*Journal of Science and Technology*
*ISSN: 2456-5660 Volume 06, Issue 03, MAY-JUNE 2021*

*www.jst.org.in* *DOI: https://doi.org/10.46243/jst.2021.v6.i03.pp172-179*

# TTS-BASED AI-BASED ASSISTANCE FOR VISUALLY IMPAIRED PEOPLE (TEXT TO SPEECH)

***Dr.P.ADITYA, B.CHANDRANSH, MITTAL, A.RAJEEV, PRANEETH***
*Department Of ECE*
*Ellenki College Of Engineering And Technology, Ts, India.*

***ABSTRACT***
***In today's society, living alone is necessary for everyone, but it can be difficult for individuals with vision impairments. A person with a visual impairment cannot perceive or feel their surroundings. In order to function independently, these persons require particular resources. It became easier to keep them in their daily lives as technology advanced, such as mobile connections and artificial intelligence. To provide a workaround for people with visual problems, we're using artificial intelligence, picture recognition, and navigation. Our project is carried out by utilising a Raspberry Pi to build a PI camera that guides them using TTS, a GPS module, and the internet.***

# 1. INTRODUCTION

When it comes to connecting to printed text, visually impaired people report a variety of issues with current technologies, including accuracy, mobility, and performance. We create clever technology that enables vision-impaired people to read printed information correctly and efficiently. In the intended experiment, citizens would use a camera-based help approach to read text documents. The frame is equipped with an embedded device designed on the Raspberry Pi board, as well as an on-board and ultrasonic sensor, to assess the item's distance.

**DEFINITION OF THE PROBLEM AND A WORK PLAN**

The following experiment needs the design of a device that takes visual data from a pi monitor mounted on a person with a vision impairment's shoulder brace. The graphic data is sent to the Raspberry Pi microcontroller, which measures the visual text information in its aural format using artificial intelligence. Obstacles will be identified utilising an Ultra-Sonic sensor that operates in a range of 8-10 cm at shoulder height. The capacity to sense risks close by allows the user to flee in their own direction. A GPS device put on the Raspberry Pi board sends the user's location while the API is executing. When a request letter is sent by the maintainer, the Wi-Fi is turned on.

# 3. APPLICATION OF THE METHODOLOGY:

The framework was broken down into modules, each of which reflected the system's distinct purposes. As the organisation grows, this strategy will be simple to add into the device troubleshooting procedure. Furthermore, the components must be merged to form the entire operating system, in addition to device maintenance and stability. The process includes project definition, simulation, material gathering, Python application development, programme testing, device integration, and verification.

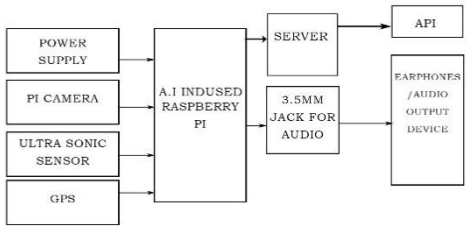



***Figure 1: Block Diagram***

# 1. EXPERIMENTAL SETUP

Figure 1 displays the machine block diagram. We also built an experimental setup utilizing different hardware modules. This setup tests the proximity and perception of the setting with A.I and produces an audio performance. We address briefly the hardware modules in the installation in the following segments.

| | |
|---|---|
| Microprocessor | Broadcom BCM2837 64bit Quad Core Processor |
| Processor Operating Voltage | 3.3V |
| Raw Voltage input | 5V, 2A power source |
| Maximum current through each I/O pin | 16mA |
| Maximum total current drawn from all I/O pins | 54mA |
| Flash Memory (Operating System) | 16Gbytes SSD memory card |
| Internal RAM | 1Gbytes DDR2 |
| Clock Frequency | 1.2GHz |

