IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⫶ Peer-reviewed & Refereed journal ⫶ Vol. 15, Issue 1, January 2026

DOI: 10.17148/IJARCCE.2026.151132

AI EYES: A REAL-TIME ASSISTIVE MOBILE APPLICATION for VISUALLY IMPAIRED PEOPLE USING OBJECT DETECTION

Yogesh M[1], Dr. Madhu HK[2]

Student, Department of MCA, Bangalore Institute of Technology, Karnataka, India[1]

Head & Associate Professor, Department of MCA, Bangalore Institute of Technology, Karnataka, India[2]

Abstract: Visually impaired people often face difficulties in understanding their surroundings, especially while moving in unfamiliar environments. Identifying nearby objects, obstacles, or people usually requires external help, which limits independence. With the availability of smartphones equipped with cameras and processing power, it is possible to use artificial intelligence to provide real-time assistance. This paper presents **AI Eyes for Visually Impaired**, an Android-based mobile application designed to assist visually impaired users through real-time object detection and voice feedback. The application uses the mobile camera to continuously capture the surrounding environment and applies an AI-based object detection model to recognize common objects. Based on the detected objects, the system identifies their direction and estimates their approximate distance, and then communicates this information through audio guidance using text-to-speech. The proposed system runs entirely on the mobile device without requiring internet connectivity, making it portable and practical for daily use. The results show that the application can effectively improve environmental awareness and support safer navigation for visually impaired users.

Keywords: Artificial Intelligence, Object Detection, Assistive Technology, Visually Impaired, Android Application, TensorFlow Lite, Real-Time Navigation, Text-to-Speech.

I. INTRODUCTION

Visual impairment makes everyday activities such as walking in crowded places, identifying nearby objects, and avoiding obstacles challenging. Traditional assistive tools like white canes are helpful for detecting obstacles on the ground but do not provide information about the type, position, or distance of surrounding objects. With the rapid development of artificial intelligence and smartphone technology, researchers have started using computer vision to assist visually impaired users by converting visual information into audio feedback [1][2].

Several studies have explored real-time object detection using deep learning models such as YOLO and SSD to support navigation assistance [3][15]. These systems use mobile cameras to detect objects and announce them through voice guidance, helping users better understand their environment [4]. However, many existing solutions face challenges such as limited object coverage, dependency on additional hardware, and reduced accuracy in real-world conditions [5][9][14]. The **AI Eyes** project focuses on addressing these issues by developing a simple, mobile-based application that performs on-device object detection and provides clear voice guidance, aiming to improve safety and independence for visually impaired users.

PROJECT DESCRIPTION

The **AI Eyes for Blind People** project is developed as an Android-based mobile application that assists visually impaired users by providing real-time information about their surroundings. The application uses the smartphone camera to continuously capture live video and applies an AI-based object detection model to identify commonly encountered objects such as people, furniture, and everyday items. The detected information is converted into simple voice messages so that users can understand their environment without relying on visual input.

The system is designed to work completely on the mobile device without requiring internet connectivity, making it portable and practical for daily use [4][15]. Along with object identification, the application also determines the relative direction and approximate distance of detected objects, which helps users make safer navigation decisions. By focusing

International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.471 ∺ Peer-reviewed & Refereed journal ∺ Vol. 15, Issue 1, January 2026
DOI: 10.17148/IJARCCE.2026.151132

on simplicity, affordability, and real-time assistance, the project aims to provide an effective assistive solution that can be easily used by visually impaired individuals in real-world scenarios [6][8].

MOTIVATION

The motivation for this project comes from the everyday challenges faced by visually impaired people while moving independently. Identifying nearby objects, obstacles, or people becomes difficult when relying only on traditional aids such as white canes. Although some assistive technologies exist, many of them are expensive, require additional hardware, or are not practical for continuous daily use [1][5]. This highlights the need for a simple and accessible assistive solution.

With the widespread use of smartphones, there is a strong opportunity to use mobile devices as assistive tools. Advances in artificial intelligence and computer vision allow object detection models to run directly on smartphones and provide real-time voice guidance [3][15]. This project is motivated by the idea of using a device that users already own to improve safety, confidence, and independence for visually impaired individuals.

