IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 5, May 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105281 |

Object Detection and Recognition Using Deep Learning for Blind People

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ABSTRACT: Physical disability has troubled many populations lives across the world. One of these restrictions that powerfully stirred some abundant classification of nation is Ocular loss. Blind folk frequently face troubles in moving about freely in the way that on street they frequently rely on utilizing sure aid maneuvers to reach certain places. There are continuous scientific researches on improving eye sightlessness but it has to go long. Also, Experts are researching the plans of assisting the blind community. This Research paper aims at helping blind people of all types to obtain their day-to-day- tasks smooth through the use of these smart device.The goal of the proposed project was to create a camera-equipped Device that would enable blind or otherwise visually impaired persons to read anything they want using modern OCR. Text-to-speech (TTS) engines and (optical character recognition) technology. Any type of documents, including books, magazines, and mobile devices, can be viewed by the suggested smart reader. Even those with poor vision or blindness can use this unique device. The earlier iteration of the proposed idea was successfully produced with mobile reader, but it had certain problems including expensive cost because an Android mobile was required, not user friendly, and inappropriate focusing. In this study, a cost-effective and more effective reader with camera is presented to address these drawbacks. This system's objective was to identify any text from a difficult image, like a blurry or low-quality photo. Google Translate is one of the applications that has used this technique.

KEYWORDS: Raspberry Pi, Pi camera, Python, Smart reader, Text-to-speech, Ultrasonic sensor

I. INTRODUCTION

According to WHO figures from 2011 [1], there are approximately 285 million visually impaired people in the world, of whom 39 million are blind and 246 have limited vision. Almost 90% of visually impaired people live in low-income environments, whereas in the United States, 82 percent of blind people are 50 or older. The majority of the 102 blinds in the world are currently found in India. Almost 15 million of the 37 million blind persons globally are from India. The worst part is that 75% of these cases involve preventable blindness. There is a severe lack of donated eyes for the treatment of corneal blindness in India as well as optometrists. India barely has 8,000 optometrists while having a requirement for 40,000. For those with specific needs, there are universities and special schools. There are several levels of need, and not all levels necessitate specific facilities and educational institutions. For instance, if given the chance, individuals with vision impairments can study alongside typical students. Because there are not many special schools for individuals with special needs, and because the majority of them are private and expensive, the majority of blind people and persons with visual problems did not attend school. Instead, they studied at home, learning the basics from their parents [2].

Typically, blind persons are dependent on the help of others. Assistance may come from people, dogs, or certain electronic equipment. There are currently numerous tools available to assist the blind in walking. The most typical is a straightforward cane or walking staff. By sweeping the cane back and forth, the blind man uses it to detect impediments, although occasionally he discovers them after they have already passed [3]. The typical walking cane has been transformed into a blind stick with an ultrasonic sensor attached. Thanks to current technological advancements. It has a number of drawbacks. As a result, the proposed solution in this research is an affordable, dependable, sturdy, and portable technology that enables blind people to navigate urban environments. For those who are blind or visually impaired, a variety of learning tools are now being created using artificial intelligence techniques [3-5]. Yet, the majority of them are not economical [4]. Each reading aid can also be used to read a particular application. The reading assistance on a personal computer (PC) is inappropriate for reading book materials [5].

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However, not all reading aids are user-friendly, inexpensive, and small in size. Even though there are many different kinds of reading aids, they cannot be utilized to read multiple texts that are displayed on mobile, computer, newspaper, or printed material screens. Moreover, diverse fonts, colors, scales, and orientations are not supported by the current methodologies [6].Thus, to address the aforementioned. So, our study attempted to create smart reading glasses for blind and visually impaired people in order to overcome the aforementioned drawbacks. In our project, the reader's spectacles are equipped with a micro camera that captures the text image to be read, converts it to text once again, and then uses a text-to-speech engine to turn it into audio. The major goal of this project is to meet the demands of persons who are blind in reading and browsing documents, computers, and mobile devices. This show can also be recommended to regular individuals who are travelling. So, reading a lot of pages while travelling might be distracting and tiresome. This suggested idea can be made available in a small and economical size.

