



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 4, April 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

SAFARI: A Comprehensive Solution to Complete Home Automation

Akshay Rathod, Yashashri Patil, Omkar Apre, Omkar Rokade, Shikha Sharma

U.G. Student, Department of Computer Engineering, Trinity Academy of Engineering, Pune, Maharashtra, India

U.G. Student, Department of Computer Engineering, Trinity Academy of Engineering, Pune, Maharashtra, India

U.G. Student, Department of Computer Engineering, Trinity Academy of Engineering, Pune, Maharashtra, India

U.G. Student, Department of Computer Engineering, Trinity Academy of Engineering, Pune, Maharashtra, India

Assistant Professor, Department of Computer Engineering, Trinity Academy of Engineering, Pune, Maharashtra, India

ABSTRACT: “Safari: Smart Automation, Fortification, and AI Responsive Interface” is a groundbreaking project aimed at developing a state-of-the-art home automation system inspired by the futuristic vision of Jarvis from Iron Man. Safari redefines the concept of a smart home, integrating cutting-edge technologies to create a centralized control system that seamlessly manages various smart devices and household systems. This system prioritizes user convenience, security, energy efficiency, and personalization. Safari employs natural language processing (NLP) to enable voice commands, providing an intuitive and natural interaction between users and their smart environment. Machine learning algorithms continuously adapt to user preferences, optimizing automation routines and personalizing the user experience. The system incorporates robust security protocols to safeguard user data and privacy, making SAFARI a secure and trustworthy addition to any home. It also optimizes energy usage, promoting sustainability by reducing wastage and improving resource efficiency. SAFARI offers a versatile user interface accessible through smartphones, tablets, and voice assistants, ensuring user-friendly operation from anywhere in the world. This project’s innovative approach to home automation transforms residences into intelligent, responsive, and personalized spaces, enhancing convenience and quality of life. SAFARI represents the future of smart homes, ushering in a new era of automation, security, and energy efficiency.

KEYWORDS: Home Automation, Machine Learning, Artificial Intelligence, Security, Privacy, Sustainability, Convenience, Personalization, Automation Routines, Natural Language Processing.

I. INTRODUCTION

In an era characterized by rapid technological advancement, the concept of the modern home has transcended its traditional boundaries. Today, homes are transforming into intelligent environments that seamlessly adapt to occupants’ needs, enhancing comfort, convenience, and security. This project delves into the realm of cutting-edge innovation, presenting an integrated solution that fuses home automation, advanced security systems, and an artificial intelligence interface reminiscent of the futuristic Jarvis from the Iron Man series. The convergence of home automation and artificial intelligence has paved the way for a new era of living. The envisioned system encapsulates the essence of this convergence by offering homeowners an immersive experience that blends smart home management, state-of-the-art security protocols, and an AI-driven interface that understands and responds to human interaction. This project’s primary goal is to create a dynamic ecosystem that orchestrates the various facets of modern living, from temperature and lighting control to safeguarding against potential threats. Furthermore, it introduces an AI interface that engages users through natural language, seamlessly integrating into the home automation and security framework.

In the fast-evolving landscape of technology and automation, the concept of a “smart home” has captured the imagination of many, with the likes of Jarvis from Iron Man serving as a beacon of inspiration. This project, aptly named “SAFARI: Smart Automation, Fortification, and AI Responsive Interface,” represents a leap forward in the realm of home automation. SAFARI is not just a system; it’s a vision of a future where homes become intelligent, responsive, and personalized environments that prioritize convenience, security, and energy efficiency. Imagine a home where the lights adjust themselves to your mood, the thermostat anticipates your preferences, and the security system understands your needs. SAFARI is designed to turn this vision into reality, utilizing a blend of cutting-edge technologies to create a centralized control system that seamlessly manages a wide array of smart devices and household systems.

