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Selfsupport Assistive Device for Visually Impaired People Using Iot

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Abstract:- Assistive device tailored for visually impaired individuals to navigate streets, public spaces, and seeking aid independently. It outlines the key components of the system, including a microcontroller board, various sensors, cellular communication, GPS modules, IoT technology, and a Bluetooth instruction provider are showcasing the technological backbone supporting its functionalities. The system primarily employs sensors to track the user's path and detect obstacles, alerting them through sound and wrist vibrations. Notably, it also notifies nearby individuals when assistance is required and sends alerts, alongside the user's location, to registered family members and caregivers via phone messages. Furthermore, registered phones can retrieve the system's location and enable real-time tracking of VIP. The abstract underscores the system's thorough testing and verification process, ensuring its functionality effectiveness. Lastly, it emphasizes the system's superiority over existing solutions and anticipates its significant positive impact on enhancing the quality of life for visually impaired individuals.

Keywords:- *IOT, SOS, GSM, GPS, Bluetooth, Embedded C.*

I. INTRODUCTION

The introduction adeptly identifies the pervasive challenges confronting visually impaired persons (VIPs), notably their reliance on aids and assistance for mobility and the inadequate integration of communication systems in existing solutions. It subtly references previous research efforts, suggesting their shortcomings in delivering holistic solutions, likely due to complexity and cost barriers. In response, the proposed system emerges as an innovative solution, leveraging IoT and sensor technology to empower VIPs enhanced mobility and continuous connectivity. By integrating features like obstacle detection and stumble alerts, the system demonstrates a proactive approach to ensuring user safety and reducing dependence on external assistance. Noteworthy is implicit emphasis on accessibility and affordability, indicating a commitment to broadening access to VIPs from diverse backgrounds. Moreover, user-centric design underscores an understanding of the importance of social support networks, while the scalability facilitated by cloud data management hints at the potential for ongoing improvement through data-driven insights.

II. LITERATURE SURVEY

A. Device for Blind People

The excerpt outlines a systematic review and meta-analysis spanning from 1980 to 2015, aiming to estimate the global prevalence of various vision impairments, including blindness and near vision issues. Researchers used hierarchical models to analyze data and estimate prevalence rates by age, country, and sex for conditions like mild and severe visual impairment, blindness, and presbyopia. The study provides valuable insights into the distribution and trends of vision impairment globally, aiding policymakers and healthcare professionals in developing targeted interventions to address these issues.

B. Smart Stick: Concept and Experiments

The proposed smart stick for the visually impaired integrates an ultrasonic sensor to detect obstacles, an LDR to sense lighting conditions, and an RF remote for remote locating. Feedback to the user is provided through either a buzzer or vibrator motor. This comprehensive design aims to enhance navigation and independence for visually impaired individuals, with potential for further customization and innovation.

C. Wearable Device for Deaf-Blind People

The paper introduces Glove Pi, an affordable and open-source assistive system designed to aid communication for deaf-blind individuals using the Malossi alphabet. The system comprises three main components: a gardener glove, a Raspberry Pi, and an MPR121 capacitive touch sensor module with an expansion board. The MPR121 module serves as a communication bridge between the Raspberry Pi and the sensors embedded in the glove, facilitating data transfer. The Raspberry Pi functions as a Wi-Fi hotspot and server, enabling data transmission to the client—a dedicated Android application. This innovative system leverages accessible technology to provide a practical solution for enhancing communication accessibility and independence for deaf-blind individuals.

D. Visual Guidance System for Blind

The paper describes the development of a navigation aid for the blind and visually impaired, centered around a smart cap. The cap utilizes a No IR camera to capture the wearer's surroundings, enabling object detection. Through earphones, the system provides voice output to describe detected objects, facilitating navigation for the user. By

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combining innovative technology with practical application, this smart cap offers a means for individuals with visual impairments to experience greater freedom and autonomy in navigating their environment.

E. Object Detection System for the Blind

For blind individuals, the ability to navigate and organize daily activities is crucial for their overall health and well-being. Simple tasks can become challenging, as distinguishing between items like packaged foods and drug containers through touch alone is not always feasible. RFID (Radio Frequency Identification) technology offers a promising solution to enhance organization and orientation during daylight activities for the blind. By using RFID tags attached to various items, such as food packages and medication containers, the blind can access information about these items through RFID readers. This technology enables them to identify and differentiate between objects more efficiently, thus empowering them to organize their daily activities with greater ease and independence. Overall, RFID technology has the potential to significantly improve the quality of life for blind individuals by facilitating better organization and navigation in their everyday lives.

