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Sensor Based Shopping Assistance System for PWDs

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ABSTRACT: A Shopping assistance system for PWDs aims to enhance the shopping experience for visually impaired shoppers by providing real-time navigation assistance, product identification, and interactive shopping features. The NodeMCU server is the central controller, coordinating data exchange between the ultrasonic sensor for obstacle detection, the LCD for presenting information, and the voice playback speaker for auditory feedback. Through IoT connectivity, the trolley communicates with a central server to access product databases, store user preferences, and assist blind people throughout their shopping.

KEYWORDS: IoT, Smart Shopping, Product Identification, Assistance System, Ultrasonic Sensor.

I.INTRODUCTION

The concept envisions a world where shopping is a seamless and empowering experience for people with visual impairments. This is the driving force behind the Shopping Assistance System designed specifically for Persons with Disabilities (PWDs). Through the innovative use of technology, this system aims to completely revolutionize how visually impaired individuals navigate stores, identify products, and engage in interactive shopping. Enhancing the shopping experience for visually impaired individuals is not just a matter of convenience, but a fundamental step towards inclusivity in our society. One such pioneering initiative is the development of a Shopping Assistance System tailored specifically for visually impaired shoppers. By integrating ultrasonic sensors, LCDs, and voice playback speakers, the NodeMCU provides real-time navigation assistance and auditory feedback, effectively making the shopping journey more accessible and enjoyable.

II.OBJECTIVES

The objective of the described Shopping Assistance System for Persons with Disabilities (PwDs) is to significantly improve the shopping experience for visually impaired individuals by offering comprehensive assistance throughout their shopping journey. This assistance includes real-time navigation guidance, accurate product identification, and interactive features to facilitate independent and confident shopping. This system, centered around the NodeMCU microcontroller, seamlessly integrates various components such as ultrasonic sensors, LCD, and voice playback speakers to provide essential feedback and information to the user. Leveraging IoT connectivity, the system enables communication between the shopping trolley and a central server, granting access to product databases. The Shopping Assistance System for PwDs leverages advanced technology to empower visually impaired individuals, offering real-time navigation guidance and product identification for an independent and confident shopping experience.

III. LITERATURE SURVEY

The Shopping experience for visually impaired individuals often relies on various methods for assistance, each with its own limitations. Human assistance, while helpful, may not always be readily available and can compromise privacy. Braille labels on select products offer some assistance, yet they are limited in availability and may not cover the entire store's range. Several mobile apps provide audio guidance and barcode scanning features, but reliance on smartphones can be cumbersome, requiring internet connectivity. To address these challenges comprehensively, a Shopping Assistance System leveraging IoT technology has emerged. Centralized around a NodeMCU, this system provides real-time navigation assistance, product identification, and interactive shopping features. Through IoT connectivity, the trolley communicates with a central server, accessing product databases and user preferences to assist visually impaired shoppers throughout their shopping journey.

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Kowshika S et al.,2021 [1], present an innovative solution for enhancing the shopping experience through the integration of Internet of Things (IoT) technology. The authors introduce the concept of a Smart Cart designed to streamline the shopping process by incorporating IoT capabilities for bill generation, alongside a mobile cart application for added convenience. By leveraging IoT, the Smart Cart aims to optimize the checkout process and provide shoppers with real-time access to their shopping lists and bills. However, despite its promising features, the author also acknowledges potential drawbacks, including inconvenience for customers and obstacles that may arise during the shopping process. Through a comprehensive exploration of both the benefits and challenges, this publication offers valuable insights into the evolving landscape of smart retail solutions and the ongoing quest for improved customer experience.

Pradeepkumar G et al.,2023 [2], introduced an innovative approach to revolutionize the traditional shopping experience through the shopping cart equipped with IoT capabilities, allowing customers to conveniently view the price of each item in their cart in real-time. Additionally, the accompanying mobile application facilitates a seamless payment option, enabling customers to pay either through the app or at the register before making their purchases. Despite this challenge, the publication provides valuable insights into leveraging IoT and mobile technology to enhance the shopping journey, highlighting opportunities for innovation and improvement in retail environments.

S.K Shankar et al.,2021 [3], introduced an innovative solution to revolutionize the shopping experience through the integration of Internet of Things (IoT) Technology. The author presents a smart trolley equipped with an advanced billing system aimed at simplifying and securing the checkout process while eliminating the need to wait in long queues. By leveraging IoT capabilities, the trolley automates the billing process, allowing customers to conveniently complete their purchases without the hassle of traditional checkout procedures. Despite this challenge, the publication offers valuable insights into the benefits of IoT-enabled smart shopping solutions, paving the way for enhanced efficiency and convenience in retail environments.