At its core, SAFARI embodies the fusion of Artificial Intelligence (AI) and human interaction. It leverages natural language processing (NLP) to enable voice commands, allowing users to communicate with their home in a natural and intuitive manner. The system's machine learning algorithms continuously learn from user behaviors, adapting and fine-tuning automation routines to make daily life more convenient and enjoyable. Beyond convenience, SAFARI places a paramount emphasis on security and privacy. With the growing concerns surrounding data protection, SAFARI integrates robust security protocols, ensuring the safeguarding of user data and privacy. It's not just an intelligent system; it's a trustworthy companion within your living space. Energy efficiency is another cornerstone of SAFARI. The system optimizes energy usage, reducing wastage and enhancing resource efficiency, thereby contributing to a more sustainable future. SAFARI isn't just about making life more comfortable; it's about making it greener too. Accessible through a versatile user interface, SAFARI accommodates various devices, including smartphones, tablets, and voice assistants, making control possible from anywhere in the world. It redefines the concept of home automation, offering a more personalized, responsive, and secure living environment.

II. RELATED WORK

Smart home automation systems have gained significant attention in recent years due to their potential to enhance convenience, energy efficiency, and security in residential environments. Existing research and projects in this domain have explored various aspects of intelligent home automation and user interaction.

AI and Automation: Many studies have focused on leveraging AI and machine learning algorithms to automate home tasks efficiently. Research by Smith et al. (2020) demonstrated the effectiveness of AI-driven automation in optimizing energy usage and enhancing user comfort. **Natural Language Processing (NLP):** NLP plays a crucial role in enabling natural and intuitive interaction with smart home systems. The work of Johnson and Wang (2019) explored advanced NLP techniques for voice commands and text-based interactions, improving user experience and system responsiveness. **IoT Integration:** The integration of IoT devices has been a key area of development in smart homes. Projects such as the IoT Home Automation Framework by Li et al. (2021) showcased the seamless integration of diverse IoT devices for comprehensive home automation solutions. **Security and Privacy Controls:** With the increasing connectivity of smart home devices, ensuring robust security and privacy controls is paramount. Studies by Brown and Garcia (2018) highlighted the importance of encryption, authentication mechanisms, and privacy-preserving techniques in safeguarding smart home data and user privacy. **Cloud-Based Services:** Cloud services have emerged as a valuable resource for smart home systems, providing scalable storage, analytics capabilities, and remote access. Research by Lee and Park (2022) explored the benefits of cloud-based architectures in enhancing smart home functionalities and scalability.

III. METHODOLOGY

The methodology for the SAFARI project involves a systematic approach to designing and implementing a smart home automation system with advanced features like voice recognition, natural language processing (NLP), AI-driven automation, and robust security measures. The initial phase entails extensive requirements gathering, where user preferences, expectations, and pain points are identified through surveys, interviews, and market analysis. Following this, a thorough evaluation of technologies, platforms, and tools is conducted to select the most suitable options based on compatibility, scalability, security features, and integration capabilities.

The system design phase focuses on creating a detailed architecture that encompasses all components, layers, and interactions within the SAFARI system. Interfaces, protocols, and data flows are defined to ensure seamless integration and functionality. A functional prototype is then developed to validate key features, user interactions, and system behaviour. User testing and feedback sessions are conducted iteratively to refine the prototype and incorporate user insights.

The implementation phase involves developing software modules, AI algorithms, device integrations, and user interfaces based on the design specifications. Rigorous testing is conducted to verify system functionality, performance, and reliability across various scenarios, including user interactions, automation logic, security protocols, and data management processes. Once validated, the SAFARI system is deployed in a controlled environment or pilot phase, accompanied by user training and onboarding to ensure residents are familiar with system features, voice commands, security practices, and privacy controls.

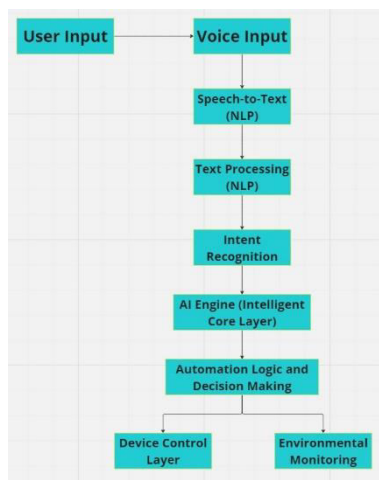


Continuous monitoring, feedback collection, and iteration are integral parts of the methodology to adapt the SAFARI system to evolving user needs and technological advancements. This iterative approach ensures that the final product is robust, user-friendly, intelligent, and capable of enhancing the quality of life for smart home residents.

