired persons. The system is simple to use since it receives instructions and responds in an audio format. The suggested system may be improved by making the following key improvements. Training is required for the current indoor navigation system. For an automated location learning and navigation system administrator. Dynamic enhancements to the system are possible. recording regular training for the indoor navigation module other average people's movements Scene in real time Capturing photographs in the area can be used to offer a description.the blind or visually impaired.

D. Devipriya, V. Sushma Sri and Mamatha I [7] For visually challenged people, a smart store assistant has been proposed that would assist them in shopping without the need for human interaction. The three primary problems of where to find the product, the product's identification and acquisition have both been handled. Product Identifier, Smart Glove, and Smart Trolley have all been built, and the prototype has achieved the desired results. The Product Identifier module pinpoints the product's location, and the Smart Glove guides the user in selecting the relevant item. The automatic billing will be handled by the Smart Trolley, and the entire amount will be shown on an LCD screen with audio feedback.

Barbara Salonikidou, Dimitris Savvas et.al [8], developed a wearability, Open source programming, a simple user interface, and a low cost were all factors in the development of the CYCLOPS navigation aid. All of the basic design requirements were exceeded in the first prototype design. The quantitative and qualitative statistics from the assessment trials show that the pilot testers quickly became used to CYCLOPS and that their performance improved as a result improves considerably as they practise more. Multiple ideas for improvements, as well as additional functionality, are included in the data. Future prototypes will be more precise, more integrated, with a user-adjustable detection range, a better audio interface, increased power autonomy, and lower costs. A step counter, data recording, and gesture recognition are also in the works. Christelle Nasrany and Riwa Bou Abdou[9], worked for the major goal of the previously outlined design is to come up with a unique idea that will make it easier for persons with impairments to communicate. The technology was able to convert signals into letters and then construct a voice with the help of a Smartphone. Enhancing the suggested system is a long-term goal that may be accomplished by first addressing the issues that have arisen, and then adding some more features. Auto-correction, for example, may be performed by introducing a new motion that is meant to delete a misspelt letter. Other motions can be utilised to construct sentences or points that are regularly used. To accommodate diverse cultures, the same system might be built using another Alphabet (for example, the Arabic Alphabet). Amiya Kumar Tripathy, Michelle D'Sa, Roweena Alva et.al [10], developed a Finger Braille technology would be a wireless assistive gadget for the visually handicapped, as they have a hard time using mobile phones. The user would have to provide the necessary braille input, which would then be translated to text and shown on the Android smartphone. Sending text messages, choosing contacts, initiating a phone call, launching the browser, and other mobile phone apps would be accessible to the visually handicapped. The android device's output would be read aloud to the blind. This would be extremely beneficial to them since they would be able to utilise a variety of programmes that are totally controlled by braille input, providing a high level of precision. Although this concept is still in its early phases and may not be widely adopted, it is a significant step forward in enabling impaired people with the ability to use and maintain cell phones.

Sambhav Jain, Sushanth D ,Varsha and J V Alamelu [11], The user verbally conveyed the thing they were looking for to the system, which received audio input through the microphone. The extracted keyword is sent into a DNN-based object identification algorithm. Once found, the object must always remain in the middle of the frame in relation to the gloves. The object tracking process begins after the object has been located. The Raspberry Pi is used to perform all of these algorithms. The Raspberry Pi controls the micro-vibrating motors based on the relative distance between the object and the camera. This procedure is repeated until the user arrives to the desired object Integration of a smart glove with a smart cane for obstacle avoidance might be a future project. Additionally, custom models may be taught to recognize other items. DNN can process video frames effectively using microcontrollers with high-performance GPUs.

