Design And Implementation of an Intelligent Reception and Guidance Robot using IOT

Prof.M.Balasubramanian[1], G. Mayil Samy[2], S. Vignesh[3],S. Venkatesan[4]

[1]Assistant Professor, Department of Electrical and Electronics Engineering,

JAYALAKSHMI INSTITUTE OF TECHNOLOGY, THOPPUR.

[2,3,4,5] UG Students, Department of Electrical and Electronics Engineering,

JAYALAKSHMI INSTITUTE OF TECHNOLOGY, THOPPUR.

bala3171981@gmail.com,mayilsamyg29@gmail.com, vigneshs.eee037@jit.net.in, venkatesans3693@gmail.com

How to Cite this Article:

Samy, G. M., Vignesh, S. & Venkatesan, S. (2026). Design And Implementation of an Intelligent Reception and Guidance Robot using IOT. International Journal of Creative and Open Research in Engineering and Management, 02(04). https://doi.org/10.55041/ijcope.v2i4.1033

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ABSTRACT

In recent years, intelligent robotic systems have become an important part of smart automation in public and institutional environments. This paper presents the design and implementation of an intelligent reception and guidance robot using Internet of Things (IoT) technology. The developed robot is intended to support visitors in places such as educational institutions, hospitals, offices, airports, and shopping complexes by offering automated reception and navigation assistance. The proposed system integrates an IoT-enabled microcontroller, ultrasonic sensors, motor control circuits, and a cloud communication platform to provide real-time monitoring and autonomous operation. The robot receives user requests, identifies pre-programmed destinations, and guides users safely using obstacle detection and motion control mechanisms. The implemented prototype demonstrates effective indoor navigation, visitor interaction, and obstacle avoidance with low hardware complexity and reduced operational cost.

Keywords—

IoT, Intelligent Robot, Reception System, Guidance Robot, Automation, Obstacle Detection, Smart Navigation.

INTRODUCTION

The rapid advancement of automation, artificial intelligence, and embedded systems has significantly contributed to the evolution of intelligent service robots. In modern environments such as educational institutions, hospitals, airports, shopping malls, and corporate offices, the need for efficient reception and guidance systems has become increasingly important. Traditionally, these services are handled manually by human staff, which can lead to inefficiencies such as delays, miscommunication, and increased operational costs.

LITERATURE REVIEW

Several research works have been carried out in the field of autonomous robots and IoT-based navigation systems. Probabilistic robotics techniques introduced by Thrun et al. focus on uncertainty handling in robot navigation.
Similarly, IoT architectures proposed by P. P. Ray emphasize connectivity and scalability in smart systems.
Existing guidance robots use technologies such as:
SLAM (Simultaneous Localization and Mapping)
Infrared sensors Computer vision
AI-based voice assistants
However, many of these systems are costly and complex. The proposed system focuses on a low- cost, efficient alternative using ultrasonic sensors and embedded controllers.To overcome these challenges, the integration of robotics with Internet of Things (IoT) technology provides a smart and scalable solution. An intelligent reception and guidance robot can interact with users, provide directions, and perform navigation tasks autonomously. These robots reduce human effort, improve accuracy, and enhance user experience.

This paper presents the design and implementation of an IoT-based intelligent reception robot capable of guiding visitors to desired locations using obstacle detection and real-time communication. The system ensures safe navigation, efficient route handling, and remote monitoring through IoT platforms.

Compared to previous works:
Reduced hardware complexity Lower cost Easy implementation Suitable for small-scale environments

HARDWARE

The hardware architecture of the system is built using low-cost and easily available embedded components. The major hard ware elements includeESP32/Nedelcucontroller,ultrasonicsensor, motordriver module (L298N), DC geared motors, LCD/OLED display, and rechargeable battery pack.

The micro controlleracts as the central processingunit of the robot. The ultrasonic sensor is used forobstacle detection. The motor driver circuit interfaces the controller with the DC motors.

BLOCK DIAGRAM:

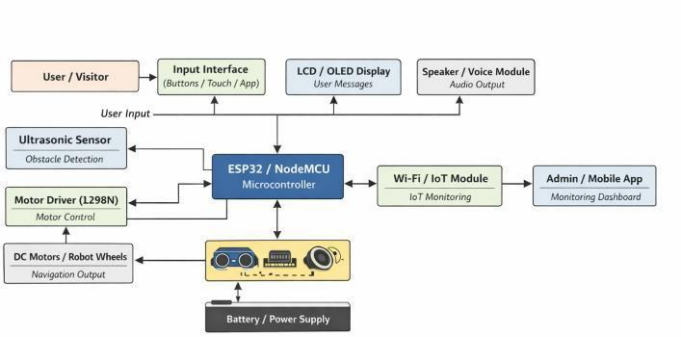

Fig. 1. Block Diagram of Intelligent Reception and Guidance Robot Using IoT.

SOFTWARE

The software is developed using Arduino IDE with embedded C/C++ programming.

Main Functions: Sensor data processing Motor control

User interface handling IoT communication Algorithm:

Initialize system components Connect to Wi-Fi

Display welcome message Wait for user input Identify destination

Start movement Continuously check obstacles Adjust direction if needed Update IoT dashboard Reach destination Return to starting point

CONCLUSION AND FUTURE WORK

This paper presented the design and implementation of an intelligent reception and guidance robot using IoT technology. The system integrates embedded control, wireless communication, and obstacle detection to provide an efficient and cost-effective solution for automated guidance.

The developed robot demonstrates reliable performance in indoor environments and can be easily deployed in institutions requiring basic navigation assistance.

Future Enhancements:

Integration of AI-based voice assistant Camera-based navigation

Mobile app control SLAM-based mapping

Face recognition for personalized interaction

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