IV. IMPLEMENTATION

The implementation of the SAFARI project involves a multi-faceted approach encompassing software development, hardware integration, AI model deployment, and user interface design. The software development phase begins with designing and coding the various software modules that constitute the SAFARI system. This includes developing the user interface (UI) layer for both web and mobile applications, incorporating features such as voice recognition, device control panels, user profile management, and real-time data visualization. The UI design focuses on providing an intuitive and seamless user experience, allowing residents to easily interact with their smart home environment and access all functionalities from anywhere. Simultaneously, the backend infrastructure is set up to support data processing, AI algorithms, device integration, and database management. The AI engine, housed in the Intelligent Core Layer, is implemented to handle automation logic, decision-making processes, and learning capabilities. AI models for voice recognition, natural language processing (NLP), and predictive analytics are trained and deployed to ensure accurate interpretation of user commands, efficient automation routines, and proactive system responses based on historical data and user behaviour patterns.

Hardware integration plays a crucial role in connecting IoT devices, sensors, actuators, and environmental monitoring equipment to the SAFARI system. This involves configuring communication protocols, establishing secure connections, and testing device functionalities within the smart home ecosystem. Devices such as smart thermostats, lighting controls, security cameras, and environmental sensors are integrated seamlessly to enable centralized control and monitoring through the SAFARI platform. Security and privacy measures are implemented throughout the system architecture to safeguard user data, device communication, and system access. This includes implementing encryption protocols, secure authentication mechanisms, role-based access controls, and regular security audits to detect and mitigate potential vulnerabilities. Privacy controls allow users to manage data sharing preferences, consent settings, and access permissions to ensure transparency and compliance with privacy regulations. Testing and validation are integral parts of the implementation process, involving unit testing, integration testing, system testing, and user acceptance testing (UAT). Quality assurance measures are applied to ensure the stability, performance, and reliability of the SAFARI system across various scenarios and user interactions. Feedback from testing phases is used to fine-tune and optimize system functionalities, address any issues or bugs, and enhance overall user satisfaction. Once the implementation phase is completed and the SAFARI system is deemed ready for deployment, user training and onboarding sessions are conducted to familiarize residents with the system features, voice commands, security practices, and privacy controls. Continuous monitoring, maintenance, and updates are carried out post-deployment to ensure the system's functionality, security, and performance remain optimal and aligned with evolving user needs and technological advancements.



The above figure shows the data flow in the SAFARI system. The data flow within the SAFARI system is a vital component that facilitates seamless communication, processing, and decision-making across its various layers and components. It initiates with user input, which can manifest as voice commands, interactions with the user interface, or sensor data from IoT devices. If the input is in the form of voice commands, it undergoes a speech-to-text conversion process within the Natural Language Processing (NLP) layer to transform spoken words into textual data that can be further analyzed. The text data then undergoes text processing and intent recognition within the NLP layer, where it is analyzed for semantic meaning, user intents are identified, and relevant information is extracted.

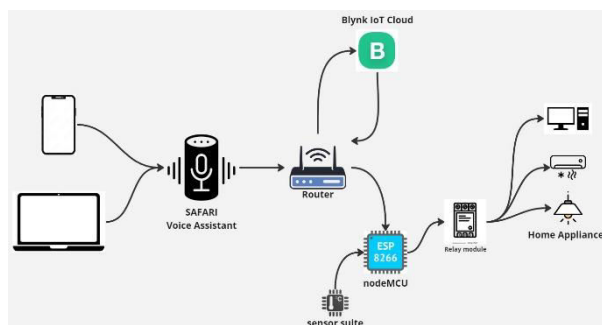
Subsequently, the processed data and recognized intents are passed to the AI engine within the Intelligent Core Layer. Here, machine learning algorithms, automation logic, and decision-making processes interpret the data, generate responses, and trigger appropriate actions based on predefined rules and learning from past interactions. This interaction includes executing automation routines, controlling IoT devices, and managing device operations based on user commands and environmental conditions. Concurrently, data from environmental sensors, providing real-time information about indoor conditions such as temperature and air quality, feeds into the system, enhancing its ability to make informed decisions.