S Javeed Akthar, M Ramanjaneyulu, P Yuvaraju and S Premkumar[12], This article is an introduction to a disabled person who is having drooling concerns with others. They employed a gadget called Sharon Structure, which would accept information communication from a diversely blessed sender according to his capabilities and office and convert it to lengthy or short limits according to the essentials. A speaker is used to exchange the content with the press of a single key. Looking at a Flowchart is transformed into a conversation with a larger group of observers. The topic of the email was the substance written on the Braille keypads. By using email tactics, the non-weak individual can provide a reasonable response to the externally impaired one in need of a hearing aid. On the Braille display, the in need of a hearing aid outwardly impaired individual analyses the contents of this communication. This allows the almost deaf externally debilitated individual to contemplate the world and gather information on anything of interest.

Areej Alajmi, Sarah Muhammad, Abdulrahman Alkandari and Altaf Alshammari[13], lilypad Arduino was used to create ultrasonic sensor gloves for blind persons. The design is made up of the stoner's right and left gloves. To begin the gloves exercise, the stoner must guide his hand to sense vibrations from the gloves to see whether there are any handicapped things around. When an item is turned on its side, the gloves sound an alert. Furthermore, it sounds an alert whenever any item approaches the stoner. A Lilypad Arduino receives data from an ultrasonic detector about the distance between it and various objects, which processes it and commands vibration motors to produce vibrations in accordance with Lilypad Arduino code. When the object comes close to the stoner, it will activate the vibration motor, which will alarm with nonstop vibration. The Lilypad Arduino sends a vibration motor command to start vibrating intermittently when the object is kept "many" away from the stoner. The Lilypad Arduino will tell a vibration motor to not vibrate if the object is kept down "more" from the stoner. Ultrasonic will return to shooting swells in order to locate things.

Arsh A Ghate, Vishal G and Chavan[14], they implemented the technique to overcome every day-to-day living hurdle so they produced smart gloves for blind people. As a result, they built a complex system known as " Mecca," which includes a variety of capabilities such as GPS shadowing, emergency dialling, and a variety of other options. As much as android operations play an important role in our lives, they cannot be used as a helpful hand for hangouts in emergency scenarios due to comparable themes that cover for the blind.As a result, they employed NFC technology. Near Field Communication is what NFC stands for. After just tapping the smartphone with gloves, you're ready to go. It will assist individuals in emergency scenarios by just tapping their smartphone to their gloves, and family members will get text messages. As a result, NFC will assist them in covering a wide range of situations by just touching the phone to the gloves. Similarly, this assistive glove is intended for those who are blind, not for people who are both blind and deaf. This design's performance can be improved with various enhancements. The NFC Point must be supported by cellphones. As a result, every beginning with a constraint opens new possibilities to investigate farther.

Giuseppe Bernieri, Luca Faramondi and Federica Pascucci [15], this paper presents the prototype of a low cost smart glove to improve the mobility of the visually impaired people. By connecting a PC via USB, the input and output of the smart glove software were gathered. They create a distinct gadget that increases the typical tool's trustworthiness and safety. It is appropriate for visually impaired persons because it allows them to perceive obstacles positioned above the stoner's hipsterism and in the eyeless location on the opposite side of the stick; the tactile input provided by the vibration motors has no effect on handicap avoidance. The algorithm is based on Zero Update to decrease sonar crosstalk and power consumption, extending battery life. The handicap avoidance algorithm can be improved by extensively testing it with visually impaired persons. Navigation in a wide open environment populated by a significant number of people with mobility impairments (e.g., a field, a railway station, etc.) remains a difficulty for these drug addicts. The smart gloves can even be worn with untrained companion dogs to avoid being handicapped by the stoner's hipsterism. Eventually, the information gathered by the glove may be integrated into a landscape map.

E.Punarselvam,Mr.M.Dhamodaran,S.Anandhkumar, P. Dinesh, S.Kaviyarasan3,G.Makesh[16], A research to help visually impaired persons walk more confidently has been proposed in order to benefit them. The research proposes a smart walking glove that alerts visually impaired people to obstacles and pits, allowing them to walk safely. It describes a more advanced navigational gadget for the blind. It comprises of a simple stroll equipped with sensors that provide environmental data. Arduino UNO, vibrator motor, and ultrasonic sensor are the main components of this project. According to the results of the trial, this project offers a few advantages and limitations. The usage of an ultrasonic sensor was one of the challenges' benefits. When it detects obstructions, this sensor used to be quite sensitive and would activate quickly. Aside from that, the expense of developing this mission was modest, and blind individuals could afford it. The problem with this job was that the ultrasonic sensor could only detect the boundaries and not depict their structure. Furthermore, this assistive glove can only be utilized by blind individuals, not deaf or blind people.