IV.EXISTING SYSTEM

The shopping experience for visually impaired individuals often relies on various methods for assistance, each with its limitations. Human assistance, while helpful, may not always be readily available and can compromise privacy. Braille labels on select products offer some assistance, yet they are limited in availability and may not cover the entire store's range. Several mobile apps provide audio guidance and barcode scanning features, but reliance on smartphones can be cumbersome, requiring internet connectivity.

To address these challenges comprehensively, a Shopping Assistance System leveraging IoT technology has emerged. Centralized around a NodeMCU, this system provides real-time navigation assistance, product identification, and interactive shopping features. Through IoT connectivity, the trolley communicates with a central server, accessing product databases and user preferences to assist visually impaired shoppers throughout their shopping journey.

V. METHODOLOGY

A. Hardware Assembly:

The hardware assembly for the shopping assistance system includes the NodeMCU as the central controller, coordinating data exchange between various peripherals. An ultrasonic sensor detects obstacles, an LCD display presents visual information, and a voice playback speaker provides auditory feedback. IoT connectivity enables communication with A central server, allowing access to product databases and user preferences. All components are interfaced with the NodeMCU, which processes data from the sensor and manages IoT connectivity, ensuring seamless assistance for visually impaired shoppers.

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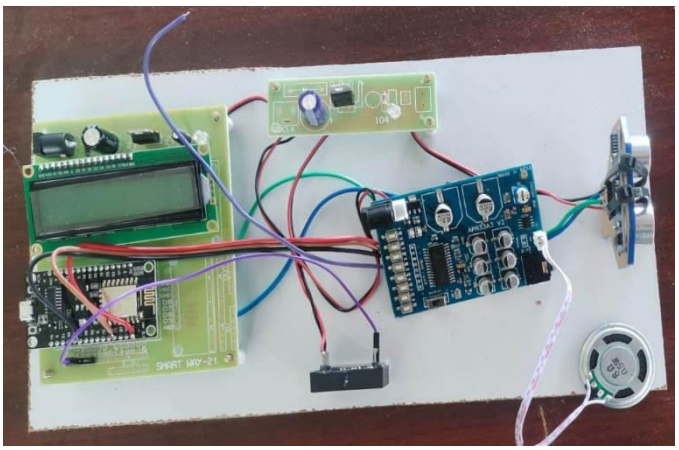

Fig.1 Hardware Assembly

B. RFID read and product display:

In the described shopping assistance system, RFID technology enables product identification by reading unique tags attached to each item. The RFID reader integrated into the system scans these tags when items are placed in the trolley are shown in Figure 2. The NodeMCU processes this information and coordinates with the LCD to visually present product details such as name, price, and ingredients. Additionally, auditory feedback through the voice playback speaker ensures accessibility for visually impaired users. Through IoT connectivity, the system accesses product databases, providing up-to-date information and enhancing the shopping experience by empowering. Informed decision-making. Overall, RFID integration enhances real-time product In the described shopping assistance system, RFID technology enables product identification by reading unique tags attached to each item. The RFID reader integrated into the system scans these tags when items are placed in the trolley shown in the Figure 2. The NodeMCU processes this information and coordinates with the LCD to visually present product details such as name, price, and ingredients. Additionally, auditory feedback through the voice playback speaker ensures accessibility for visually impaired users. Through IoT connectivity, the system accesses product databases, providing up-to-date information and enhancing the shopping experience by empowering. Informed decision-making. Overall, RFID integration enhances real-time product identification, contributing to a seamless shopping experience for individual with visual impairments.

