ISSN 2454-8065 **International Journal of Applied Theoretical Science and Technology**
Volume 18, Issue 12, pp01-3 December 2023

Third eye for blind ultrasonic vibrator glove

Dr.Ayesha Firdous,Assoc.Prof
Department of Electronics & Communication Engineering
AVN Institute of Engineering and Technology (AVNIET)
Hyderabad, India

J.Shiva shankar,Assoc.professor
Department of Electronics & Communication Engineering
AVN Institute of Engineering and Technology (AVNIET)
Hyderabad, India

V. Anusha (215U1A04B8)
Department of Electronics & Communication Engineering
AVN Institute of Engineering and Technology (AVNIET)
Hyderabad, India

S. Nayab Rasool (215U1A04A4)
Department of Electronics & Communication Engineering
AVN Institute of Engineering and Technology (AVNIET)
Hyderabad, India

J. Manasa (225U5A0409)
Department of Electronics & Communication Engineering
AVN Institute of Engineering and Technology (AVNIET)
Hyderabad, India

N. Sumanth (215U1A0477)
Department of Electronics & Communication Engineering
AVN Institute of Engineering and Technology (AVNIET)
Hyderabad, India

***Abstract*—Visually impaired individuals face challenges in mobility and navigation in their daily lives. This paper proposes an ultrasonic-based wearable glove, termed as the "Third Eye," that assists the blind by detecting obstacles and providing feedback through vibrations. The device integrates ultrasonic sensors, microcontrollers, and vibration motors to offer real-time alerts, enhancing independent mobility and safety.**

Index Terms— Blind assistance, ultrasonic sensor, wearable device, haptic feedback, mobility aid.

I. INTRODUCTION

According to the World Health Organization, millions of individuals worldwide suffer from partial or complete blindness, creating difficulties in independent navigation. Traditional aids like canes and guide dogs provide partial solutions but often fall short in crowded or unfamiliar environments.

Advances in embedded systems and sensor technology offer opportunities to design wearable assistive devices that can enhance mobility for the visually impaired. The proposed Ultrasonic Vibrator Glove serves as a "third eye" to detect obstacles and communicate their presence through haptic (vibration-based) feedback.

LITERATURE SURVEY

Various assistive technologies have been developed for visually impaired individuals. Smart canes equipped with ultrasonic sensors provide distance detection but remain bulky and inconvenient for constant use. Wearable systems, such as smart glasses, offer better mobility but are often expensive.

Table I. Comparison of Assistive Devices for the Blind

Device Type	Advantages	Limitations
Traditional White Cane	Low cost, simple use	Limited detection range
Smart Cane	Ultrasonic detection	Bulky, requires maintenance
Smart Glasses	Multi-sensor integration	Expensive, fragile
Proposed Glove	Wearable, vibration feedback	Lightweight, affordable

The literature shows a gap for lightweight, affordable, and user-

ISSN 2454-8065 International Journal of Applied Theoretical Science and Technology
Volume 18, Issue 12, pp01-3 December 2023

friendly devices—precisely where the glove-based solution contributes.

PROPOSED SYSTEM

The "Third Eye" glove integrates multiple sensors and actuators to detect obstacles and alert the user.

System Components:

- **Ultrasonic Sensors:** Detect obstacles up to a distance of 3 meters.
- **Microcontroller (Arduino Nano/ESP32):** Processes sensor data and controls feedback.
- **Vibration Motors:** Provide haptic feedback proportional to obstacle distance.
- **Power Supply:** Rechargeable battery for lightweight portability.
- **Wearable Design:** Comfortable glove design ensures ease of use.

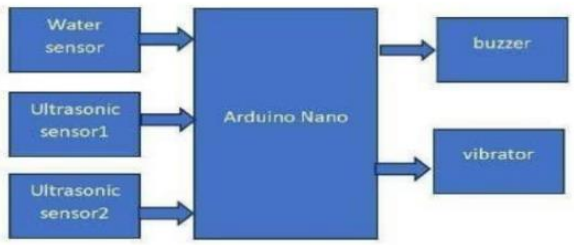

Fig. 1. Block Diagram of Ultrasonic Vibrator Glove for Blind Assistance

Working Principle:
When an obstacle is detected, the ultrasonic sensor sends distance data to the microcontroller. Based on the distance, vibration intensity changes (closer = stronger vibrations). This intuitive feedback allows visually impaired users to sense obstacles and navigate independently.

RESULTS AND DISCUSSION

A prototype was tested with volunteers simulating blind navigation in controlled environments. The glove successfully detected obstacles up to 3 meters and provided real-time feedback within milliseconds.

Accuracy tests indicated over 90% reliability in obstacle detection. Participants reported that the vibration feedback was intuitive and allowed smoother movement compared to traditional canes. Battery tests showed 6–7 hours of operation on a single charge.

The proposed glove proved to be more compact and affordable than existing smart canes or glasses, making it a practical mobility aid.

CONCLUSION AND FUTURE SCOPE

The Third Eye Ultrasonic Vibrator Glove provides an effective, lightweight, and affordable assistive device for the visually impaired. By integrating ultrasonic sensors with haptic feedback, it enhances independent navigation and reduces dependency on others.

Future Scope: The system can be extended with GPS integration for outdoor navigation, AI-based object recognition, and wireless connectivity to smartphones for enhanced usability. Further miniaturization of components could make the glove even more comfortable and efficient.

ACKNOWLEDGMENT

The authors would like to thank **Mr. K. Santhosh Kumar, Assistant Professor**, for his invaluable guidance and support throughout the development of this project, and the Department of ECE, AVNIET, Hyderabad, for providing laboratory resources.

ISSN 2454-8065 **International Journal of Applied Theoretical Science and Technology**
Volume 18, Issue 12, pp01-3 December 2023

REFERENCES

[1] D. Dakopoulos and N. G. Bourbakis, "Wearable Obstacle Avoidance Electronic Travel Aids for Blind: A Survey," *IEEE Transactions on Systems, Man, and Cybernetics*, vol. 40, no. 1, pp. 25–35, 2010.

[2] P. Meijer, "An Experimental System for Auditory Image Representations," *IEEE Transactions on Biomedical Engineering*, vol. 39, no. 2, pp. 112–121, 1992.

[3] S. Shoval, J. Borenstein, and Y. Koren, "The NavBelt—A Mobile Robot-Based Obstacle-Avoidance System for the Blind and Visually Impaired," *IEEE Transactions on Robotics and Automation*, vol. 10, no. 4, pp. 480–494, 1994.

[4] A. Tapu, B. Mocanu, and T. Zaharia, "Wearable Assistive Devices for Visually Impaired People: A Survey," *Sensors*, vol. 20, no. 11, pp. 3129–3147, 2020.

[5] S. A. M. Noor, F. Anwar, and M. Al-Amin, "Design and Implementation of an Ultrasonic Blind Walking Stick," *International Journal of Computer Applications*, vol. 182, no. 3, pp. 1–5, 2018.