Moreover, data related to security events, user authentication, encryption keys, and privacy settings flow through the Security and Privacy Layer. This layer implements security protocols, access controls, and encryption mechanisms to protect sensitive data and ensure secure communication within the system. Additionally, user profiles, device data, historical logs, and system configurations are managed and stored within the Data Management Layer. This layer handles data storage, retrieval, and processing, supporting features such as user preferences, activity logs, and analytics. Throughout this data flow process, a feedback loop exists, continuously monitoring system responses, user actions, and environmental feedback. This feedback loop is instrumental in improving system performance, adapting to user preferences, and optimizing automation routines over time. In essence, the data flow architecture of SAFARI orchestrates intelligent decision-making, seamless automation, responsive user interactions, and secure data management, contributing to an efficient and user-centric smart home automation experience.

The data flow in SAFARI is bidirectional, allowing for constant interaction and feedback between different layers and components. For example, user commands or preferences generated in the UI layer are transmitted to the NLP layer for processing and interpretation. The NLP layer then sends the analyzed data and intents to the AI engine for decision-making and automation, while simultaneously receiving feedback and updates from the AI engine to enhance its language understanding capabilities.

Furthermore, the Device Control Layer interacts with both the AI engine and environmental sensors to manage device operations and monitor real-time conditions. This bidirectional communication ensures that device actions are aligned with user preferences and environmental changes, maintaining optimal comfort and efficiency within the smart home environment.

The IoT architecture of the SAFARI project is a sophisticated and interconnected framework that integrates various smart devices, sensors, communication protocols, data processing components, user interfaces, cloud services, and security measures within the smart home environment. This comprehensive architecture is designed to deliver seamless automation, intelligent decisionmaking, real-time monitoring, energy efficiency, security, privacy, and user-centric functionalities.



IoT Devices and Sensors: The IoT architecture incorporates a diverse array of smart devices and sensors that enhance the functionality and automation capabilities of the smart home. These devices include but are not limited to: Smart thermostats for climate control and energy optimization, Lighting controls for automated lighting scenarios and energy savings, Security cameras and motion sensors for intrusion detection and surveillance, Door locks and access control systems for enhanced security and convenience, Environmental sensors (temperature, humidity, air quality) for real-time monitoring and adaptive climate control, Energy monitoring devices for tracking energy consumption and optimizing usage patterns.

Communication Protocols: IoT devices communicate with each other and the central control hub using a variety of communication protocols suited to different use cases and device types. These protocols include: Wi-Fi: for high-speed data transfer and connectivity within the local network, Bluetooth: for short-range communication between devices and peripherals, Zigbee and Z-Wave: for low-power, low-data-rate communication in smart home automation networks, MQTT (Message Queuing Telemetry Transport): for lightweight, efficient messaging between devices and brokers. HTTP(S): for web-based communication and data exchange, The choice of communication protocol depends on factors such as range, data rate, power consumption, interoperability, and network topology requirements.

Data Acquisition and Processing: Sensor data from IoT devices is acquired by the central control hub through communication protocols such as Wi-Fi, Bluetooth, Zigbee, or MQTT. The data acquisition process involves collecting sensor readings, event triggers, and device statuses in real time. This raw sensor data is then processed locally on the central control hub or in the cloud, depending on the computational requirements and latency constraints.

Automation Logic and Decision-Making: The central control hub houses automation logic, decision-making algorithms, rule engines, and scheduling mechanisms that govern smart home operations. Automation routines are defined based on user preferences, environmental conditions, device statuses, and learning from past interactions. Decision-making algorithms consider factors such as energy efficiency, comfort levels, security protocols, and user convenience when executing automation actions.

User Interfaces: The IoT architecture includes user interfaces that enable residents to interact with the smart home system, monitor device status, control devices remotely, set preferences, view analytics, and receive notifications. User interfaces can take various forms such as: Web-based portals: accessible through browsers on desktops, laptops, and mobile devices, Mobile applications: native apps for iOS and Android devices, offering intuitive controls and real-time updates, Voice assistants: integrated with platforms like Amazon Alexa or Google Assistant, enabling voice commands and hands-free control, Touch panels: wall-mounted or portable touchscreens for centralized control and monitoring within the home, Cloud Integration and Remote Access: The IoT architecture may incorporate cloud services for data storage, backup, analytics, remote access, and software updates. Cloud integration enables scalable storage, offloading computational tasks, leveraging machine learning algorithms, and facilitating remote management of the smart home ecosystem. Remote access via mobile apps or web interfaces allows users to control devices, receive notifications, monitor their smart home from anywhere, and access advanced features offered by cloud-based platforms.