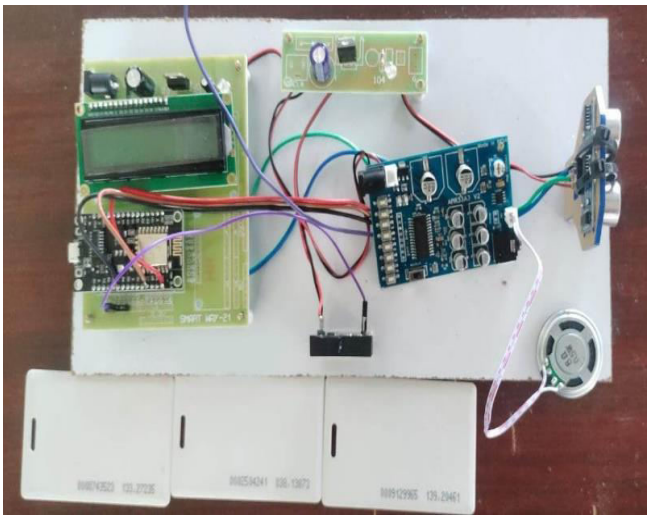

Fig. 2 Hardware assembly with RFID Reader

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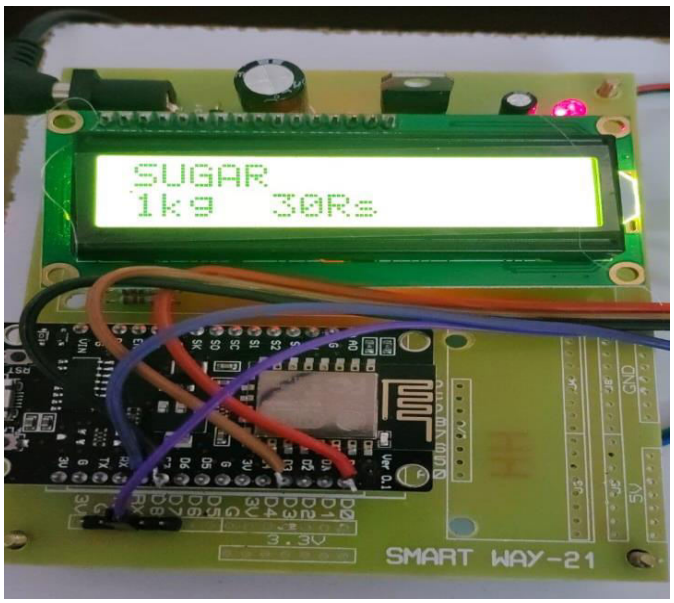

Fig. 3 Product display in LCD

C. Obstacle Detection & Audio Feedback

The obstacle detection module, comprising an ultrasonic sensor and the NodeMCU server, ensures safe navigation for visually impaired shoppers by constantly scanning surroundings and alerting users of obstacles. The ultrasonic sensor detects obstacles, while NodeMCU server coordinates data exchange, integrating with other components like the LCD and voice player speaker. This module provides real-time obstacle detection and distance measurement, enhancing the shopping experience by seamlessly integrating with the overall system.

The audio feedback module, consisting of a voice playback speaker and the NodeMCU server, delivers auditory cues and guidance to users. It provides navigation assistance, product identification, and error notifications, enhancing user interactions and accessibility within the shopping environment. The module's integration with other system components ensures clear and informative audio feedback, contributing to a comprehensive shopping assistance system for visually impaired shoppers. In conclusion, the obstacle detection and audio feedback modules synergize to create a holistic shopping assistance system for visually impaired shoppers. Seamlessly integrated with other components like the LCD, these modules ensure a safe, informative, and accessible shopping experience, empowering visually impaired individuals to navigate store environments confidently and independently.

D. IoT App Installation

The use of the Blynk application to control Arduino boards presents an exciting opportunity for remote control and monitoring. Blynk enables users to create smartphone applications that can control Arduino boards connected to a PC with internet access from anywhere in the world. This functionality includes controlling LEDs, servos, receiving data, and more. While Bluetooth connectivity between the smartphone and Arduino is an option, this aspect is not covered in this work. Blynk can be easily downloaded from the Google Play Store for Android or the App Store for Apple devices, providing a virtual dashboard and connectivity to Arduino. Programming with Blynk is straightforward, involving dragging and dropping widgets from the toolbar and assigning them to Arduino pins. The project can utilize a standard Arduino board without an internet shield, connected to a PC with internet access and a smartphone. The PC facilitates internet connectivity for the Arduino and uploads Arduino code. The Arduino code for Blynk projects resembles ordinary code but includes specific sections for Android communication. A simple example, modified from internet sources, demonstrates the similarities between Blynk and standard Arduino coding. To begin a project, several steps are required, including installing the Blynk app on the smartphone, downloading and installing the Blynk library on the PC, setting the correct port for communication, uploading the Arduino code, and running the Blynk app on the smartphone. the smartphone.

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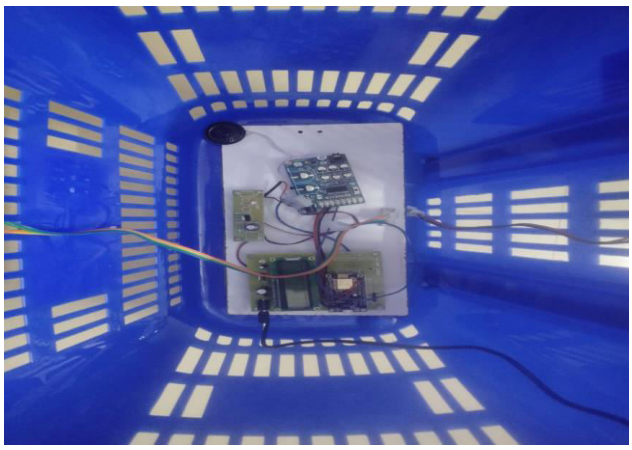