➢ *Existing System*

The existing system designed to aid visually impaired individuals employs a combination of sensors, GPS, and communication modules to offer navigation assistance and emergency support. Sensors detect obstacles, while GPS tracks the user's location for navigation. A GSM module facilitates communication by sending emergency alerts with the user's location to predefined contacts.

Additionally, a WIFI module may provide internet connectivity for real-time tracking and enhanced navigation assistance. Some versions also include heartbeat and temperature sensors for monitoring the user's vital signs. Despite its effectiveness, reliance on GSM communication may lead to reliability issues, especially in areas with poor network coverage. Further development is needed to improve reliability, accuracy, and adaptability to various environments.

➢ *Proposed System*

The proposed system present a multifaceted approach to address the challenges faced by visually impaired individuals (VIPs) in navigating their surrounding safely and independently. By harnessing the capabilities of detection sensors, the system empowers VIPs to detect obstacles in their path, thereby mitigating risk of collisions and falls.

Additionally, the system's alert mechanisms serve as a vital lifeline by promptly notifying both family members and caregivers of any stumbling incidents or instances where the VIP requires assistance. This timely communication not only ensures that help can be provided swiftly but also fosters a sense of security and reassurance for both the VIP and their support network. Furthermore, the system's incorporation of cloud connectivity and Internet of Things (IoT) technology enhances its functionality and accessibility. Through continuous location tracking, families and caregivers can monitor the VIP's movements in real-time, facilitating rapid response in case of emergencies or unexpected situations.

Moreover, the utilization of cloud-based storage enables seamless data upload, storage, and retrieval, streamlining the process of information sharing and analysis. This integration of technology not only augment the system efficacy but also contribute with its scalability and adaptability to user needs.

In essence, the proposed system represents a significant advancement in assistive technology for VIPs, offering a holistic solution that addresses both their mobility and communication requirements. By combining innovative sensor technology, alert systems, and cloud connectivity, the system not only enhances the safety and independence of VIPs but also fosters greater connectivity and support within their social network.

As a result, it holds the potential significant to improve the quality of life and overall well-being of visually impaired individuals, empowering them to navigate through the world with confidence and autonomy.

III. METHODOLOGY

The proposed system present a multifaceted approach to address the safety and independence of visually impaired individuals (VIPs). Worn on the wrist of VIPs for convenience, the system employs sensors to monitor the path up to 4 meters ahead, triggering alarm sounds and vibrations as the user approaches obstacles. This dual-alert system accommodate user with hearing impairment or in noisy environment.

In case of a stumble, the system automatically alerts nearby individuals and send a SMS to the user's family or caregivers, ensuring prompt assistance. Moreover, users can activate an alarm by uttering the word "Help," which also notifies surrounding individuals and sends an SMS with the user's location to their support network. Additionally, the system allows for location tracking through SMS requests, empowering caregivers to locate the device when needed. Utilizing Internet of Things (IoT) technology, all data, including obstacle detection and location information, is uploaded to the cloud, ensuring accessibility and analysis.

Overall, this comprehensive system not only enhances safety but also fosters independence for VIPs, enabling them to navigate their surroundings with greater confidence and support.