Thae Linn, Ali Jwaid, Steve Clark[17], The study's purpose was to provide a mobility aid for those who are blind or visually challenged. A compact system with little or no user training was previously explored. The study's main purpose was to develop a uniform design.This challenge contributes by building a mobility resource that is low cost, light weight, wearable, and washable, and requires little or no user instruction. The difficulty of coverage angle, 15°, was discovered after the assessment method with one ultrasonic sensor. Although another sensor was installed to improve the situation, there was no longer enough time to take additional actions. The magnitude improvement in software development, on the other hand, covered the vibrating motor's energy. To put it another way, the subsequent version enabled the motor to vibrate more as the barrier approached.

Abdulrahman Alkandari, Areej Alajmi, Sarah Muhammad, Altaf Alshammari[18], A plenty of blind humans go through in their very own lives due to the fact of their vision loss. Vision is one of the five important senses in the human body. People with Vision loss have their own disability. This study suggests using the Lilypad Arduino to create Ultrasonic sensors gloves for blind people. It's a solution for the blind and others who don't want to use his stick to get instructions to places and items nearby. The blind will be able to move from one side to the other and from one region to another, as well as desire to assist others in learning about the highs and surrounding items.

Girish Gajanan Mulye[19], People with "blindness" are frequently isolated and pressured to live in a restrained world, as they face serious compound communication problems. This paper introduces a gadget to aid the conversation of blind and people, thus fostering their independence and integration in the society. This paper proposed Advance glove for blind humans using Arduino. That it is a solution for the blind and others who do not want to lift their sticks. Except for the requirement to assist others in inspecting the highs and surrounding items, the blind individual will be able to move from one spot to another and from side to side.

Manuel Caeiro-Rodríguez, Iván Otero-González, Fernando A. Mikic-Fonte and Martín Llamas-Nistal[20], Over the last 40 years, smart gloves have been under development to facilitate human-computer interaction based entirely on hand and finger movement. Despite several dedicated efforts and numerous advancements in adjacent fields, these gadgets have yet to become widespread. New gadgets with accelerated characteristics have emerged in recent years, and they are being employed for research as well. This research examines the three major capabilities of current industrial smart gloves.: (i) Pose estimation and movement tracking for hands and fingers, (ii) kinesthetic feedback, and (iii) sensory feedback The initial contribution of this work is a detailed explanation of the human and finger hand degrees of freedom, followed by an investigation of industrial smart gloves[21-26]. This provides a clear reference for evaluating the available solutions on the market. It also aids in comprehending the many elements and challenges of the various technologies. The review itself is another contribution[27-35]. To the best of our knowledge, this is the first time a review approach like PRISMA has been used to conduct an evaluation of commercial smart gloves. This will make it easier to reproduce the findings in the future and compare them to the current situation. In addition to the commonly diagnosed exoskeleton and fabric, the analysis revealed two additional glove types: strips of fabric and open fingers[35, 36].

IV. CONCLUSION

The goal of the smart glove for the blind project is to assist visually impaired persons in walking and estimating the distance between obstacles. The Arduino UNO, Ultrasonic Sensor HC-SR04, Flame Sensor, Heart Rate Sensor, Global Positioning System (GPS), and Global System for Mobile Communication (GSM) , Regulator, Rechargeable Battery, Buzzer are the main components for this project. Based on the results of the experiment, there area few advantages and limits to this project, which are detailed in the preceding section. The adoption of the ultrasonic sensorHC-SR04 was one of the project's benefits. This sensor was extremely sensitive, and it will identify impediments much faster. Furthermore, the cost of developing this initiative was modest, making it accessible to blind individuals. The ultrasonic sensor utilised in this experiment had a disadvantage in that it could only detect obstructions, not show their shape. Additionally, this assistive glove is solely for blind persons, not the visually impaired or the deaf. This project's performance can be improved with future development.