II. RELATED WORK

Text detection and recognition have been a challenging issue in different computer vision fields. It has been difficult to detect and recognize text in various computer vision applications. Several academic publications have covered various approaches and algorithms for removing text from photos. This literature review's main goal is to examine some of these techniques' efficacy in terms of accuracy rates [7]. Learning growth made use of the well-known framework for the train to achieve high accuracy of the text and character detection and recognition modules in end-to-end text recognition using the strength of neural network paired with the new unsupervised feature [8]. Simple techniques have been used to integrate these two models to create a complete text recognition system.
ICDAR 2003 and SVT data sets are the ones that were utilized. A cropped character from the first data set was correctly classified 83.9 percent of the time using the 62-way character classifier method. The system for new scene text identification heavily relied on machine learning techniques. In order to increase accuracy, two different types of classifiers have been built [9]. The first was created to generate candidates, while the second was created to filter out candidates that are not text. An innovative method has been created to benefit from information coming from multiple channels. This study employed the ICDAR 2005 and ICDAR 2011 data sets. Significant results have been obtained using this strategy in a variety of evaluation regimens [10]. This system's objective was to identify any text from a difficult image, like a blurry or low-quality photo. Google Translate is one of the applications that has used this technique.

III. PROPOSED ALGORITHM

A. Block Diagram

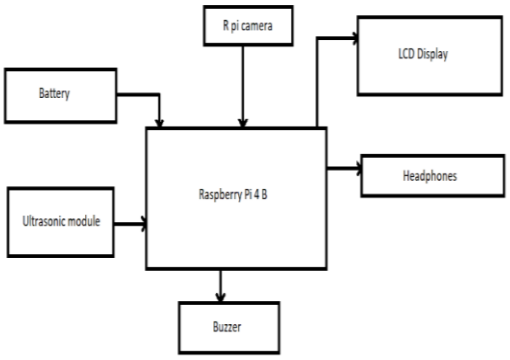

Figure represents the block diagram of reading proficiency device. A 5V power supply is provided to the device. The main component is raspberry pi 4 B, which is connected to the R pi camera and ultrasonic sensor.The RPi camera used for capturing the image which provides image input to the raspberry pi and ultrasonic sensor for object detection and the user gets the output through buzzer. The data received from R pi camera is converted to audio file and gives the output through the headphones.The LCD display is used to display the text which is captured by the R pi camera and also displays the distance between the obstacles and the device.

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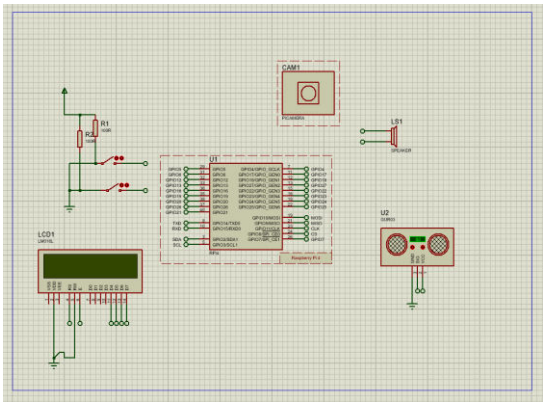
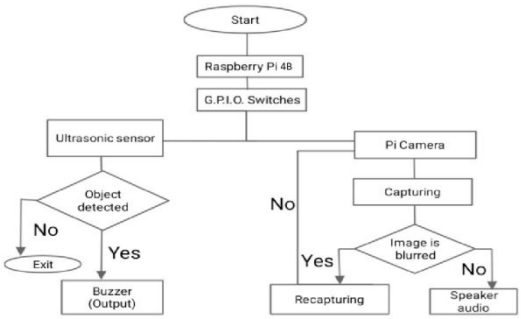
B. Circuit Diagram



C. Flowchart

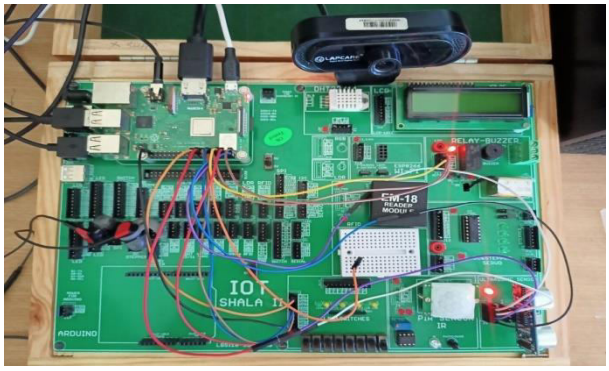


The reading proficiency device is used for conversion of text image to speech and for the object detection using ultrasonic sensor. Basically, this device works in two modes –

- Text to Speech conversion
- Object detection

When the raspberry starts then the user gets to select two modes i.e., object detection or text to speech conversion. If the user chooses the object detection mode using GPIO Switches then if the device detects any obstacles, it gives an audio output through buzzer. The second mode is text to speech conversion in this there are three tasks, first the image gets captured using RPi Camera then it checks whether the image is blur or cleared. If the image is blur then there will no text to speech conversion and it will not provide any output. If the image is cleared it converts image in the text format and finally it will provide an audio output.

