IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, May 2026
Impact Factor: 8.2

NEXUS ROBO: Smart Movable Robot for Felicitation Ceremonies

Prof.S.D.Shelar[1], Prof.S.R.Shinde[2], Pratiksha Jadhav[3], Snehal Jagtap[4], Soni Chabukswar[5], Rupali Deshpati[6], Bhumika Atote[7], Yashoda Valadadde[8]

[*1,2] Professors, CSE (Artificial Intelligence & Data Science) Department

[3,4,5,6,7,8] Students, CSE (Artificial Intelligence & Data Science) Department

Shree Siddheshwar Women's College of Engineering Solapur, Maharashtra, India

Abstract: *In today's modern world, automation and smart communication systems are becoming increasingly important in public interactions and event management. The proposed project, "Guest Welcome and Felicitation Robot," is an intelligent robotic system developed to provide an attractive, automated, and interactive method for welcoming guests during events, seminars, exhibitions, conferences, colleges, hotels, and other public gatherings. The robot is specially designed to create a professional and innovative welcoming experience through audio and visual communication technologies. The robot is equipped with a speaker module that allows it to play customized welcome messages. The speaker is connected to a mobile device using Bluetooth technology, which enables the operator to control and play audio messages wirelessly. One of the major advantages of the system is its multilingual capability, as audio messages can be changed and played in different languages according to the guest or event requirements. This feature makes the robot more flexible and suitable for diverse environments and audiences. In addition to audio communication, the robot also contains an LED display module that is capable of showing welcome messages, guest names, announcements, or any customized text. Similar to the speaker module, the LED display is also connected through Bluetooth communication, allowing users to update or modify the displayed text directly from a mobile phone in real time. This wireless communication system makes the project user-friendly, efficient, and easy to operate without requiring complex technical knowledge. The primary objective of this project is to reduce manual effort in welcoming guests while improving the quality of interaction and presentation. The robot enhances the overall experience of guests by providing a modern, engaging, and technologically advanced welcome system. It also demonstrates the practical implementation of robotics, embedded systems, wireless communication, mobile connectivity, and display technology in real-world applications. The project provides several advantages such as portability, ease of control, low operational cost, multilingual support, real-time message customization, and automation of repetitive tasks. Furthermore, the system can be upgraded in the future with advanced technologies such as artificial intelligence, facial recognition, voice interaction, autonomous movement, and IoT-based remote monitoring to increase its functionality and efficiency.In conclusion, the Guest Welcome and Felicitation Robot is an innovative and effective solution for automated guest interaction. The project successfully combines robotics and wireless communication technologies to create a smart and flexible welcoming system suitable for various social, educational, and professional environments.*

Keywords: Machine Learning, Secure Communication, ESP32, Robotics, Bluetooth Communication, Threat Detection, Event Automation, Embedded Systems.

DOI: 10.48175/IJARSCT-35773

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, May 2026
Impact Factor: 8.2

I. INTRODUCTION

Automation and robotics are becoming increasingly important in modern technology and are widely used in industries, hospitals, hotels, exhibitions, and public events. Traditional felicitation ceremonies and guest welcoming systems rely heavily on human effort, which may cause coordination difficulties, delays, and inefficiencies during events. To overcome these limitations, the project **NEXUS ROBO: Smart Movable Robot for Felicitation Ceremonies** was developed.

The robot provides a smart and interactive way of welcoming guests and presenting ceremonial items such as bouquets, trophies, shawls, and mementos. The system combines robotics, wireless communication, embedded systems, and display technologies to create an automated and attractive event management solution.

The robot uses Bluetooth communication to connect with a mobile device for wireless control. It can display customized scrolling text messages on an LED matrix display and play welcome audio through a speaker system.

The robot movement is controlled using DC motors and motor driver modules integrated with an ESP32 microcontroller. The proposed system reduces manual effort while adding innovation, professionalism, and audience engagement to ceremonies and public functions.

II. LITERATURE REVIEW

Robotics technology has gained significant importance in automation systems due to its efficiency, accuracy, and flexibility. Various service robots have been developed for hospitality, healthcare, industries, and event management applications.