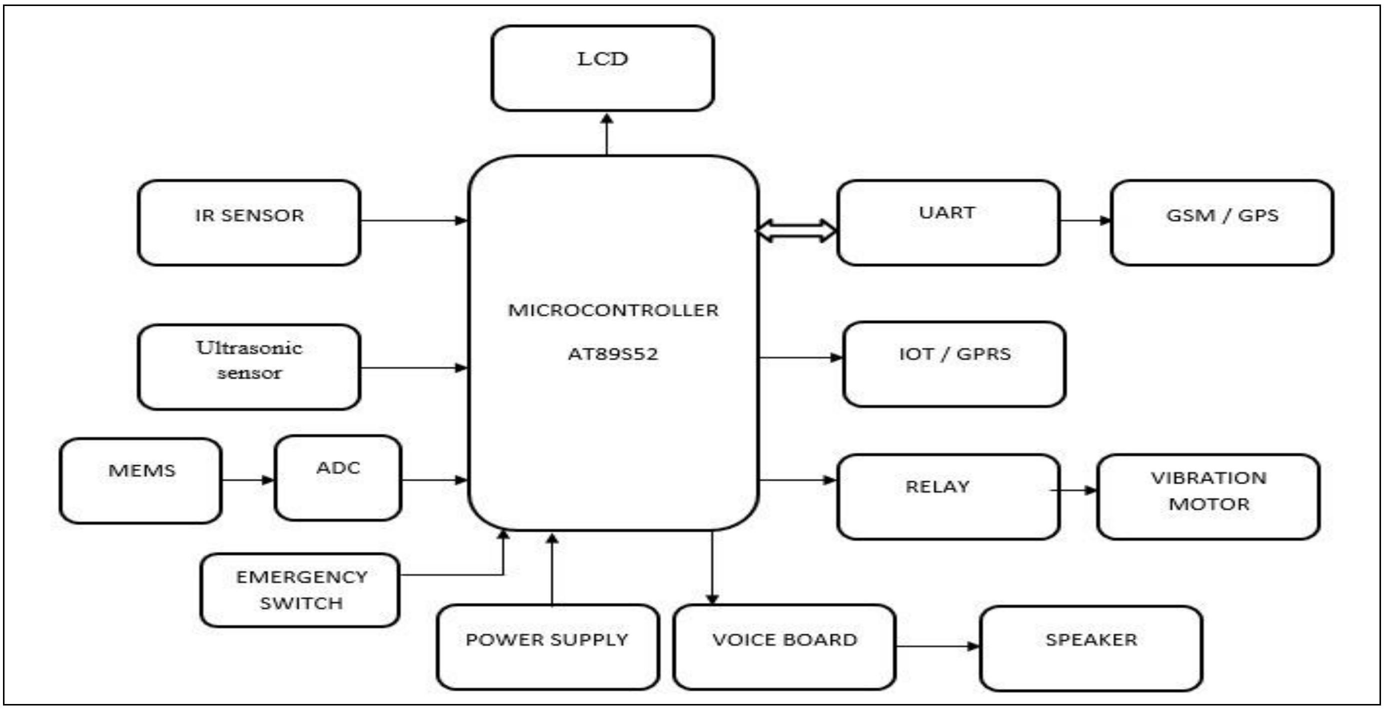

Fig 1: Block Diagram

IV. BLOCK DIAGRAM DISCRIPTION

The microcontroller AT89S52 is chosen for its robust capabilities and cost-effectiveness, offering a flexible solution for various embedded control applications. Programming for the microcontroller is done in Embedded C language and compiled using KEIL. Communication between PC and microcontroller is facilitated through the MAX232 standard, with both ends programmed using C language.

A. AT89S52 Microcontroller

The AT89S52 microcontroller boast low power consumption and high performance with 8K bytes of In-system programmable Flash memory making it compatible with industry-standard 80C51 instruction set.

B. Infrared Sensor

Infrared sensors, widely favoured by amateur roboteers, provide crucial insights for various robotics events in India, offering granular control for tasks such as line following, obstacle avoidance, and micro mouse navigation.

C. Ultrasonic Sensor

Ultrasonic sensors, akin to radar or sonar, utilize high-frequency sound waves to evaluate echoes for target attributes, finding applications in measuring wind speed, tank fullness, and speed through air or water.

D. LCD

LCD screens, characterized by their ability to display 16 characters per line across two lines, play a vital role in numerous electronic applications, with command and data registers controlling display instructions and content.

E. Vibration Sensor

Piezoelectric vibration sensors harness the piezoelectric effect to convert pressure, acceleration, or force into electrical signals, serving diverse purposes in quality assurance, process control, and research across industries.

F. Mems

Accelerometer, renowned for their low power consumption and accuracy, detect proper acceleration in devices like process control systems and vehicles, measuring phenomena such as vibration, tilt, collision, and gravity.

Gyroscopes, relying on angular momentum principles, maintain orientation by resisting external torque, crucial for applications requiring stable orientation, such as navigation systems.

G. ADC0808/0809

The ADC0808/0809 data components feature a 8-bit Analog-to-digital converter and a 8-channel multiplexer, utilizing successive approximation for conversion without the needs of external adjustments, and offers easy interfacing with microprocessors.

