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Smart AI Blind Stick

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***Abstract* - A smart system concept has been devised to give blind people smart technological assistance. It is challenging for those who are blind or visually impaired to navigate their surroundings. Real-time assistance, object detection, and artificial vision are all features of the Raspberry Pi-based system. In this project, we'll utilize the Raspberry Pi to build a smart system with a speaker module, switch, and camera module for blind people. The voice output of the system is managed by TTS (text to speech), and it consists of a speaker module that gets audio feedback. The proposed system recognizes an object in the surrounding environment and provides auditory input, including warning messages delivered through headphones. The system's overall objective is to provide a low-cost, high-efficiency text-to-voice and navigation aid for the blind that gives them a sense of artificial vision by providing data on both static and moving things in their environment.**

Keywords: Artificial vision and object identification, TTS (text to speech), Low-cost, and text-to-voice.

I. INTRODUCTION

Continuous efforts have been made to advance innovation in order to simplify life. Everyone in today's fast-paced world is embracing innovation's advantages, but some segments of society still struggle with it. Among them are those who are physically incapable of traveling alone or engaging in other activities.

This project aims to provide one such successful show that combines the newest technological advancements to provide intelligent and useful electronic assistance to the dazzle. This project shows how to use and implement a voice assistance system for people with disabilities so they don't have to rely on others to get about. This project uses a Raspberry Pi to identify hops using ultrasonic sensors implanted into each glasses and provide audio assistance based on those leaps. In addition to providing vocal support for navigation, Smart Dazzle Stick alerts the speaker or headphones when a user encounters a dangerous situation. The goal's paths should be investigated. They have greater challenges in life. The patient with this illness is still able to move freely and walk. The original stroller bar offers an optional Voice Collaborator.

Here we have a Raspberry Pi, a buzzer, an ultrasonic sensor, and a sound playback module (speaker). Among them might be the Raspberry Pi. Microcontrollers give everything speed, accuracy, and predictability. The distance between the resistance and the rod is measured by the ultrasonic sensor to ascertain the resistance in front of the person. Speakers will help those who are disabled by the outside world reach their objectives through preparation or assistance. A visually impaired individual is someone who, even with blind eyes, finds it difficult to perceive the smallest details. Hyun must assist these people. The World Health Organization (WHO) estimates that 10% of blind people are blind and unable to function freely and securely. These inquiries offer an additional excellent time technique to assist anxious individuals in making critical decisions. Walkers, often known as white canes or canes, and heterosexual dogs with distinct reactions are the astute and unimpressed classes. The ability to see will become vital to the human body. Our eyes are the first line of access to the nuances in our environment. But the majority of these tools are accurate and have limited capabilities. Ultimately, the smart joystick built on a Raspberry Pi is demonstrated as a means of resolving issues and resolving those that already exist. The smart wand combines several sensors and gadgets to enable users to do a wide range of daily tasks and workouts.

What is Raspberry Pi?

The Raspberry Pi Establishment, a UK-based company that creates educational and computing resources, is the name of a line of stand-alone computers known as Raspberry Pi. Since the Raspberry Pi was first released in 2012, many upgrades and variants have also been released. The first Pi included a 700MHz single-core CPU with 256MB of Smash, but the latest model has a quad-core processor with a clock speed of more than 1.5GHz and 4GB of Slam. The Pi Zero costs a reasonable $5, while the Raspberry Pi costs less than $100 (typically about $35). People use Raspberry Pis for a variety of purposes, including learning to code, building projects, home repairs, using Kubernetes clusters and edge

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computing, and even for business purposes. Though it runs Linux and may be incredibly inexpensive, the Raspberry Pi also features a large number of input/output (GPIO) pins that allow you to operate electronic devices for physical computing and Internet of Things research.

What is Machine Learning?

By evaluating large amounts of data using sophisticated computations, machine learning can help uncover hidden designs in IoT data. By using the data gathered in centre forms, machine learning may either supplement or replace manual forms. By leveraging machine learning on the Internet of Things (IoT) to carry out predictive tasks across a broad range of applications, companies are enabling enterprises to absorb cutting-edge information and enhance their operational skills. IoT and machine learning provide information-covered experiences for quicker, automated responses and better decision-making. Through the consumption of images, video, and audio, machine learning for the Internet of Things can be used to predict future patterns, identify inconsistencies, and make significant discoveries. By using IoT machine learning, you can:

- Information processing and formatting into a trustworthy format.
- Build models for machine learning.
- Install these machine learning models on the edge, cloud, and keyboard.