Bluetooth-controlled robotic systems are commonly used because of their low cost, easy implementation, and reliable wireless communication. Embedded controllers such as Arduino and ESP32 are widely adopted for robotic applications due to their processing capability and IoT compatibility.

Several researchers have developed mobile-controlled robots capable of object transportation and automation tasks. However, most existing systems focus only on movement automation without integrating interactive communication features such as audio greeting systems and LED display messaging.

NEXUS ROBO improves existing robotic systems by integrating:

- Wireless Bluetooth communication
- Audio-based guest interaction
- LED matrix display technology
- Remote mobile control
- Event management automation

The proposed system provides a practical and innovative robotic solution specifically designed for felicitation ceremonies and public interaction systems.

III. METHODOLOGY

The methodology of the proposed system involves the integration of mechanical design, embedded systems, wireless communication, and robotic automation.

Step 1: Structure Design

The robot body is designed using lightweight plywood and acrylic materials to provide durability, stability, and attractive appearance.

Step 2: Motor Integration

DC gear motors are connected to wheels through motor driver circuits to enable movement in different directions.

Step 3: ESP32 Programming

The ESP32 microcontroller is programmed using Embedded C through Arduino IDE for movement control, LED display operation, and Bluetooth communication.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, May 2026
Impact Factor: 8.2

Step 4: Bluetooth Communication

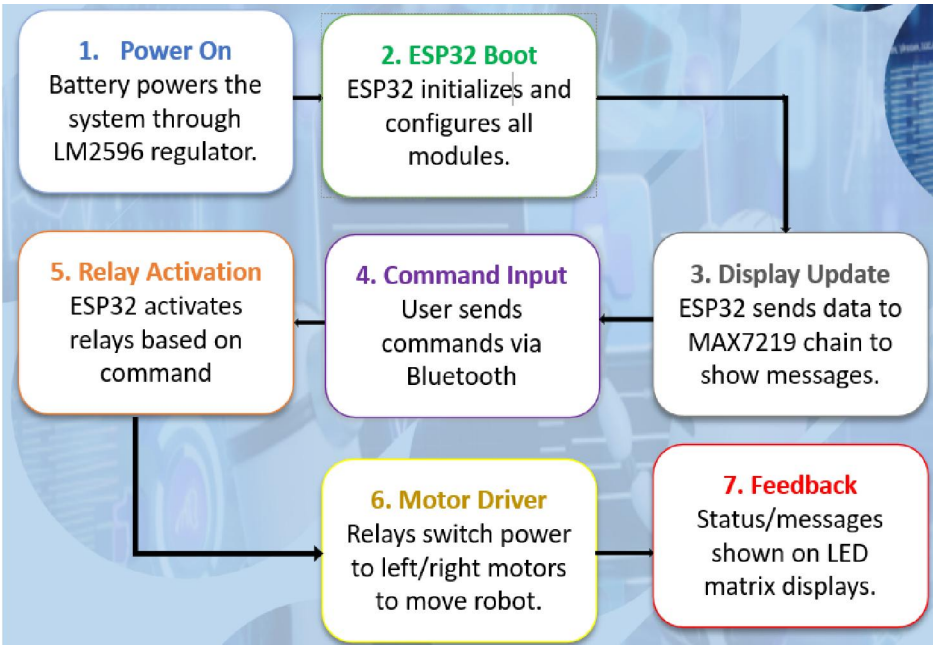
The robot establishes Bluetooth connectivity with a smartphone application for wireless command transmission.

Step 5: Audio and Display System

The Bluetooth audio receiver module receives welcome audio from the mobile device and plays it through the speaker system. Simultaneously, customized text messages are displayed on the LED matrix display.

Step 6: Object Delivery Mechanism

The robot carries bouquets and ceremonial items on a specially designed holding platform and safely delivers them during events. To avoid confusion, the family name must be written as the last part of each author name (e.g. John A.K. Smith).Each affiliation must include, at the very least, the name of the company and the name of the country where the author is based (e.g. Causal Productions Pty Ltd, Australia).