The key motivating factors are:

- Limited environmental awareness provided by traditional assistive tools
- High cost and hardware dependency of existing assistive systems
- Availability of smartphones with cameras and processing capability
- Advancement of AI-based object detection for real-time applications
- Need for a simple, affordable, and user-friendly assistive solution

II. RELATED WORK

Several studies have been carried out in the area of assistive technologies for visually impaired people, focusing on improving navigation and object awareness. Early solutions mainly relied on traditional tools or sensor-based systems such as ultrasonic devices, which could detect obstacles but did not provide information about the type of object [1][6]. With the introduction of computer vision, researchers started using camera-based systems to identify objects and convert visual information into audio feedback for better understanding of the surroundings [2][4].

Recent research has explored the use of deep learning–based object detection models such as YOLO and SSD for real-time assistance. YOLO-based systems provide fast detection but require higher computational resources, which can be challenging for mobile devices [3]. SSD MobileNet, on the other hand, offers a balance between speed and accuracy and is widely used in mobile assistive applications [15]. However, many existing solutions still face limitations such as dependency on additional hardware, limited object categories, and reduced performance in real-world environments [5][9][14]. These limitations highlight the need for a lightweight, mobile-based assistive system that can operate effectively in daily scenarios.

III. METHODOLOGY

Several studies have been carried out in the area of assistive technologies for visually impaired people, focusing on improving navigation and object awareness. Early solutions mainly relied on traditional tools or sensor-based systems such as ultrasonic devices, which could detect obstacles but did not provide information about the type of object [1][6]. With the introduction of computer vision, researchers started using camera-based systems to identify objects and convert visual information into audio feedback for better understanding of the surroundings [2][4].

Recent research has explored the use of deep learning–based object detection models such as YOLO and SSD for real-time assistance. YOLO-based systems provide fast detection but require higher computational resources, which can be challenging for mobile devices [3]. SSD MobileNet, on the other hand, offers a balance between speed and accuracy and is widely used in mobile assistive applications [15]. However, many existing solutions still face limitations such as dependency on additional hardware, limited object categories, and reduced performance in real-world environments [5][9][14]. These limitations highlight the need for a lightweight, mobile-based assistive system that can operate effectively in daily scenarios.

ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 1, January 2026

DOI: 10.17148/IJARCCE.2026.151132

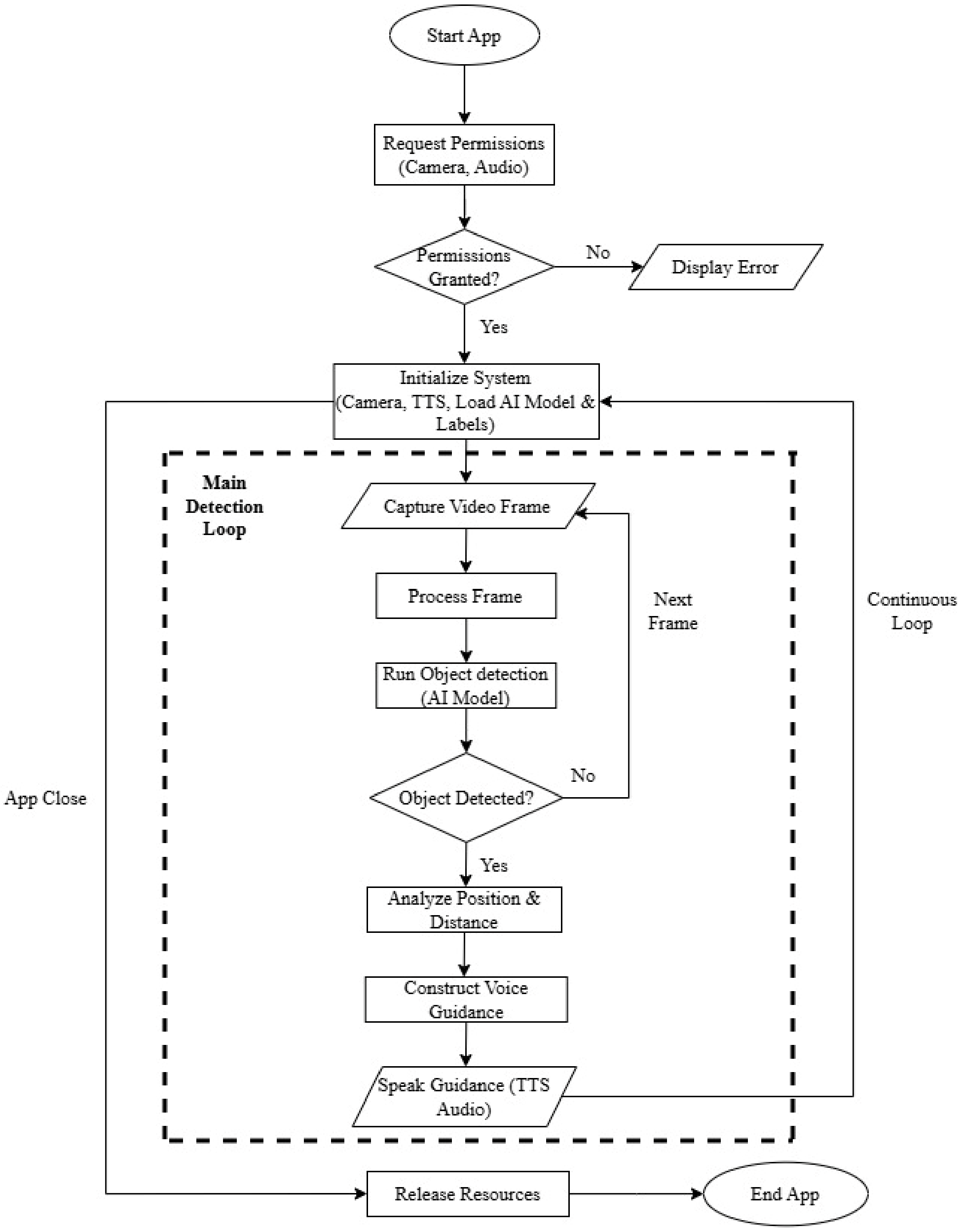

Fig 1: AI Eyes Flowchart

IV. RESULTS AND EVALUATION

The **AI Eyes** application was tested on an Android smartphone to evaluate its performance in real-world conditions. The evaluation focused on object detection accuracy, direction identification, distance estimation, and clarity of voice output. During testing, the system was able to detect commonly encountered objects such as people, chairs, bottles, laptops, and vehicles, and announce them with appropriate voice guidance [4][15].

The application responded in real time with minimal delay, as all processing was performed directly on the mobile device. The approximate distance information helped users understand how close an object was, improving navigation safety. Although minor misclassifications occurred in some cases, the overall performance was satisfactory for practical use. These results show that the system can effectively enhance environmental awareness and provide meaningful assistance to visually impaired users in daily scenarios [5][9].

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 1, January 2026

DOI: 10.17148/IJARCCE.2026.151132

V. DISCUSSION

The performance of the **AI Eyes** system shows that mobile-based artificial intelligence can play an important role in assistive navigation. By combining real-time object detection with voice guidance, the system helps visually impaired users gain better awareness of their surroundings. The ability to identify objects along with their direction and approximate distance provides useful contextual information that traditional assistive tools cannot offer. Running the system entirely on the mobile device improves response time and ensures usability even without internet access, which is a key advantage for real-world deployment [4][8].

At the same time, the discussion highlights certain limitations of the proposed system. Object detection accuracy may decrease in low-light conditions or when objects are visually similar, which is a known limitation of lightweight deep learning models used on mobile devices [5][9]. Distance estimation is also approximate, as it is based on visual cues rather than physical depth measurement [14]. Despite these challenges, the system achieves a good balance between accuracy, performance, and usability. With proper filtering and controlled voice output, the application avoids overwhelming the user and remains effective as a practical assistive solution.

VI. CONCLUSION

This **AI Eyes** project demonstrates that a smartphone-based application can effectively assist visually impaired users by providing real-time object awareness through voice guidance. By using artificial intelligence and computer vision, the system converts visual information into meaningful audio feedback, helping users understand their surroundings and navigate more safely.

The application meets its objective of offering a simple, affordable, and portable assistive solution that works without additional hardware or internet connectivity. Although the system has certain limitations related to detection accuracy and distance estimation, it still provides practical benefits in daily scenarios. Overall, the project shows that mobile-based AI solutions can play a valuable role in improving accessibility and independence for visually impaired individuals.