REFERENCES

[1] Gharieb, W& Nagib, G. (2019). “Smart Cane for Blinds”. In Proc. 9th Int. Conf. on AI Applications (pp. 253-262).
[2] L. Gopan and Aarthi, R., “A vision based DCNN for identify bottle object in indoor environment”, Lecture Notes in Computational Vision and Biomechanics, vol. 28, pp. 447-456, 2018.
[3] Syed Tahir Hussain Rizvi, M. Junaid Asif and Husnain Ashfaq “Visual Impairment Aid Using Haptic And Sound Feedback,”2019 International Conference on Communication, Computing and Digital Systems (C- CODE)
[4] Neven Saleh, Mostafa Farghaly, Eslam Elshaaer, Amr Mousa,”Smart glove-based gestures recognition system forArabic sign language”,Published in: 2020 International Conference on Innovative Trends in Communication andComputer Engineering (ITCE) on 8-9 Feb. 2020
[5] K. D. Kumar and Thangavel, S. K., “Assisting visually challenged person in the library environment”, Lecture Notes in Computational Vision and Biomechanics, vol. 28, pp. 722-733, 2018
[6] De Cillis, F., De Simio, F., Faramondi, L., Inderst, F., Pascucci, F., and Setola, R., “Improving Situational Awareness for First Responders, In Proc. of 9th International Conference on Critical Information Infrastructures Security, 13–15 October 2019.
[7] Fanucci, L., Giusti, D., Iacopetti, F., Leoporini, B., Roncella, R.,Santoro, C., and Scebba, A., “Mobility Aid in Urban Scenariosfor Visually Impaired People,” In Proc. of Assistive Technologyfrom Adapted Equipment to Inclusive Environments, AAATE, 2018.
[8] Faramondi, L., Inderst, F., Panzieri, S., and Pascucci, F., “Hybrid map building for personal indoor navigation systems,” In Proc. Of IEEE/ASME International Conference on Advanced Intelligent Mecha-tronics, AIM, pp.646–651, 8–11 July 2020.
[9] Faramondi, L., Inderst, F., Pascucci, F., Setola, R., and Delprato,U., “An enhanced indoor positioning system for first responders,” InProc. of International Conference on Indoor Positioning and IndoorNavigation, IPIN, 28–31 Oct. 2018.
[10] Faria, J., Lopes, S., Fernandes, H., Martins, P., ad Barroso, J.,“Electronic white cane for blind people navigation assistance,” In Proc.of World Automation Congress, WAC, 19–23 Sept. 2019.
[11] Ivanchenko, V., J. Coughlan, and H. Shen, “Staying in the crosswalk:a system for guiding visually impaired pedestrians at traffic intersec-,” Assistive technology research series, 2018.
[12] Kang, S. J., Young, H., and In, H. M., “Development of an intelligentguide-stick for the blind,” In Proc. of IEEE International Conferenceon Robotics and Automation, ICRA, 2017.
[13] Oliva, G., Panzieri, S., Pascucci, F., and Setola, R., “Network lo-calization by Shadow Edges,” In Proc. of IEEE European Control Conference, ECC, pp.2263–2268, 17–19 July 2018.
[14] Precision Microdrives - Vibration Motors 310-101 https://catalog.precisionmicrodrives.com/order-parts/datasheet/310-113-10mm-vibration-motor-3mm-type.
[15] Scheggi, S., Talarico, A., Prattichizzo, D., “A remote guidance system for blind and visually impaired people via vibrotactile haptic feed-back,” In Proc. of Mediterranean Conf. on Control & Automation, MED, Palermo, Italy, 2019.
[16] WHO global data on visual impairment. https://www.who.int/blindness/ publications/ globaldata/en/ ; 2020
[17] N. Rubini, Prasanthi, C., Subanidha, S., Vamsi, T. N. S., and Jeyakumar, G., “An optimization framework for solving RFID reader placement problem using greedy approach”, in 2017 4th International Conference on Advanced Computing and Communication Systems, ICACCS 2017, 2017, vol. 2017- January, pp. 900-905.
[18] Ravi, Performance of isolated and continuous digit recognition system usingKaldi Toolkit DJ Mahadevaswamy Int. J. Recent Technol. Eng 8, 264-271 2019
[19] Design and analysis of UHF BJT feedback oscillator using linearand non-linear simulation KB Pramod, HV Kumaraswamy, BPP Kumar, C Prathap, M Swamy IEEE Xplore Journal Emerging Trends in Communication, Control, Signal 2013
[20] Voice Controlled IoT Based Grass Cutter Powered by Solar Energy 2021 - books.google.com Mahadevaswamy, Kiran Kumar Hamse K Chethan Sudheesh Advances in VLSI, Signal Processing, Power Electronics, IoT, Communication 2021
[21] Robust Perceptual Wavelet Packet Features for Continuous Kannada Speech Recognition using Kaldi Toolkit DJ Mahadevaswamy Solid State Technology 63 (3), 2412-2427, 2020
[22] Performance Analysis of LP Residual and Correlation Coefficients basedSpeech Seperation Front End, DJ Ravi IEEE Xplore Journal 2017 International Conference on Current Trendsin … 2017
[23] Performance analysis of adaptive wavelet denosing by speech discrimination and thresholding DJ Ravi IEEE Xplore Journal Electrical, Electronics, Communication, Computer and 2016
[24] Peformance analysis of speech enhancement using adaptive waveletthresholding DJ Ravi IEEE Digital Xplore Journal Recent Trends in Electronics, Information …2016
[25] Robust Perceptual Wavelet Packet Features for Recognition of ContinuousKannada Speech DJ Ravi Wireless Personal Communications 121 (3), 1781-1804, 2021
[26] Robust Perceptual Wavelet Packet Features for Recognition of ContinuousKannada Speech M Swamy, DJ Ravi Wireless Personal Communication 2021
[27] Robust Continuous Kannada speech recognition using Kalditoolkit DJ Ravi Materials Today: Proceedings
[28] Providing Natural Language Interface To Database Using ArtificialIntelligence, MSDNAKARKH PoojaINTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH 8 (10), 1074-1078 2019Performance of Isolated and Continuous Digit Recognition System usingKaldi Toolkit Mahadevaswamy International Journal of Recent Technology and Engineering 8 (2S2), 264-2712019