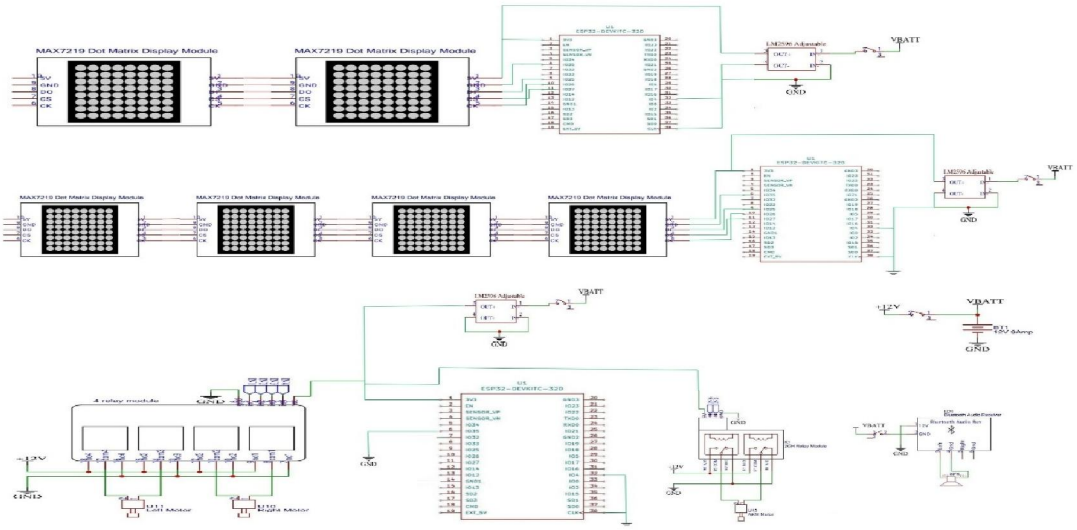
IV. SYSTEM ARCHITECTURE / PROPOSED MODEL

The system architecture consists of the following modules:

- Mobile Control Application
- Bluetooth Communication Module
- ESP32 Microcontroller
- Motor Driver Circuit
- DC Motors and Wheels
- LED Matrix Display
- Audio Amplifier and Speaker System
- Battery Power Supply

The mobile application sends commands wirelessly through Bluetooth. The ESP32 processes the commands and controls robot movement, LED display messages, and audio output.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, May 2026
Impact Factor: 8.2



V. TECHNOLOGIES USED

Technology	Purpose
ESP32 Microcontroller	Main control unit
Arduino IDE	Programming environment
Embedded C	Robot programming
Bluetooth Communication	Wireless control
MAX7219 LED Matrix	Scrolling message display
DC Motors	Robot movement
Motor Driver Module	Motor control
Speaker Module	Audio greeting system
Node.js	Backend control
HTML/CSS/JavaScript	Web dashboard

VI. MODULES DESCRIPTION

1. ESP32 Control Module

Controls all robotic operations including movement, LED display, and Bluetooth communication.

2. Motor Driver Module

Acts as an interface between ESP32 and DC motors.

3. Bluetooth Communication Module

Provides wireless communication between smartphone and robot.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, May 2026
Impact Factor: 8.2

4. LED Display Module
Displays scrolling welcome messages and guest names.

5. Audio Module
Plays multilingual welcome audio messages through speakers.

6. Power Supply Module
Provides regulated electrical power to all components.

7. Bouquet Holding Module
Carries bouquets, trophies, and ceremonial items securely.

VII. MODELING AND ANALYSIS

Test Parameter	Expected Result	Actual Result	Status
Power Supply Test	System should start	Successful startup	Pass
Motor Movement Test	Smooth movement	Smooth movement observed	Pass
Wireless Communication	Instant response	<1 second delay	Pass
Load Carrying Test	Carry ceremonial items	Up to 2 kg supported	Pass
Stability Test	Balanced movement	Stable operation	Pass
Battery Backup	Minimum 45 min	60 min achieved	Pass

Functional Testing Analysis

VIII. RESULTS AND DISCUSSION

The NEXUS ROBO prototype was successfully implemented and tested under real event conditions. The robot demonstrated efficient movement control, stable wireless communication, and smooth ceremonial item delivery.