II. LITERATURE REVIEW

2.1) T. Rubesh Kumar, C. Purnima "Assistive System for Object Detection with Voice Output For Blind Users" International Journal of Research in Engineering & Advanced Technology 2014.

T. Rubesh Kumar proposed navigation is obviously essential in today's society. Objects are everywhere in the surrounding. There are already a few systems that have some promise for portable use, but they cannot handle product detection. But a big limitation is that it is very hard for blind users to find the position of the object where it is placed. T. Rubesh Kumar, C. Purnima have proposed a camera-based assistive Object detection framework to help blind persons to recognize objects in their daily lives. Main contributions embodied in this prototype system are: A novel motion-based algorithm to solve the aiming problem for blind users by their simply shaking the object of interest for a brief period. A portable camera-based assistive framework to aid blind persons reading text from hand-held objects.

2.2) Pooja Sharma, Mrs. Shimi S. L and Dr. S.Chatterji, "Design of microcontroller based virtual eye for the blind" International Journal of Scientific Research Engineering Technology, 2014.

Pooja Sharma proposed Blindness is a state of lacking the visual perception due to physiological or neurological factors. In this proposed work by Pooja Sharma, Mrs. Shimi S. L. and Dr. S. Chatterji, a simple, cheap, friendly user, virtual eye will be designed and implemented to improve the mobility of both blind and visually impaired people in a specific area. The proposed work includes a wearable equipment consists of head hat, mini hand stick and foot shoes to help the blind person to navigate alone safely and to avoid any obstacles that may be encountered, whether fixed or mobile, to prevent any possible accident. The main component of this system is the ultrasonic sensor which is used to scan a predetermined area around blind by emitting reflecting waves. The reflected signals received from the barrier objects are used as inputs to Arduino microcontroller. The microcontroller carries out the issued commands and then communicate the status of a given appliance or device back to the earphones using Raspberry pi speech synthesizer. The proposed system is cheap, fast, and easy to use and an innovative affordable solution to blind and visually impaired people in third world countries.

2.3) Anusha Bhargava, Karthik V. Nath, Pritish Sachdeva and Monil Samel "Reading Assistant for the Visually Impaired" International Journal of Current Engineering and Technology, 2015.

Anusha Bhargavaetal proposed Majority of the visually impaired use White cane for their navigation. This gives rise to the need for the development of devices that could bring relief to the agonizing tasks that the visually impaired has to go through says Anusha Bhargava, Karthik V. Nath, Pritish Sachdeva and Monil Samel. This project aims to study the image recognition technology with speech synthesis and to develop a cost effective, user friendly image to speech conversion system with help of Raspberry Pi. The project has a small inbuilt camera that scans the object, converts it to audio format using a synthesized voice for detecting objects. Not only does this save time and energy, but also makes life better for the visually impaired as it increases their independency.

2.4) Nagaraja L, Nithin D, Nagarjun R S, Veena S Murthy, Nishanth M Anand "Online Blind Assistive System using Object Recognition" Year: 2019.

Nagaraja L proposed that this work implemented using python and when run gives an accurate decision for object detection and classification, while DNN give accurate results. The problem is with its family of networks regarding speed; it provided very slow results for 5 FPS on a GPU. They have come up with unique text localization formula which works on

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models of edge distributions and stroke orientation. Problems related to traffic signal detection and identification has been overcome using video stream in Matlab. Visuals are provided for blind person by object detection and its identification. The focus in this paper is on the Object detection and the recognition.

2.5) Mallapa D. Gurav, Shruti S. Salimath, Shruti B. Hatti, Vijayalaxmi I. Byakod , "B-LIGHT: A detecting aid for the Blind People using YOLO and OpenCV" International Journal of Scientific Research Engineering & Technology (IJSRET 2017).

Mallapa D. Gurav et al proposed that, this project presents a smart device that assists the visually impaired which effectively and efficiently detects objects. The proposed project uses the methodology of a camera based assistive device that can be used by people to recognize obstacles. The framework is on implementing image capturing technique in an embedded system based on Raspberry Pi board. The proposed fully integrated system has a camera as an input device to feed the clicked images for digitization and the scanned image is processed by a software module the YOLO (You Only Look Once engine). You Only Look Once (YOLO) is the identification of obstacles using photoelectric devices and computer software. It coverts images of objects into machine encoded text. In this research these images are converted into audio output. YOLO is used in machine process such as cognitive computing, machine translation, text to speech, key data and text mining. The recognition process is done using YOLO the character code in files are processed using Raspberry Pi device on which it recognizes objects using python programming and audio.