[29] Automatic Garbage Collection using Fire Bird-V Robot Mahadevaswamy International Journal of Engineering Research and Technology 2018

[30] Android based smart Door Locking System with Multitask Mahadevaswamy International Journal of Engineering Research and Technology 2018

[31] Implementation of Advanced Electric Metering and Billing System onArduino using Artificial Neural Networks Mahadevaswamy International Journal of Engineering Research and Technology 2018

[32] Control Mechanism for Gun using Virtual Reality Gear. DJR Mahadevaswamy, Sharath P Patil, Nikhil T, Rahul N V, Sameeksha K Chandra International Journal of Computer Applications: A Proceedings on National 2018

[33] A Pattern Comparision Approach to Speech versus Silence Discrimination as a Preprocessing Front End for Speech Recognition MDJ Ravi Grenze International Journal of Computer Theory and Engineering 2017

[34] A Pattern Comparision Approach to Speech versus Silence Discrimination as a Preprocessing Front End for Speech Recogition Mahadevaswamy Thegreenze, Grenze ID: 02.ICCTEST.2017.1.6 2017

[35] S.K.V. Rao, Kiran, N. Kumar, Mahadevaswamy "System Identification of FIR Filters", Journal of Engineering Research and Sciences, vol. 1, no. 4, pp. 74-80 (2022).