The Bluetooth communication system maintained reliable connectivity within 8–10 meters. The robot responded to commands almost instantly with very low delay.

The LED matrix display effectively showed customized scrolling text messages while the speaker module played multilingual welcome audio. The carrying platform safely transported bouquets and trophies without affecting movement stability.

The system significantly reduced manual effort and improved professionalism during ceremonies.

IX. ADVANTAGES OF THE SYSTEM

- Reduces manual effort during events
- Wireless mobile-based operation
- Attractive and interactive guest welcoming
- Low-cost robotic implementation
- Multilingual audio support
- Customizable LED display
- Smooth and stable robotic movement
- Easy maintenance and operation
- Real-time control through smartphone
- Enhances audience attraction and professionalism

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, May 2026
Impact Factor: 8.2

X. LIMITATIONS

- Robot works best on smooth surfaces
- Limited Bluetooth communication range
- Battery backup is limited
- Can carry only lightweight items
- Requires manual control
- Obstacle detection is not included

XI. FUTURE SCOPE

- Future enhancements may include:
- AI-based autonomous navigation
- Obstacle detection sensors
- Voice command integration
- Face recognition system
- IoT-enabled remote monitoring
- Wi-Fi-based communication
- Automatic path planning
- Gesture-based robot control
- Cloud-connected event management system

XII. CONCLUSION

The project NEXUS ROBO: Smart Movable Robot for Felicitation Ceremonies successfully demonstrates the practical application of robotics, embedded systems, Bluetooth communication, and automation technologies in modern event management systems.

The developed robot provides an efficient, attractive, and innovative solution for guest welcoming and ceremonial item delivery. The prototype successfully achieved stable movement, reliable wireless communication, customizable LED display operation, and multilingual audio interaction.

The project reduces manual effort while improving professionalism and audience engagement during events. The system also serves as a strong educational platform for learning robotics, embedded systems, wireless communication, and automation concepts.

The proposed system can be further enhanced using artificial intelligence, IoT technologies, and autonomous navigation features to create a fully intelligent robotic event management platform.

XIII. ACKNOWLEDGEMENT

The authors sincerely thank the Department of Computer Science & Engineering (Artificial Intelligence and Data Science), SSWCOE, Solapur, for providing laboratory facilities, technical support, and guidance throughout the development of this project. The authors also express gratitude to faculty members, project guides, and team members for their continuous encouragement and valuable suggestions.

XIV. FIGURE NAMES

Overall System Architecture
Block Diagram of NEXUS ROBO
Circuit Diagram of Robot System
Bluetooth Communication Flow
Activity Diagram of Robot Operation

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, May 2026
Impact Factor: 8.2

ESP32 Control System Architecture
LED Matrix Display Workflow
Robot Movement Control Diagram
Mobile Application Interface
Functional Testing Analysis Graph

XV. COMPARATIVE ANALYSIS TABLE

Parameter	Manual Method	NEXUS ROBO
Human Effort	High	Very Low
Innovation	Limited	High
Time Efficiency	Moderate	High
Audience Attraction	Moderate	Excellent
Accuracy	Depends on person	Consistent
Automation	Not Available	Fully Supported
Technology Demonstration	Limited	Strong

REFERENCES

[1] M. Banzi, Getting Started with Arduino, Maker Media, 2020.
[2] Espressif Systems, ESP32 Technical Reference Manual, 2025.
[3] K. Ogata, Modern Control Engineering, Pearson Education, 2019.
[4] S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Pearson, 2021.
[5] A. S. Tanenbaum, Computer Networks, Pearson Education, 2020.
[6] J. Craig, Introduction to Robotics: Mechanics and Control, Pearson, 2019.
[7] Arduino Documentation Team, Arduino IDE and Embedded C Programming Guide, 2024.
[8] MAX7219 LED Display Datasheet, Maxim Integrated, 2023.
[9] Bluetooth SIG, Bluetooth Wireless Communication Specification, 2024.
[10] R. Siegwart and I. Nourbakhsh, Introduction to Autonomous Mobile Robots, MIT Press, 2021