**4. Hardware Modules**

## A.RASPBERRY PI 3 MODEL B+:

The Raspberry Pi 3 B+ is the most recent iteration of the Raspberry Pi 3 series, and it uses a BCM2837B0 Cortex-A53 (ARMv8) CPU with a 1.4GHz clock speed on a 64-bit SoC. IEEE 802.11b/g/s/ac cellular LAN networking at 2.4GHz and 5GHz. Bluetooth 4.2 and Bluetooth Low Energy (BLE) models (Bluetooth low energy). IEEE 802.11b/g/n/ac (IEEE 802.11b/g/n/ac) The on-board standard for internet connectivity is Wireless LAN. An extra 40 pins are added to the GPIO entry pins header. The audio video performance of the present full-size HDMI generation is available for quality output. There are four USB 2.0 connections for connecting to the outside world. Connection to the Raspberry Pi camera using the CSI camera port. Touchscreen connection through the DSI monitor port on the Raspberry Pi. Composite camera port with 4-pole stereo output You can load and save your operating system using the Micro SD slot. DC control entry 5V/2.5A Assistance with control over Ethernet (PoE) (requires separate PoE HAT).

I choose ARDUINO UNO for the following reasons:

Low-cost (about $35)

On a small board, there's a lot of computing power.

There are a variety of interfaces to choose from (HDMI, multiple USB, Ethernet, onboard Wi-Fi and Bluetooth, many GPIOs, USB powered, etc.)

Python is a valuable tool on Linux (making it easy to build applications)

Examples have been made public with the help of the community.

-Developing such an embedded board would be both costly and time intensive.

- 
- 
- 

***Figure 2:Raspberry Pi 3 Model B+***

**Table 1: RASPBERY PI 3 TECHNICAL SPECIFICATION**

**B. POWER SUPPLY:**

A power supply is an electrical device that produces and delivers a charge of electricity.
A power supply's principal job is to transform energy from a source into the voltage, power, and frequency needed to power the cargo.
An energy input connects one or more power output connections with one or more power supplies, which accept electricity from a source and provide electricity to the load.

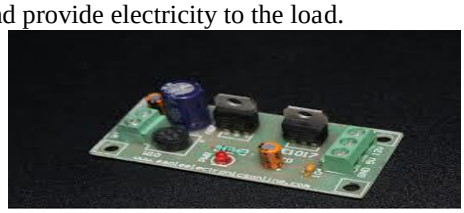


***Figure 3:Power supply***

**C. PI CAMERA:**

The Raspberry Pi Camera v2 is the Raspberry Pi Foundation's most recent official camera board.
The Raspberry Pi Camera Module v2 is a custom-designed, high-resolution 8-megapixel Sony IMX219 image sensor with fixed focus lenses for the Raspberry Pi.
The Raspberry Pi camera module can capture both video and still images in high resolution. It's easy to use for newcomers, but it has a lot to offer experienced users who want to learn more. On the internet, there are a number of videos demonstrating people utilising it in time, slow motion, and other visual effects. Our libraries can also be used to generate camera effects.

The module has a 5-metric, fixed-focus sensor that can record in 1080p30, 720p60, and VGA90 video formats, as well as silences if you're performing nitty-gritty. It's connected to the Raspberry Pi's CSI port via a 15cm ribbon cable. Many third-party libraries, such as the Pi-camera Python library, are designed to access it using the MMAL and V4L APIs.

The camera module is widely used in home security systems and wildlife camera traps.

***Figure 4: Pi camera***

**D. HC-SR04 ULTRASONIC SENSOR:**

Ultrasonic transducers are sensors that fall into three categories: transmitters, receivers, and transceivers. Electrical signals are converted into ultrasounds by transmitters, receivers, and transceivers, and ultrasounds are transmitted and received by transceivers. Ultrasound transducers, like radar and sonar transducers, are frequently used in applications that analyse reflected signals to locate targets. The time between transmitting a signal and getting an echo, for example, can be used to calculate the distance between two entities. Transducer configuration varies widely depending on their intended use; those employed for diagnostic purposes, such as the range-finding applications discussed earlier, are often less successful than those used to change the

properties of the liquid medium or achieve the liquid medium's aims (e.g. erosive).