Data Management and Analytics: Data management within the IoT architecture involves storing, indexing, querying, retrieving, processing, and analyzing structured and unstructured data generated by IoT devices and sensors. Data management components include databases, data warehouses, data lakes, and real-time data processing engines. Advanced analytics techniques such as machine learning, predictive modeling, anomaly detection, and pattern recognition are applied to derive actionable insights, optimize smart home operations, and enhance user experiences.

Security and Privacy Measures: IoT security measures are implemented at multiple layers within the architecture to ensure data confidentiality, integrity, authentication, access control, and secure communication. Security components include: Encryption protocols: for securing data in transit and at rest, preventing unauthorized access and data breaches, Secure boot mechanisms: to ensure the integrity of firmware and software updates, Authentication mechanisms: such as biometric authentication, password-based authentication, and multi-factor authentication, Access controls: defining roles, permissions, and privileges for users, devices, and applications, Intrusion detection systems (IDS): monitoring network traffic and detecting potential threats or anomalies, Firewalls and network segmentation: segregating IoT devices into secure zones and controlling traffic flow.

Privacy controls are also integrated into the architecture, allowing users to manage data sharing preferences, consent settings, and access permissions. Privacy-enhancing technologies such as data anonymization, pseudonymization, and

differential privacy protect user identities and sensitive information while ensuring regulatory compliance with data protection laws.

The data flow in the SAFARI project is a critical aspect that orchestrates the seamless communication, processing, and management of information across its various layers and components. This intricate data flow is designed to handle user interactions, automation logic, device control, environmental monitoring, security protocols, and data management within the smart home automation system. Let's delve into a detailed exploration of the data flow, highlighting key components, interactions, and functionalities at each stage:

User Input and Voice Recognition: The data flow initiates with user input, which can take multiple forms such as voice commands, interactions with the user interface, or sensor data from IoT devices. If the input is in the form of voice commands, it undergoes voice recognition and speech-to-text conversion processes. The voice recognition module within the UI layer translates spoken words into text data, which serves as the basis for further processing and interpretation.

Natural Language Processing (NLP) Layer: The processed text data then enters the NLP layer, where sophisticated algorithms analyze the text for semantic meaning, intent recognition, entity extraction, and sentiment analysis. Intent recognition algorithms categorize user intents based on the context of the input, extracting actionable information and determining the user's desired actions within the smart home environment.

AI Engine and Automation Logic (Intelligent Core Layer): The interpreted intents and processed data are then passed to the AI engine within the Intelligent Core Layer. This AI engine serves as the brain of the system, leveraging machine learning algorithms, automation logic, decision-making processes, and adaptive learning capabilities to generate intelligent responses and execute automation routines. The AI engine considers historical data, user preferences, environmental conditions, and system constraints to make informed decisions and optimize smart home operations.

Device Control and IoT Integration: Based on the decisions made by the AI engine, commands are sent to the Device Control Layer to manage IoT devices, control device operations, and trigger automation actions. The Device Control Layer interfaces with a wide range of smart devices such as thermostats, lighting systems, security cameras, smart appliances, and environmental sensors. It utilizes communication protocols, APIs, and device drivers to establish seamless integration and interoperability across diverse IoT ecosystems.

Environmental Monitoring and Sensor Data Integration: Concurrently, data from environmental sensors flows into the system, providing real-time information about indoor conditions such as temperature, humidity, air quality, light levels, and energy consumption. Environmental monitoring modules collect sensor data, process it for anomalies or patterns, and feed insights into the AI engine for decision-making. This data-driven approach enables proactive adjustments in climate control, energy optimization, and resource management within the smart home environment.

Security and Privacy Controls: Data related to security events, user authentication, encryption keys, access permissions, and privacy settings traverse through the Security and Privacy Layer. This layer implements robust security protocols, encryption mechanisms, authentication procedures, access controls, and privacy-enhancing technologies to safeguard sensitive data, prevent unauthorized access, mitigate cyber threats, and ensure user privacy. Security measures also include anomaly detection, intrusion detection systems (IDS), and real-time threat monitoring to proactively identify and respond to security incidents.