2.6) A. Hanah, R. Farook, S. J. Elias, M. R. A. Rejab, M. F. M. Fadzil and Z. Husin, "IoT Room Control and Monitoring System Using Rasberry Pi," 2019 4th International Conference and Workshops on Recent Advances and Innovations in Engineering (ICRAIE), Kedah, Malaysia, 2019.

This project describes a room control and monitoring system using Internet of Things (IoT). It aims to help the user specifically the elderly to monitor their room automatically wirelessly though mobile application. This project using Raspberry Pi 3 Model B to communicate with Firebase cloud platform and mobile application developed using Android Studio. The system accumulates the temperature, humidity and gas surrounding the room and executes the output to the actuator to act and the sensors data are stored into the database. In mobile application, user can login to view the real-time sensors data with date and time. The system will turn on the fan when the temperature is hot; the gas alert system is activated when there is gas leakage occurs by notifying the user through cellular network and light is turned on when there is human motion detected. The user able to use via mobile application to send command to control the room devices. An alert notification is sent to the user mobile application when the system detects a big difference between previous and current sensors data.

2.7) N. S. Sanjay and A. Ahmadinia, "MobileNet-Tiny: A Deep Neural Network-Based Real-Time Object Detection for Rasberry Pi," 2019 18th IEEE International Conference On Machine Learning And Applications (ICMLA), Boca Raton, FL, USA, 2019.

In this paper, we present new neural network architecture, MobileNet-Tiny that can be used to harness the power of GPU based real-time object detection in raspberry-pi and also in devices with the absence of a GPU and limited graphic processing capabilities such as mobile phones, laptops, etc. MobileNet-Tiny trained on COCO dataset running on a non-Gpu laptop dell XPS 13, achieves an accuracy of 19.0 mAP and a speed of 19.4 FPS which is 3 times as fast as MobileNetV2, and when running on a raspberry pi, it achieves a speed of 4.5 FPS which is up to 7 times faster than MobileNetV2. MobileNet-Tiny was modeled to offer a compact, quick, and well-balanced object detection solution to a variety of GPU restricted devices.

2.8) S. R. Kawale, S. Mallikarjun, D. G. V, K. D. V. Prasad, A. M N and A. K. N, "Smart Voice Navigation and Object Perception for Individuals with Visual Impairments," 2023 7th International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), Kirtipur, Nepal, 2023.

Technological advancements have brought about substantial changes to the accessibility alternatives that cater to those with diverse abilities. The integration of artificial intelligence (AI) into assistive technology has presented unprecedented opportunities for enhancing the autonomy and quality of life of those with disabilities. The focus of rigorous investigation is on "Smart Blind Sticks," which are novel equipment designed to enhance the mobility and safety of those with visual impairments. This article presents a comprehensive account of the conceptualization, design, and implementation of a technologically advanced blind stick. The primary objective of this innovative device is to detect and promptly respond to impediments in the immediate environment, hence facilitating navigation for those with vision impairments. The proposed system utilizes advanced sensor technologies and advanced data processing techniques to provide precise obstacle detection. Moreover, it employs state-of-the-art navigation systems to provide instantaneous

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guidance, guaranteeing seamless and secure transportation at all instances. The distinguishing characteristics of the smart blind stick set it apart from conventional white canes, hence affording its users more mobility. Experimental evidence showcases the practical use of this approach, therefore emphasizing its capacity to significantly enhance accessibility and promote autonomy among individuals with visual impairments.

2.9) L. Thomas, T. K. L and S. K. H. R, "Artificial Intelligence for Face recognition and Assistance for Visually Impaired," 2023 5th International Conference on Energy, Power and Environment: Towards Flexible Green Energy Technologies (ICEPE), Shillong, India.