D. Prototype Design:



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IV. PSEUDO CODE

1. Start the program.

2. Read the state of switch 1.
3. If switch 1 is turned on:
a. Set the device to ultrasonic sensor mode.
b. Perform the necessary actions for ultrasonic sensor mode.

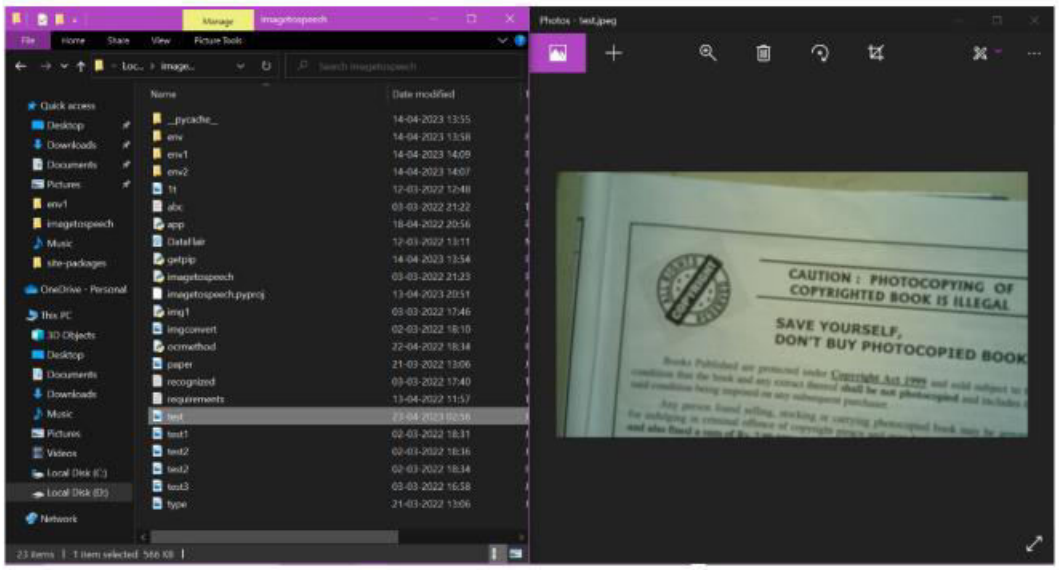
4. Read the state of switch 2.

5. If switch 2 is turned on:
a. Set the device to image capture mode.
b. Perform the necessary actions for image capture mode.
c. Read the state of switch 3.

6. If switch 2 is on and switch 3 is turned on:
a. Capture an image.
b. Convert the image to text.
c. Convert the text to speech.
d. Output the speech.
7. End the program.

V. SIMULATION RESULTS

- For mode 1, the Ultrasonic-sensormeasures thedistance between the obstacle and the device. At a perticular distance the buzzer gets activated, which gives an audio output.
- For Mode2, the image is captured using camera and is converted to a text file.
- Below is the image which is captured by camera and stored in the test file of the project
- The image which is stored is converted into a text file and then converted into audio output.
- Here the image is captured and converted successfully converted into audio output.



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CONCLUSION AND FUTURE WORK

The future scope for the Raspberry Pi-based reading proficiency device with two modes is vast and has the potential to revolutionize the way we approach literacy education. Some potential areas for improvement and expansion include:

1. Integration of artificial intelligence: The device can be enhanced with machine learning and AI capabilities to improve its accuracy and performance over time. By analyzing user data and adapting to their unique needs and preferences, the device can provide a more personalized and effective learning experience.
2. Expansion of language support: The device can be programmed to recognize and convert text from multiple languages, making it a valuable resource for individuals who are learning a new language or struggling with language barriers.
3. Expansion of object detection capabilities: The device can be equipped with additional sensors, such as cameras or infrared sensors, to enhance its object detection capabilities. This can enable it to detect and recognize a wider range of objects, including colors and shapes, and provide more detailed feedback

The future scope for the Raspberry Pi-based reading proficiency device with two modes is vast, and continued innovation and development can have a significant impact on literacy education. By making reading proficiency more accessible and enjoyable, we can empower individuals with the skills and knowledge they need to succeed in life.
In conclusion, the Raspberry Pi-based reading proficiency device with two modes - text to speech conversion and object detection can provide a comprehensive solution to support individuals with reading difficulties.

