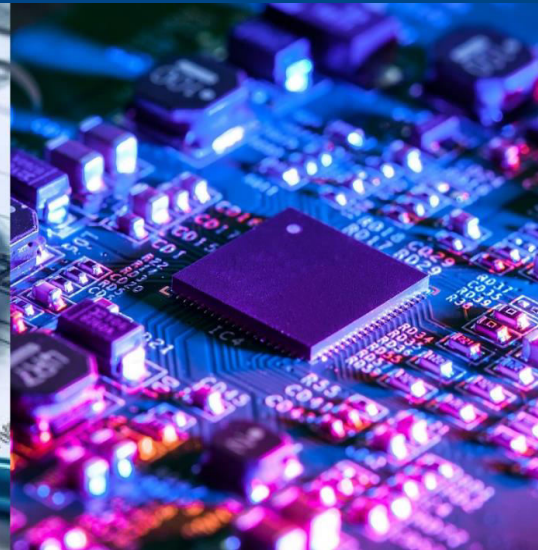
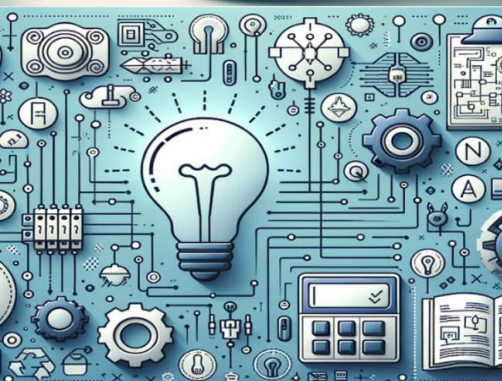




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Smart Assisting System for Blind Person

Prof. Prof K.R Sakpal, Monali Sukinda Narute, Varsha Namdev Kadbane, Chaitali Rajaram Gore,
Shravani Vilas Walhekar

Department of Electronics and Telecommunication, Navasahyadri Education Society's Group of Institutes, College of
Engineering, Naigaon, Pune, Maharashtra, India

ABSTRACT: This paper presents a smart assistive system designed for visually impaired individuals, combining Optical Character Recognition (OCR), a voice-controlled virtual assistant, and home automation technology. Using a Raspberry Pi as the central controller, the system enables document reading, appliance control, and access to essential information through voice commands. OCR technology, paired with Google Text-to-Speech (GTTS), reads printed text aloud. Google Assistant offers personal assistance with daily tasks such as checking emails, weather, and news, while home automation is controlled via Python and voice inputs. A Reed switch-based door sensor enhances safety. The proposed system provides a cost-effective, voice-driven solution to enhance independence and quality of life for visually impaired users.

KEYWORDS: Raspberry Pi, OCR, GTTS, Google Assistant, Home Automation, Voice Commands, Reed Switch, Visual Impairment, Assistive Technology

I. INTRODUCTION

Secure mobility and autonomy remain significant challenges for visually impaired individuals. Navigating unfamiliar environments, reading printed documents, and managing household appliances independently often present difficulties, leading to frustration, dependency, and reduced quality of life.

This project aims to address these concerns through a comprehensive system that integrates three main technologies—Optical Character Recognition (OCR), a Google-based virtual assistant, and home automation—powered by a Raspberry Pi. OCR reads physical text using a camera module and converts it into speech via GTTS. The personal assistant uses the Google Voice Hat and Google API to perform routine tasks. Home automation enables users to control appliances using voice commands. A Reed switch-based door sensor adds a layer of safety.

By combining these functionalities, the proposed system serves as a smart assistant for blind individuals, helping them read, control their environment, and access digital services without physical interaction.

II. PROBLEM STATEMENT

Visually impaired individuals face multiple challenges:

- Inability to read printed materials
- Dependency on others for operating household appliances
- Limited access to virtual assistance for daily needs
- Safety concerns regarding home environment

This paper addresses these problems by integrating OCR, virtual assistance, and home automation into a single, voice-controlled smart device.

III. OBJECTIVES

- To develop a system that reads printed text aloud using OCR and GTTS
- To integrate a Google-based virtual assistant for daily task assistance
- To enable voice-based home automation for increased independence
- To ensure safety using a door sensor (Reed switch)



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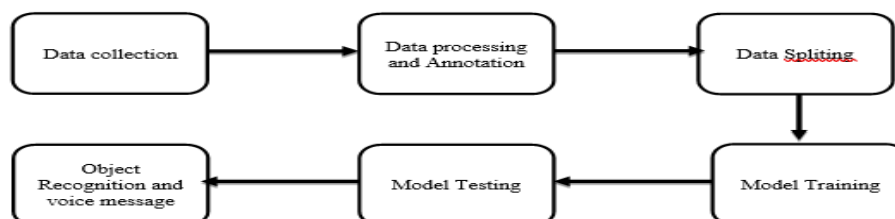
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IV. LITERATURE REVIEW

Numerous works have been published on assistive technologies for the blind.