In this world, many people are affected by blindness and they face so many difficulties in their daily life. According to World Health Organization (WHO), there are approximately 2.2 billion people who are completely blind. They need to depend on primitive solutions like white canes, trained dogs, or other people. But these helping hands cannot always assist them. The affected people need a smart assisting device that avoids bumping into an obstacle and helps in navigating from one place to another independently. This proposed work describes the smart walking stick which makes blind people walk safely. By using the latest technologies and IoT devices, this smart walking stick can be developed where it provides safe navigation to the user. The proposed system employs a novel solution for navigation in indoor with the help of deep learning algorithms. In case of panic situations or emergency conditions, the predefined message with the user's location will be sent to the caretaker using an API. This smart walking stick is affordable, durable and provides more convenience to the user to walk safely, and gives more confidence without depending on any other externals.

2.10) Wang, "A Body Measurement Method Based on the Ultrasonic Sensor," 2018 IEEE International Conference on Computer and Communication Engineering Technology (CCET), Beijing, China, 2018.

To realize the automatic measurement and improve the efficiency of the body measurement in the garment customization, we propose a body measurement method based on the ultrasonic sensor. The novel measurement structure and method are proposed to achieve the accurate bust, waist, and hip (BWH) information. First, the depth information is measured by the ultrasonic sensor arrays. The sensors should capture the front and back depth of the key body parts, the depth information and the certain position of sensors can generate the space coordinates. Second, the space coordinates are fitted with the quantic function to generate the curves. Third, the front curve, back curve, and the estimated parameter constitute the finial BWH data. Experimental results indicate that the proposed method can achieve accuracy of 95.6%.

III. PROBLEM STATEMENT

A smart navigation system for visually impaired people that makes obstacle detection easier for blind people. By using object detection and identification, this technology enables blind people to travel on their own. Software that converts text to speech is used to notify users of objects that are discovered.

IV. OBJECTIVES

The significant impact that the creation of a Smart Blind AI Stick promises for visually impaired folks worldwide is driving this transformative adventure. It is more than just a technological advancement; it is a ray of hope that brings safety and independence. This project pushes the envelope of disability and promotes equality of opportunity and inclusivity. By developing such a tool, we not only advance assistive technology but also make a strong statement about the boundless potential of innovation. It is evidence of our dedication to turning obstacles into chances and creating a more promising and approachable future for all people, irrespective of their visual impairments.

V. SYSTEM DESIGN

The central processing unit is a Raspberry Pi, which provides a small and affordable option for the design. The General Purpose Input/Output (GPIO) pins allow for the easy management of input and offer flexible connectivity to a variety of devices, such as switches, LEDs, and ultrasonic sensors. The Raspberry Pi 3 Model B+, which was selected, runs on a micro SD card and requires a 5V power source for effective data storage. Its flexibility and connectivity possibilities are enhanced by its hardware features, which include an Ethernet port, four USB ports, an HDMI port, and an audio jack.

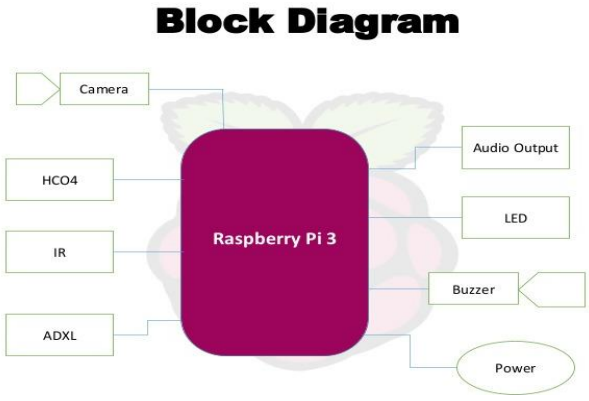

Figure 1: Block Diagram

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In order to interface with ultrasonic sensors and enable precise and instantaneous obstacle detection, the GPIO pins are essential. The 700MHz single-core processor of the Raspberry Pi makes sure that algorithms run quickly. With support for Python, Java, C, and C++ among other programming languages, the Raspberry Pi offers a flexible platform that may be used to build sophisticated features.

In order to augment its functionality even more, an Ethernet port is employed for internet access, which makes it easier to install the necessary driver APIs. This connectivity makes it possible for the system to obtain necessary resources, such as extra software and driver updates. Utilizing information from linked sensors, the Raspberry Pi algorithm plays a key role in determining the distances between barriers.

The creative addition of a text-to-speech (TTS) driver API increases usability and accessibility. The obstacle detection system produces distance data, which this API translates into voice. The user then receives the real-time, synthesized speech through earphones, giving them a seamless, instantaneous knowledge of their surroundings. Using an integrated approach, a comprehensive and intuitive smart stick system for efficient navigation and obstacle awareness is created by utilizing the capabilities of the Raspberry Pi.