***Figure 5: HC-SR04 ULTRASONIC SENSOR***

**HARDWARESETUP**

The below figure shows the full hardware setup of the system.

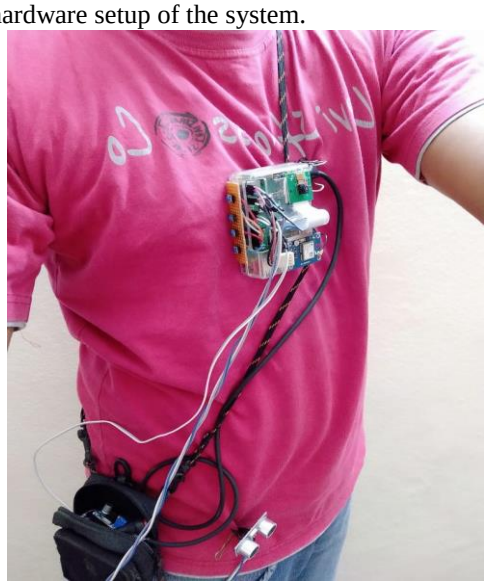
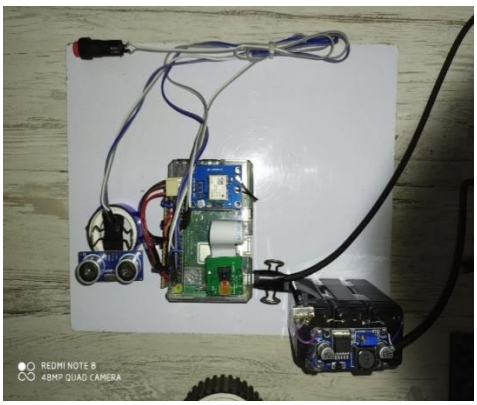


***Figure 7: Implementation of Hardware Setup***



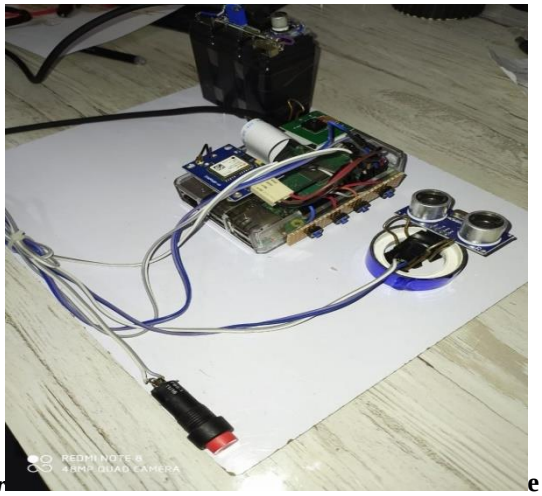


***Figure 8: Hardware Setup***

# 5. ALGORITHM AND FLOWCHART

**A. Algorithm:**

• The Raspberry Pi initialises the libraries for the pi microphone, ultrasonic sensor, GPS module, and Espeak before turning on the power; once all of the libraries are initialised, the ultrasonic sensor begins detecting the area in range. • When a sensor detects something within its range, the information is sent to the Espeak controller for distance measurement and data storage.

• There are two methods for employing the strategy. If the button is not pressed, the mechanism returns to the ultrasonic sensor for distance control.

• When the button is pressed, the Raspberry Pi's camera is engaged, and the image is processed by the AI.

• The GPS device sends the server its location.

• The processed.jpg file from the camera has been converted to an Espeak text file.

• Espeak turns this text file into its audio equivalent, which the customer can listen to..