H. Relay

Relays serve as electrically operated switches, facilitating circuit switching without direct electrical connection, making them indispensable for applications requiring isolation between circuits.

I. Internet of Things (Iot)

The Internet of Things (IoT) constitute a network of interconnected physical objects accessible through internet, characterized by features such as interconnectivity,

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heterogeneous device integration, dynamic adaptability, and scalability.

Enabling technologies for IoT encompass contextual data acquisition, processing, security, and privacy enhancement mechanisms, driving the proliferation of IoT applications across diverse domains.

J. Keil C51 C Compiler

The Keil C51 C Compiler for AT89S52 microcontroller. It provides more features than any other C51 compiler available today. The C51 Compiler have the efficiency and speed of assembly language.

Language extensions in the C51 Compiler give you full access to all resources of AT89S52. The C51 Compiler translates C source files into re locatable object modules which contain full symbolic information for debugging with the µVision Debugger or an in-circuit emulator. In addition to the object file, the compiler generates a listing file which may optionally include symbol table and cross reference information.

V. RESULT & DISCUSSION

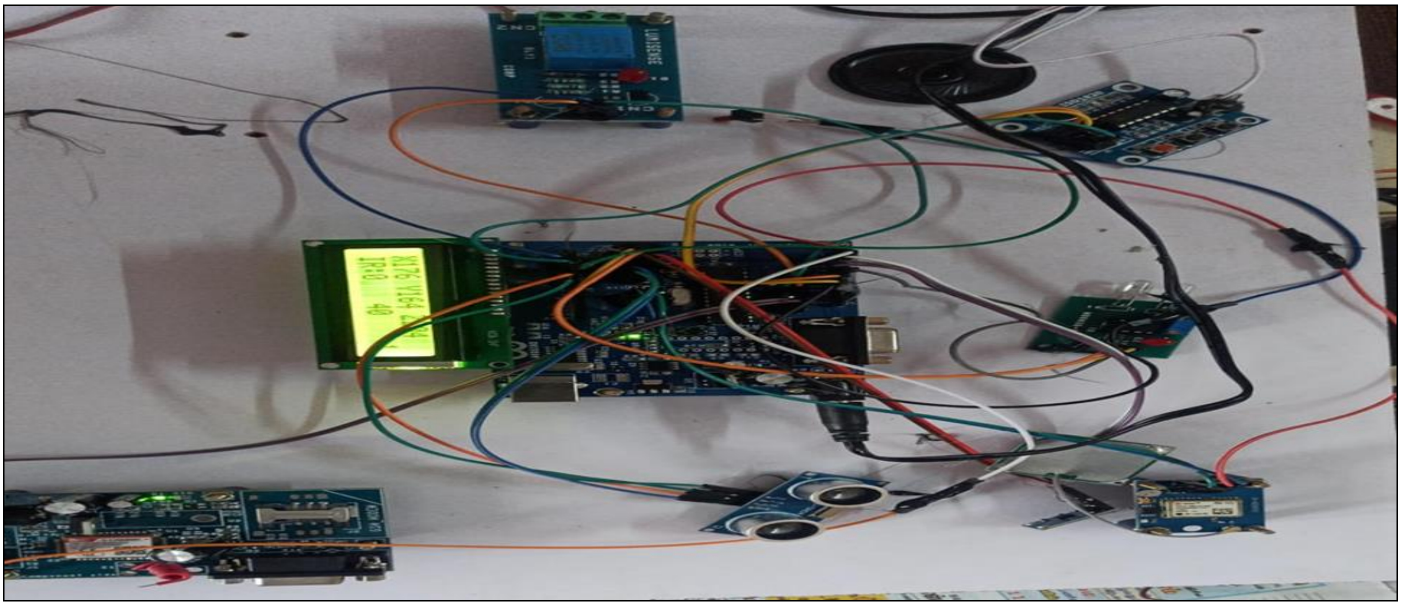

Fig 2: View of Vips Device Output

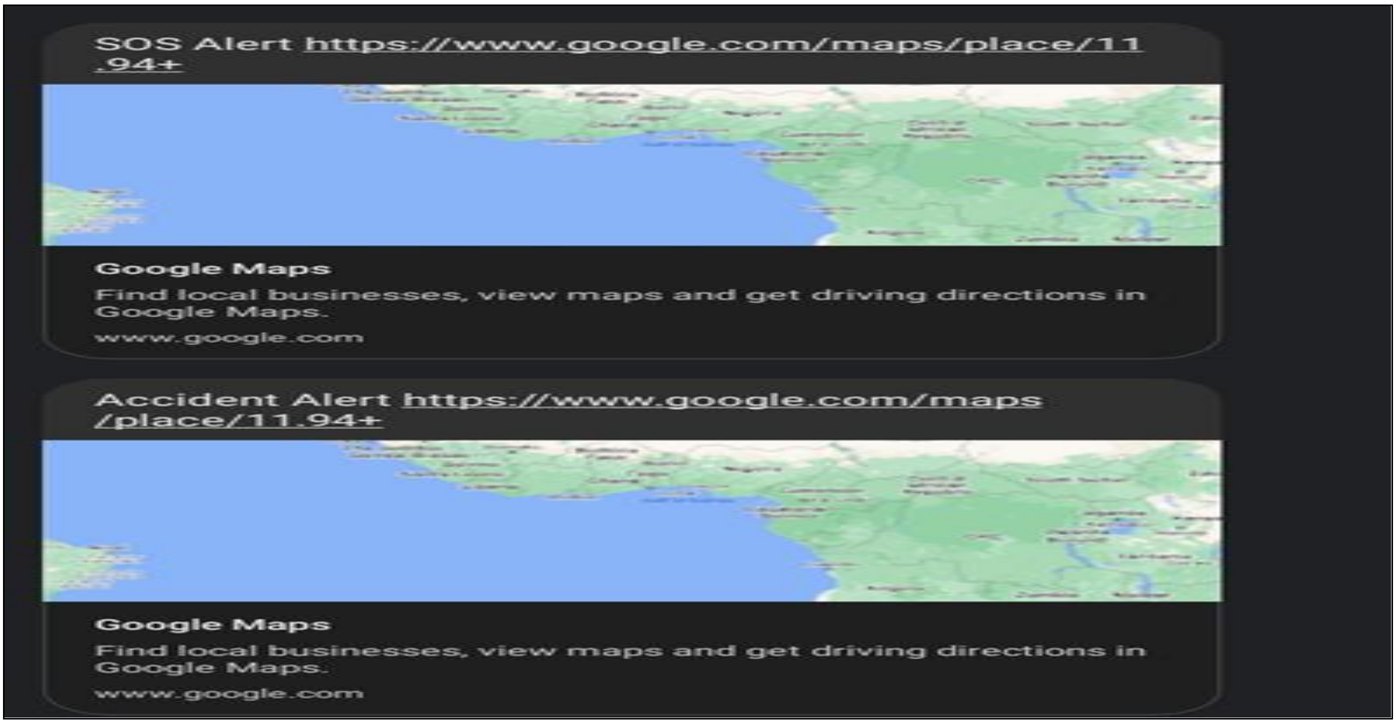

Fig 3: SMS Alert with GPS Location

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➢ *Link for Data Stored in IOT*