- Text-to-Speech for the Blind (Kumar et al., 2021) explored converting text into speech using OCR tools.
- Home Automation Using Voice Command (Sharma & Rajan, 2022) described controlling appliances via Google Assistant.
- Google Assistant Based Personal Assistant (Iqbal et al., 2020) integrated Google APIs for assistance services.
- However, few systems combine all three technologies (OCR, personal assistant, and home automation) into one portable device. This paper addresses this gap.

V. SYSTEM ARCHITECTURE



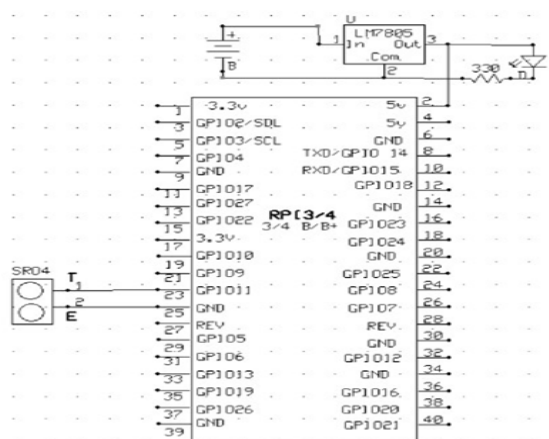
5.1 Hardware Components

- Raspberry Pi 4 Model B
- Camera Module (for OCR)
- Microphone and Speaker (Voice input/output)
- Google Voice Hat
- Relay Module (for appliance control)
- Reed Switch (door sensor)
- Wi-Fi Module

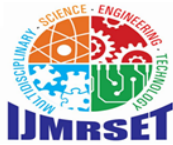
5.2 Software Components

- Python
- Google Text-to-Speech (GTTS)
- Google Assistant SDK
- OpenCV (for image processing)
- OCR Engine (Tesseract)

CIRCUIT DIAGRAM



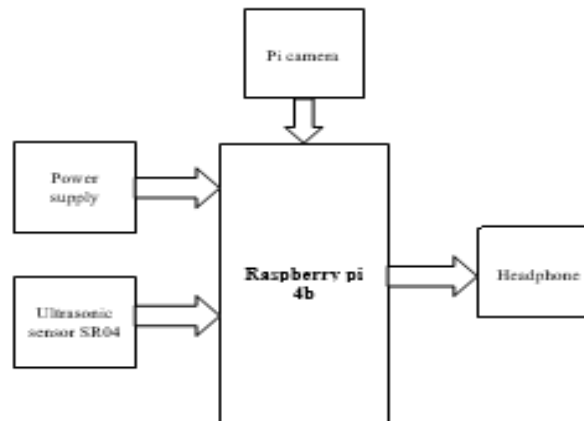
BLOCK DIAGRAM



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BLOCK DIAGRAM



VI. WORKING METHODOLOGY

- OCR Module**
 - Captures printed text using camera
 - Processes text using OpenCV and Tesseract
 - Converts recognized text to speech using GTTS
- Google Assistant Integration**
 - Activated via voice command
 - Provides responses to tasks like reading mail, weather updates, etc.
- Home Automation**
 - Voice command triggers relays using Raspberry Pi GPIO pins
 - Appliances like lights, fans controlled through voice
- Safety Sensor (Reed Switch)**
 - Detects door status (open/close)
 - Sends alert or takes action when needed

VII. RESULTS AND DISCUSSION

7.1 Test Scenarios

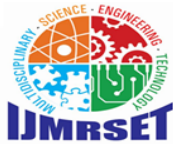
Test Case	Input	Expected Output	Result
OCR Text Reading	Printed document	Audio speech	Pass
Google Assistant Query	"What's the weather?"	Weather info spoken	Pass
Appliance Control	"Turn on fan"	Fan switched on	Pass
Door Status	Door open	Alert triggered	Pass

7.2 Observations

- The OCR module shows 85–90% text accuracy
- Assistant responds in less than 2 seconds
- Appliance control is real-time and reliable
- The door sensor effectively enhances home security

VIII. ADVANTAGES

- Assists visually impaired in reading and interacting with the environment
- Fully voice-controlled, requiring no physical contact
- Real-time response and multi-functional



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- Cost-effective and portable solution

IX. DISADVANTAGES

- OCR accuracy may reduce under poor lighting
- Requires internet connectivity for Google Assistant
- Limited appliance control range based on relay capacity

X. CONCLUSION AND FUTURE SCOPE

10.1 Conclusion

This project demonstrates a powerful and accessible assistive system for the visually impaired. By merging OCR, Google Assistant, and home automation, the system supports reading, communication, and independent living. It fosters inclusivity and enhances quality of life through voice-enabled interaction.

10.2 Future Scope

- Integration of AI for better contextual responses
- Use of LiDAR or ultrasonic sensors for obstacle detection
- Expansion to mobile app version
- Multi-language support for OCR and GTTS

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