**B. Flowchart:**

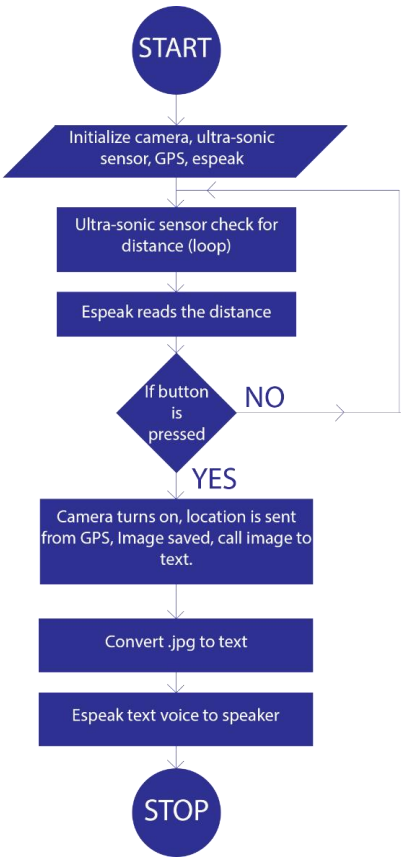



***Figure 9: Flow Chart***

# ADVANTAGES AND LIMITATIONS

A. **ADVANTAGES:**

1. The most notable benefit is that it identifies text and gives voice for persons who are blind or visually challenged.

2. It allows those with vision impairments to see items before they injure them.

3.The device's GPS technology makes it simple to determine the user's current location using a mobile device API.

4. Now that A.I. is a part of this project, data computations are easier and more effective.

B. LIMITATIONS:

1.People with visual impairments use a screen reader to read computer content to them. correct meaning of a word is not always grasped, especially when it comes to medical terminology, etc.

# 6. PERSPECTIVE ON THE FUTURE

Our present work shows that the technique we've devised is extremely effective in the home. This method is significantly better than prior attempts, and I planned to make some additional adjustments as part of my work. GPRS technology will be used to convert the device into a web-based control system in the future, allowing consumers to view the system remotely via the Internet. To monitor the entire area, a new feature will be added. Sensors such as a barometer, an air quality control system, a gas detector, and a web interface might be combined into a single device that estimates not only temperature and humidity, but also all other parameters.

# 7. CONCLUSION

Individuals with eyesight impairments frequently require it. It can be used by those with visual impairments to quickly interpret text without the need for help. This is something you'll keep doing to comprehend text on the iPad, books, and other surfaces. Individuals who are visually handicapped can only read material in the same way as regular people using this strategy.

Display readers employ a machine's sounding voice, which is quite boring for others. Some businesses are attempting to develop voice synthesisers that can mimic how humans read a text, such as accurate intonation, but I feel they are still a long way from their aims, despite significant advances in recent years.

**REFRENCES**

***[1]HongguangXu,FamingLi,ChunyuChen,Xianhong Dong. NOKIA mobile phone LCD module LPH7366 principle and its application. Foreign electronic components. pp 5557,2004.***

***[2] Dong, Wei, et al. "Mosaic: Towards city scale sensing with mobile sensor networks." Parallel and Distributed Systems (ICPADS), 2015 IEEE 21st International Conference on. IEEE, 2015.***

***[3] Patel, Riki H., Arpan Desai, and Trushit Upadhyaya. "A discussion on electrically small antenna property." Microwave and Optical Technology Letters 57.10 (2015): 2386-2388.***

***[4] David, Chavez M., et al. "A low-cost, rapid-deployment and energy-autonomous wireless sensor network for air quality monitoring." Sensing Technology (ICST), 2015 9th***
***International Conference on. IEEE, 2015.***

***[5] Upadhyaya TK, Kosta S, Jyoti R, Palandoken M; Negative refractive index material-inspired 90-deg electrically tilted ultra wideband resonator. Opt. Eng. 0001;53(10):107104. doi:10.1117/1.OE.53.10.107104.***