http://www.iotclouddata.com/23log/151/home.php

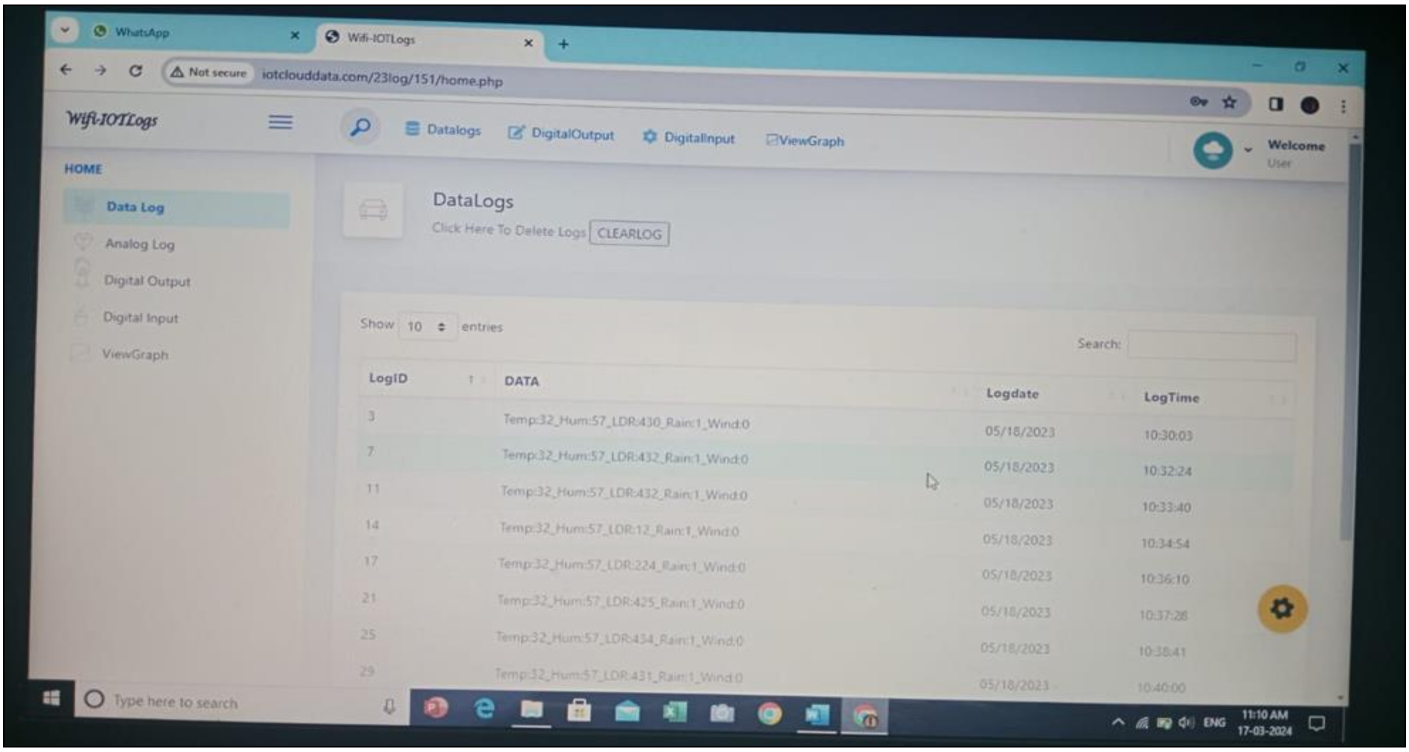

Fig 4: Data stored in IOT

Fig 5: Graph view of Data logs

The system described relies on a combination of sensors to enhance safety and assistance for users, particularly focusing on detecting objects in the user's path and alerting caregivers and surrounding individuals in case of emergencies or assistance needs. The integration of various sensors, such as an SOS switch for emergency alerts with GPS location, MEMS (Micro-Electro-Mechanical Systems) to detect stumbling events, IR sensors for object detection, and a speaker for voice alerts, ensures comprehensive monitoring and notification capabilities.

By utilizing IoT technology, the collected data can be uploaded to the cloud, enabling remote access and monitoring by caregivers and family members. This comprehensive approach not only enhances the safety and well-being of the user but also provides peace of mind to caregivers and surrounding individuals by facilitating timely assistance when needed.

Overall, the system represents an effective solution for improving the support and care provided to individuals who may require assistance due to mobility issues or other challenges.

VI. CONCLUSION & FUTURESCOPE

In conclusion, Our Assistive device for Visually Impaired persons (VIPs) stands out with comprehensive features aimed at enhancing mobility, safety, and independence. Through rigorous testing and verification, we have demonstrated its functionality and effectiveness in navigating streets, detecting obstacles, seeking assistance when needed. With features like sound and vibration alerts, real-time tracking, and automatic alerts to caregivers, our system surpasses existing solutions. We firmly believe that this innovative tool will significantly contribute to improve the quality of life for VIPs, providing confidence and autonomy in navigating the world around them.

In the future, we envision several avenues for enhancing our wearable smart system for visually impaired individuals. This includes integrating advanced machine learning algorithms to improve obstacle detection and path prediction, incorporating haptic feedback technology for more intuitive navigation cues, and exploring partnerships with urban planners to interface for seamless interaction and expanding compatibility with other wearable devices could further enhance user experience.

Furthermore, continuous user feedback and iterative testing will be crucial for refining and evolving the system to meet the needs of visually impaired individuals effectively. Overall, the future scope of our project involves continuous innovation and collaboration to create even more sophisticated and user-friendly solutions enhancing the mobility and independence of visually impaired persons.

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