International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.471 ⁙ Peer-reviewed & Refereed journal ⁙ Vol. 15, Issue 1, January 2026
DOI: 10.17148/IJARCCE.2026.151132

VII. FUTURE WORK

Although the AI Eyes for Blind People system performs effectively as a basic assistive application, there are several areas where it can be improved further. One important enhancement would be the integration of **depth estimation techniques** or stereo vision to provide more accurate distance measurement instead of approximate estimation using a single camera. This would help users better judge how far an object is and improve safety during navigation, especially in crowded or unfamiliar environments.

The system can also be enhanced by training a **custom dataset** that focuses on objects specifically important for visually impaired users, such as stairs, doors, corridors, and ground-level obstacles. This would improve detection accuracy and reduce misclassification in real-world scenarios. Additional features such as vibration-based alerts, multilingual voice support, and integration with wearable devices like smart glasses or bands could further improve usability. In the future, combining object detection with GPS-based navigation could provide complete indoor and outdoor guidance, making the system more comprehensive and reliable.

REFERENCES

[1]. World Health Organization, *World Report on Vision*, WHO Press, Geneva, 2019.
[2]. Redmon, J., Divvala, S., Girshick, R., and Farhadi, A., “You Only Look Once: Unified, Real-Time Object Detection,” *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 779–788, 2016.
[3]. Redmon, J., and Farhadi, A., “YOLOv3: An Incremental Improvement,” *arXiv preprint arXiv:1804.02767*, 2018.
[4]. Jain, A., and Kanhere, S., “Assistive Technologies for Visually Impaired: A Survey,” *International Journal of Computer Applications*, vol. 182, no. 10, pp. 1–6, 2018.
[5]. Tapu, R., Mocanu, B., and Zaharia, T., “Wearable Assistive Devices for Visually Impaired: A State of the Art Survey,” *Pattern Recognition Letters*, vol. 137, pp. 37–52, 2020.
[6]. Manduchi, R., and Kurniawan, S., “Mobility-Related Accidents Experienced by People with Visual Impairment,” *Insight: Research and Practice in Visual Impairment and Blindness*, vol. 6, no. 2, pp. 44–54, 2013.
[7]. Jain, A., and Raghuwanshi, B., “Smart Navigation System for Visually Impaired Using Computer Vision,” *International Journal of Engineering Research and Technology (IJERT)*, vol. 8, no. 5, pp. 234–238, 2019.
[8]. Dakopoulos, D., and Bourbakis, N., “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.
[9]. Reddy, R., and Reddy, S., “AI-Based Object Detection for Visually Impaired People,” *International Journal of Advanced Research in Computer Science*, vol. 10, no. 3, pp. 12–16, 2019.
[10]. Patil, P., Kulkarni, S., and Joshi, A., “Mobile-Based Assistive System for Visually Impaired Using Deep Learning,” *International Conference on Smart Computing and Informatics*, pp. 451–458, 2020.
[11]. Godard, C., Mac Aodha, O., and Brostow, G., “Unsupervised Monocular Depth Estimation with Left-Right Consistency,” *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 270–279, 2017.
[12]. Everingham, M., Van Gool, L., Williams, C. K. I., Winn, J., and Zisserman, A., “The Pascal Visual Object Classes (VOC) Challenge,” *International Journal of Computer Vision*, vol. 88, no. 2, pp. 303–338, 2010.
[13]. Aladren, A., Lopez-Nicolas, G., Puig, L., and Guerrero, J. J., “Navigation Assistance for the Visually Impaired Using RGB-D Sensor with Range Expansion,” *IEEE Systems Journal*, vol. 10, no. 3, pp. 922–932, 2016.
[14]. Chen, X., Ma, H., Wan, J., Li, B., and Xia, T., “Multi-View 3D Object Detection Network for Autonomous Driving,” *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 1907–1915, 2017.
[15]. Liu, W., Anguelov, D., Erhan, D., et al., “SSD: Single Shot MultiBox Detector,” *European Conference on Computer Vision (ECCV)*, pp. 21–37, 2016.