The first mode, which converts printed text from images to speech, can significantly improve reading comprehension and fluency. It can also be useful for those learning a new language or struggling with specific vocabulary. The device's affordability and accessibility make it an attractive option for individuals in both developed and developing countries.The second mode, which uses an ultrasonic sensor to detect objects, can provide additional support to individuals with visual impairments or other disabilities. It can help them navigate their surroundings and increase their independence.Overall, this device has the potential to make a significant impact on the lives of individuals with reading difficulties or disabilities. By combining both text to speech conversion and object detection capabilities, the device can provide a comprehensive solution that addresses multiple needs at once.

REFERENCES

[1] Sharang Sharma, Manind Gupta, Amit Kumar, ;Meenakshi Tripathi, Manoj Singh Gaur; “Multiple Distance Sensors Based Smart Stick for Visually Impaired
People”, IEEE 7th Annual Computing and Communication Workshop and
Conference (CCWC); 2017; pp:- 255-262

[2] Piyush Rane, Priyanka Ambawane, Devshree Bharatia; “Smart Electronic Stick for Visually Impaired using Android Application and Google’s Cloud Vision” IEEE, 2019, pp:- 1-6

[3] Wan-Jung Chang, Liang-Bi Chen, Ming-Che Chen, Jian-Ping Su, Cheng-You Sie, and Ching-Hsiang Yang; “Design and Implementation of an Intelligent Assistive System for Visually Impaired People for Aerial Obstacle Avoidance and Fall Detection”, IEEE SENSORS JOURNAL; 2020, pp:-1558-1748

[4] U. Sairam, Charitha Tuniki, Vanitha Kunta, “Multi-Functional Blind Stick for Impaired People”, IEEE Conference Record # 48766, 2020 ;pp-895-899

[5] Arunarani. M, Keerthika. B, Sivapalanirajan. M, Lavanya Narayani.T, Ananthi. M ; “Design of Smart Cane with integrated camera module for visually impaired people", International Conference on Artificial Intelligence and Smart Systems(ICAIS); 2021, pp:- 999-1004

[6] Chirayu Asati, Nitika Meena, M. Felix Orlando, “Development of an Intelligent Cane for Visually Impaired Human”, 28th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), 2019, pp:- 72-78

[7] Malti Bansal, Saurabh Malik, Mohit Kumar, Nikita Meena,“Arduino based Smart Walking Cane for Visually Impaired People”, Fourth International Conference on Inventive Systems and Control (ICISC), 2020, pp:- 462-465

[8] Muhammad Jawad Ghafoor, Muhammad Junaid, Arslan Ali, “Nav-Cane A Smart Cane for Visually Impaired People”, International Symposium on Recent Advances in Electrical Engineering (RAEE), 2019, pp:- 134-138

[9] Jinqiang Bai, Shiguo Lian, Member, Zhaoxiang Liu, Kai Wang, Dijun Liu, “Smart Guiding Glasses for Visually Impaired People in Indoor Environment”, Transactions on Consumer Electronics (TCE), 2017, pp:- 258-268

[10] T.S. Aravinth, “WiFi and Bluetooth based Smart Stick for Guiding Blind People”, 3rd International Conference on Intelligent Sustainable Systems (ICISS), 2020, pp:- 317-320

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[11] Nur Syazreen Ahmad Lai Boon and Patrick Goh, "Multi-sensor Obstacle Detection System via Model-based State-Feedback Control in Smart Cane Design for the Visually challenged" , IEEE Access (Volume: 6), 2018, pp:- 1-12

[12] Priyanka Ambawane, Devshree Bharatia and Piyush Rane, "Smart e-stick for Visually Impaired using Video Intelligence API", IEEE Bombay Section Signature Conference (IBSSC), 2019, pp:- 1-6

[13] Roy ABI ZEID DAOU, Jeffrey CHEHADE, Georgio ABOU HAYDAR, Ali HAYEK, Josef BOERCSOEK and Jose Javier Serrano OLMEDO, "Design and Implementation of Smart Shoes for Blind and Visually Impaired People for More Secure Movements", 32nd International Conference on Microelectronics (ICM), 2020, pp:- 67-71

[14] Himanshu Sharma, Meenakshi Tripathi, Amit Kumar and Manoj Singh G, "Embedded Assistive Stick for Visually Impaired persons'', 9th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2018, pp:- 55-61

[15] Lavanya Narayani.T, Sivapalanirajan. M, Keerthika. B, Ananthi. M and Arunarani. M, "Design of Smart Cane with integrated camera module for visually impaired people", International Conference on Artificial Intelligence and Smart Systems (ICAIS), 2021, pp:- 999-1004

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Impact Factor: 8.379

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ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

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