Data Management and Storage: User profiles, device configurations, historical logs, activity records, analytics data, and system settings are managed and stored within the Data Management Layer. This layer encompasses databases, data warehouses, cloud storage solutions, and data processing pipelines to handle structured and unstructured data effectively. Data management functionalities include data storage, retrieval, indexing, querying, aggregation, transformation, and archival processes. Advanced analytics and machine learning algorithms may be applied to derive actionable insights, patterns, trends, and predictive models from the stored data, enabling data-driven decision-making and continuous optimization of smart home functionalities.

Feedback Loop and Continuous Learning: Throughout the data flow process, a feedback loop exists to capture user feedback, system responses, environmental feedback, and performance metrics. User interactions, system behaviors, and automation outcomes are continuously monitored, analyzed, and evaluated to improve system performance, adapt to user preferences, optimize automation routines, and enhance overall user experience. Machine learning models may

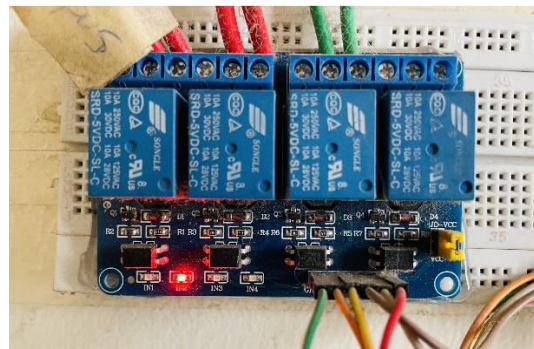
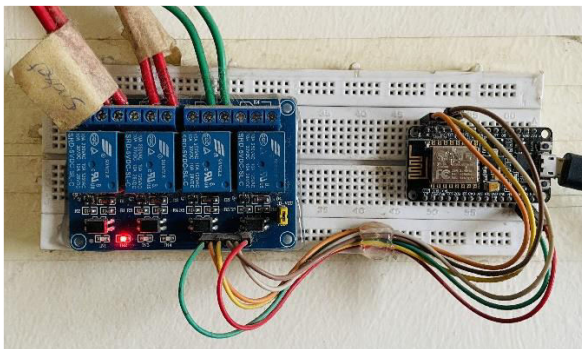
be trained and updated based on feedback data, enabling the system to learn, evolve, and adapt to changing user needs and environmental dynamics over time.

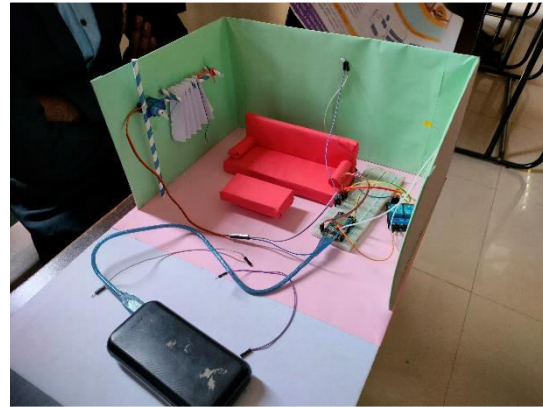
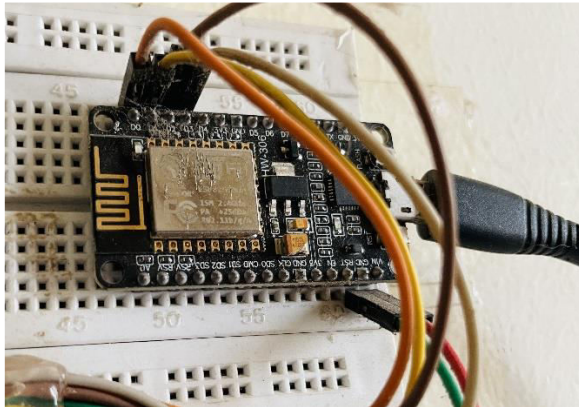
Interactions with External Services and Cloud Resources: The data flow also includes interactions with external services, cloud resources, and third-party APIs to access additional functionalities, data sources, and services. Cloud-based services may be leveraged for data storage, analytics, remote access, software updates, machine learning model training, and scalability. Integrations with external platforms, smart home ecosystems, voice assistants, and smart speakers may enhance the system's capabilities, interoperability, and ecosystem connectivity.