VI. PROPOSED SYSTEM

A) Import the given image from dataset

Using Keras' pre-processing picture data generator function, we must import our data set and generate the size, rescale, range, zoom range, and horizontal flip functions. Next, we use the data generator method to import our image dataset from the folder. Here, we set the parameters for the train, test, and validation phases as well as the target size, batch size, and class mode. We then use this function to train our own network by adding CNN layers.

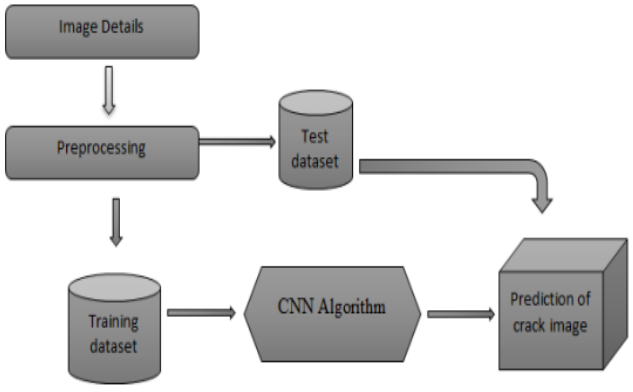

Figure 2: System Architecture

B) To train the module by given image dataset

With the help of a classifier, fit generator function, training steps for each epoch, the total number of epochs, validation data, and validation steps, we are able to train our dataset.

C) Working process of layers in CNN model

Convolutional neural networks, or CNNs, are a type of deep learning technique that can recognize different characteristics of an input image and assign weights and biases to them based on training. Compared to alternative classification techniques, ConvNet necessitates significantly less pre-processing. Primitive techniques require hand-engineered filters, but with sufficient training, ConvNets may learn these filters and properties. The architecture of a ConvNet was impacted by the configuration of the Visual Cortex and is akin to the patterns of connections between neurons. Only alterations in the receptive Field, a very small area of the visual field, cause individual neurons to fire. Each of the four levels in their network comprises 1,024 input units, 256 in the first hidden layer, 8 in the concealed layer, and 2 output units.

Input Layer: CNN's input layer holds picture data. Three-dimensional matrices are used to represent image data. It must be rearranged into a single column. A photograph that is 28 × 28 = 784 in size needs to be transformed to 784 x 1 before it can be entered.

Convo Layer: Since the convolution layer extracts features from the image, it is often referred to as the feature extractor layer. A portion of the image is first linked to the Convo layer, which performs the convolution process described earlier and calculates the dot product between the filter and the receptive field, a local area of the input image that is the same size as the filters. The output volume of the process is represented by a single integer. Next, repeat the technique by applying a Stride filter over the subsequent receptive field of the identical input image. Until the entire image has been processed, it will carry out this process again. The output will be the input for the next layer.

Pooling Layer: A pooling layer is used to reduce the physical volume of the input image after convolution. It is used in between two convolution layers. Applying FC after the Convo layer without adding pooling or max pooling will need a lot of processing power. Therefore, using maximum pooling is the sole method to reduce the geographic volume of the input image. Max pooling was used in a grayscale slice with a Stride of 2. It detects that the 4 x 4 input is reducing to a 2 by 2 size.

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Fully Connected Layer (FC): Within the completely linked layer are neurons, weights, and biases. It establishes connections between neurons in different layers. People have learned how to classify photos into several groups by using it.

Softmax / Logistic Layer: The last layer of CNN is called Softmax. It is located at the base of the FC layer. Softmax is used for multi-classification, while logistic is used for binary classification algorithms.

Output Layer: The output layer stores the label as one-hot encrypted data. You now comprehend CNN quite well.

D) Classification

The first step in the analysis of video streams is called Moving Object Extraction, during which the system identifies and isolates objects that are in motion. This is a crucial step since it sets up the tasks of analysis and recognition that come after. Background subtraction, a method that distinguishes moving objects from the static background by identifying regions of notable change between successive video frames, is one often used strategy in this step. The system may efficiently filter out unnecessary information and focus just on the items of interest by isolating these dynamic aspects.