***[6] Shanko, Eriola J., and Michalis G. Papoutsidakis. "Real time health monitoring and wireless transmission: A µController application to improve human medical needs." E-Health and Bioengineering Conference (EHB), 2013. IEEE, 2013.***

***[7] Upadhyaya, T.K., Kosta, S.P., Jyoti, R. and Palandöken, M., 2016. Novel stacked µ-negative material-loaded antenna for satellite applications. International Journal of Microwave and Wireless Technologies, 8(2), pp.229-235.***

***[8] Patel, Riki H., et al. "Design of S-Shape GPS Application Electrically Small Antenna." World Academy of Science, Engineering and Technology, International Journal of Electrical, Computer, Energetic, Electronic and Communication Engineering 9.4 (2015): 480-483.***

***[9] UNO, ARDUINO. "DEVELOPMENT OF ROBOTIC ARM USING."***

***[10] Bacci, C., et al. "Preliminary Result of Frascati (ADONE) on the Nature of a New 3.1-GeV Particle Produced in e+ e− Annihilation." Physical Review Letters 33.23 (1974): 1408.***

***[11] Dalsania, Piyush, et al. "Analysis of multiband behaviour on square patch fractal antenna." Communication Systems and Network Technologies (CSNT), 2012 International Conference on. IEEE, 2012.***

***[12] Salford, Leif G., et al. "Nerve cell damage in mammalian brain after exposure to microwaves from GSM mobile phones." Environmental health perspectives111.7 (2003): 881.***

***[13] Upadhyaya, TrushitK.etal. "Miniaturization of tri band patch antenna using metamaterials." Computational Intelligence and Communication Networks (CICN), 2012 Fourth International Conference on. IEEE, 2012.***

***[14] Kosta, Shiv Prasad, et al. "Human blood-based electronic transistor." International Journal of medical engineering and informatics 4.4 (2012): 373-386.***

***[15] Riki H patel, arpan H Desai, Trushit Upadhyaya; "Design of H-Shape X-Band Application Electrically Small***
***Antenna", International Journal of Electrical Electronics and***
***Data Communication (IJEEDC), Volume-3, Issue-12. Pp 1-4, 2015 IRAJ DOI Number –IJEEDC-TRAJ- DOI-3486***

***[16] Markovà, Eva, et al. "Microwaves from GSM mobile telephones affect 53BP1 and γ-H2AX foci in human lymphocytes from hypersensitive and healthy persons." Environmental health perspectives 113.9 (2005): 1172.***

***[17] Patel, Riki H., Hardik Modi, and Vrunda S. Patel. "Mobile Effect on Human Body." (2015).***

***Mortazavi, S. M. J., et al. "Increased radioresistance to lethal doses of gamma rays in mice and rats after exposure to microwave radiation emitted by a GSM mobile phone simulator." Dose-response 11.2 (2013): dose-response.***

***[18] Ultrasonic Transducers: Materials and Design for Sensors, Actuators and Medical Applications.***

***[19] Piezoelectric Transducers and Applications.***

***[20] Westerveld, Wouter J (2014). Silicon photonic micro-ring resonators to sense strain and ultrasound (Ph.D.). Delft University of Technolo***
***gy.***

***[21] S.M. Leinders, W.J. Westerveld, J. Pozo, P.L.M.J. van Neer, B. Snyder, P. O'Brien, H.P. Urbach, N. de Jong, and M.D. Verweij (2015). "A sensitive optical micro-machined ultrasound sensor (OMUS) based on a silicon photonic ring resonator on an acoustical membrane"***

***[22] Gibbs, Samuel (18 February 2015). "Raspberry Pi becomes best-selling British computer". The Guardian. Retrieved 28 December 2016.***
***[23] Cellan-Jones, Rory (5 May 2011). "A£15 computer to inspire young programmers". BBC News.***