Fig .4 Working Model

VI.PROPOSED SYSTEM

The Smart Shopping Trolley System represents a cutting-edge solution designed specifically to cater to the needs of visually impaired shoppers. At its core lies the NodeMCU, a central controller seamlessly orchestrating the system's various components. Complementing this is an LCD, serving as a visual interface for users to receive vital information and instructions. Leveraging IoT connectivity, the system ensures real-time communication and data exchange between devices, enhancing user experience and functionality. An ultrasonic sensor plays a pivotal role, enabling the detection of obstacles and guiding users through the store with precision and safety. Accompanying these technological marvels is a specially designed trolley model, engineered to accommodate both the physical needs of users and the intricate hardware of the system. Together, these elements synergize to provide comprehensive navigation assistance, empowering visually impaired shoppers to navigate the store effortlessly, avoid obstacles, and locate desired products easily and confidently. This Smart Shopping Trolley System utilizes advanced technology to offer smooth navigation support for visually impaired shoppers, elevating their shopping experience with accuracy, security, and assurance. So, the Smart Shopping Trolley System not only enhances accessibility for visually impaired shoppers but also promotes independence and inclusivity by seamlessly integrating cutting-edge technology with thoughtful design, ensuring a more empowering and dignified shopping experience.

Fig .5 Ultrasonic sensor fitted in Trolley

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Fig .6 RFID tag reader fitted in Trolley

VII.CONCLUSION

In summary, the smart shopping cart is a testament to the transformative power of technology in encouraging inclusion and empowerment. Thanks to the integration of components such as LCDs, ultrasonic sensors, and special carts, NodeMCUs go above and beyond to deliver complete solutions to meet the needs of blind sellers. In addition to increasing accessibility by providing quick service and product identification, it supports the user's sense of freedom and confidence. Additionally, seamless communication and data exchange can be facilitated through IoT connectivity to make work efficient and effective. More than simple, this system embodies a paradigm shift towards a more inclusive society where people of all abilities can walk through public spaces with dignity and autonomy. Smart cars represent a beacon of progress and the potential for technology to break down barriers and create a fairer world for everyone. The system is not limited to blind sellers only. This expansion marks a significant step towards positive social change, highlighting its role in promoting universal access and participation.

REFERENCES

[1] F.Xia, L.T. Yang, L.Wang, and A. Vinel, “Internet of Things”, International Journal of Communication Systems, vol.25, no.9, p.1101, 2012.K. R. Chowdhury, M. Di Felice, “Search: a routing protocol for mobile cognitive radio ad hoc networks,” Computer Communication Journal, vol. 32, no. 18, pp. 1983-1997, Dec.20

[2] P. Castillejo, J-F. Martinez, J.Rodringuez-Molina, and A. Cuerva. “Integration of wearable Communication, vol.20, no.4, pp.38-49, 2013.

[3] N.Mitton, S.Papavassiliou, A.Puliafito, and K.S. Trivedi,” Combining cloud and sensor in a smart city environment, ”EURASIP journal on Wireless Communications and Networking, vol.2012, no.1,p.1,2012.

[4] T.Song, R.Li, X.Xing, J.Yu, and X.Cheng, “A privacy-preserving communication protocol for IoT applications and knowledge in the Internet of Things (IIKI) 2016, 2016.

[5] S. Shepard, RFID: radio frequency identification. McGraw Hill Professional, 2005.

[6] Zeeshan Ali.Reena, Sonkusare, “RFID based Smart Shopping: An Overview” in International Conference Advances in “Communication and Computing” Technologies, Issue in 2014.

[7] Prasidhhi K.Kharinar, Dhanashri H. Gawali, “Innovative Shopping Cart For Smart Cities” in IEEE International Conference on Recent Trends in Electronics Information & Communication Technology (RTEICT), May 19-20, 2017, India.

[8] Mr. P. Chandrasekar, Ms. T. Sangeetha, “Smart Shopping Cart with Automatic Billing System through RFID and ZigBee” in IEEE S.A. Engineering College, Chennai, Tamil Nadu, 2014, India.

[9] Akshay Kumar, Abhinav Gupta, S.Balamurugan, s. Balaji and Marimuthu R., “Smart Shopping Cart” in School of Electrical Engineering, VIT University, Vellor, IEEE, 2017.

[10] Ruinian Li, Tianyi Song, Nicholas Capurso, “IoT Applications on Secure Smart Shopping” in International conference on Identification, Information, and Knowledge in the Internet of Things, 2017.

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