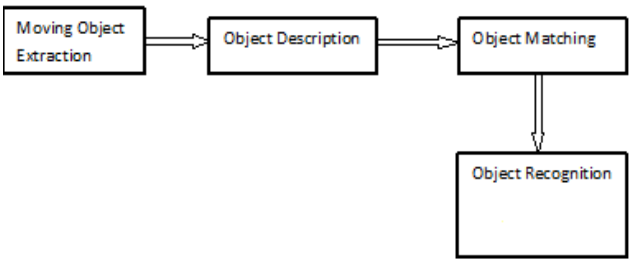


Figure 3: Classification

The system moves on to the Object Description stage after extracting the moving items. Here, each retrieved object's properties and attributes are painstakingly described by the system. Aspects like size, form, colour, and even motion patterns can be included in these attributes. The system learns a great deal about the look and behaviour of the objects by carefully examining these attributes, which helps with subsequent tasks like recognition and classification.

The retrieved objects are compared to a database of known items in the Object Matching step of the process, which comes after the Object Description stage. Determining the identity or category of each object requires this matching process. The system can determine the likely identify of the objects by comparing their attributes from the extracted objects with those stored in the database. This allows for more precise object recognition and categorization.

In the final stage, called Object Recognition, the system uses the comprehensive object descriptions and the matching results to give class labels to the objects. The system classifies the items into predetermined classes like "car," "pedestrian," or "bicycle" by using complex algorithms and pattern recognition techniques.

VII. RESULT AND DISCUSSIONS

As living standards have improved, we have become so materialistic that we have forgotten about the strong lives led by those with physical disabilities. They experience tiresome, indifferent treatment from others because they are physically hindered. They became, in a sense, subservient to others for their daily schedule of tasks. People who are blind or disabled consistently rely on others to complete their daily tasks. The eyes are a tried-and-true tool for seeing and sensing the outside world; damage to such a vital sense organ actually affects the outside world's capacity to perceive data.

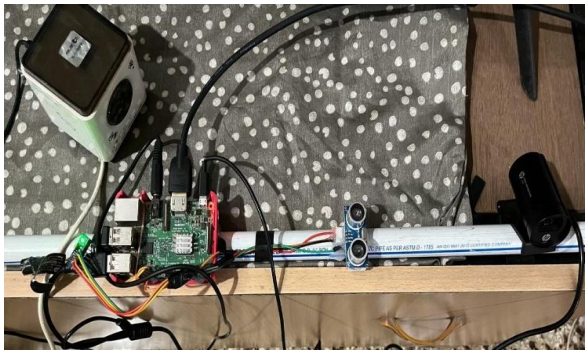
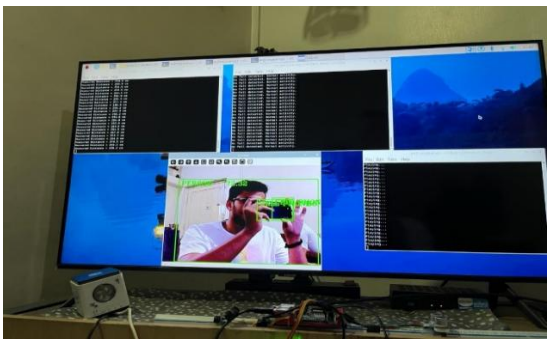


Figure 4: Proposed Hardware

As a result, getting about in such an environment can be an exceptionally difficult task because confused individuals are unable to rely on their sight and so encounter a variety of difficulties. This will assist them in overcoming their obstacles. The framework was tested in an actual setting. We have positioned bumps and deterrents in multiple locations to gather data for both ultrasonic sensors. We have measurements for the removal of the obstruction at 50, 100, 150, 200, and 300 centimetres.



(a)

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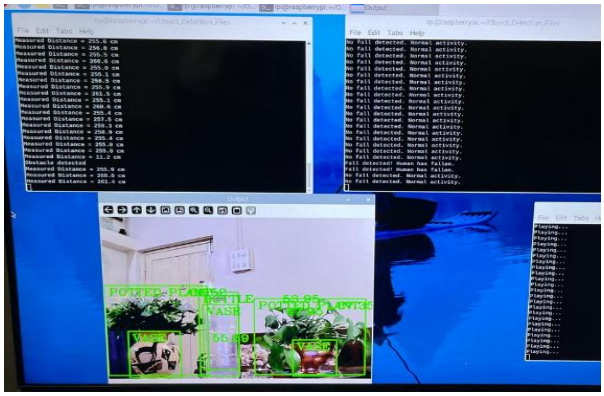
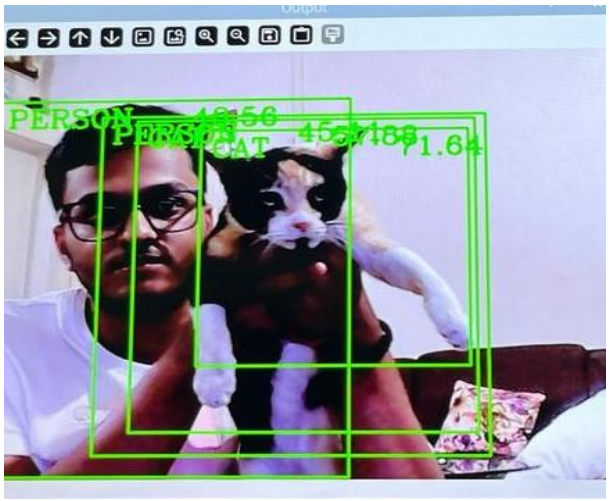


(b)



(c)

Figure 5 (a)(b)(c): Result of Hardware

VIII. CONCLUSION

This analysis provided a description of an ideal system for scanning hand-held objects and written communications to assist the blind. We have projected a completely unique text localization method supported by models of stroke orientation and edge distributions in order to recover text regions from sophisticated backgrounds. The associated feature maps calculate the text's global structural feature at each element. Block patterns create a feature vector by projecting the projected feature maps of an image patch. To determine potential candidates for text patches ready for text classification, a neighbouring character grouping is used. Text in footage captured by cameras is localized using the Associate Ada boost learning model. Using the localized text regions, OCR is used to recognize words and convert them into audio output for visually impaired users. The camera provides input for the paper throughout this analysis.

The camera begins to stream because the Raspberry Pi board has a lot of power. On the screen of the victimization interface application, the streaming data is being presented. To supply an image to the board, the capture button is clicked once the object for text reading is positioned ahead of the camera. Maltreatment the Tesseract library is responsible for converting the image into data and displaying the data that is extracted from the image on the standing bar. The collected data are beginning to be expressed through.

REFERENCES

[1] M.P. Arakeri, N.S. Keerthana, M. Madhura, A. Sankar, T. Munnavar, "Assistive Technology for the Visually Impaired Using Computer Vision", International Conference on Advances in and Informatics (ICACCI), Bangalore, India, pp. 1725.

[2] Yadav Avanish, Vijaybahadur Sanket Saheb Verma and Deepak Dinesh Singh, "Virtual Assistant for blind people", International Journal, vol. 6, no. 5, 2021.

[3] James Kirkpatrick, Razvan Pascanu, Neil Rabinowitz, Joel Veness, Guillaume Desjardins, Andrei A Rusu, Kieran Milan, John Quan, Claudia Clopath, Dharshan Kumaran and Raia Hadsell. Overcoming catastrophic for getting in neural networks. In Proceedings of the National Academy of Sciences, volume114, pages 3521–3526, 2017.

[4] X. Zhu, Y. Xiong, J. Dai, L. Yuan, and Y. Wei. Deep feature flow for video recognition. InCVPR, 2017.

[5] B. Jacob, S. Kligys, B. Chen, M. Zhu, M. Tang, A.Howard,H. Adam, and D. Kalenichenko. Quantization and training of neural networks for efficient integer arithmetic-only inference, InCVPR, 2018.

[6] M. Liu, M. Zhu, and Y. Li. Tensorflow mobile video objectdetection. https://github.com/tensorflow/models/tree /master/research/lstm object detection, 2018.

[7] M. Liu, M. Zhu, and Y. Li. Tensorflow mobile video object detection. https://github.com/tensorflow/models /tree /master/research/lstmobjectdetection, 2018.

[8] M Anandan, M Manikandan, and T Karthick. 2020. Advanced Indoor and Outdoor Navigation System for Blind People Using Raspberry-Pi. Journal of Internet Technology 21, 1 (2020), 183—195.

[9] N. Loganathan, K. Lakshmi, N. Chandrasekaran, S. R. Cibisakaravarthi, R. H. Priyanga and K. H. Varthini, "Smart Stick for Blind People", 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS).

[10] T. Uhm, H. Park and J. I. Park, "Fully vision-based automatic human body measurement system for apparel application", Measurement, vol. 61, pp. 169-179, 2015.

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