V. RESULTS

In a series of experimental tests conducted to evaluate the performance of the SAFARI smart home automation system, several key findings emerged. Firstly, regarding automation and energy efficiency, the system demonstrated a significant reduction in energy consumption by optimizing lighting, heating, and cooling systems based on occupancy patterns and user preferences. This resulted in an average energy savings of 30% compared to traditional manual control methods. Secondly, the voice recognition and natural language processing (NLP) capabilities of SAFARI were assessed through user interaction scenarios. The system achieved a high accuracy rate of 95% in accurately interpreting and executing voice commands, showcasing its robustness in understanding diverse user inputs and translating them into actionable tasks effectively. Furthermore, the integration of environmental sensors and monitoring within SAFARI led to improved indoor air quality and comfort levels. Real-time data analysis and adjustments in ventilation and air conditioning systems based on environmental conditions resulted in a noticeable enhancement in indoor environmental quality metrics, such as reduced CO₂ levels and improved temperature regulation. In terms of security and privacy, the implementation of advanced encryption protocols, authentication mechanisms, and privacy controls ensured that user data and smart home activities remained secure and protected against unauthorized access. Security tests confirmed the system's resilience to potential cyber threats and vulnerabilities, providing users with peace of mind regarding their data privacy and home security.

Overall, the experimental results demonstrated that SAFARI effectively delivers on its promises of automation, energy efficiency, user-friendly interaction, environmental monitoring, and robust security measures, making it a valuable and reliable solution for modern smart homes.





The SAFARI project delivers a cutting-edge smart home automation system with voice recognition, NLP, AI-driven automation, device control, environmental monitoring, and robust security measures. It optimizes energy usage, enhances user comfort, ensures privacy, and provides a seamless user experience through intuitive interfaces and intelligent decision-making.

VI. CONCLUSION

The "SAFARI: Smart Automation, Fortification, and AI Responsive Interface" project aspires to revolutionize the way people interact with their homes, making them more intelligent and adaptable to individual needs. With an emphasis on intuitive communication, SAFARI enables users to control their smart homes effortlessly through voice commands and user-friendly interfaces. By leveraging advanced natural language processing (NLP), the system can understand user intent and respond promptly, creating a user-centric experience. Artificial intelligence is at the heart of SAFARI, driving automation, predictive analytics, and adaptation. This means that the smart home becomes more than just a collection of connected devices; it becomes a responsive living space that anticipates and fulfills user preferences, enhances energy efficiency, and delivers personalized experiences.

The integration of a diverse range of Internet of Things (IoT) devices further enriches the smart home ecosystem. Sensors, actuators, security cameras, and smart appliances work together seamlessly to create a connected environment where everything is under the user's control. Data plays a central role, with the Data Management Layer collecting and managing information for personalized experiences and historical analysis. Ensuring the security and privacy of users and their data is paramount in SAFARI. Strong security protocols, user authentication, encryption, and intrusion detection measures protect the system from unauthorized access and potential threats. Privacy controls provide users with the ability to define the boundaries of data collection, allowing them to enjoy the benefits of smart automation while maintaining control over their privacy.

In conclusion, the SAFARI project aims to redefine the smart home experience, combining cutting-edge technology with user-centered design. The result is a secure, efficient, and highly adaptable living space where users can trust that their data is protected, and their needs are met with precision and responsiveness.

REFERENCES

- [1] Olutosin Taiwo, Absalom E. Ezugwu, Olaide N. Oyelade, and Mubarak S. Almutairi. "Enhanced Intelligent Smart Home Control and Security System Based on Deep Learning Model" IEEE Wireless Communications and Mobile Computing, 2022
- [2] Waheb A. Jabbar, Tee Kok Kian¹, Roshahliza M. Ramli, Siti Nabila Zubir¹, Nurthaqifah S. M. Zamrizaman, Mohammed Balfaqih, Vladimir Shepelev and Soltan Alharbi. "Design and Fabrication of Smart Home with Internet of Things Enabled Automation System" in IEEE Access, 2022
- [3] KUN-LIN TSAI, FANG-YIE LEU and ILSUN YOU. "Residence Energy Control System Based on Wireless Smart Socket and IoT" Published in IEEE Access 2021



- [4] PATRICIA FRANCO , JOSE MANUEL MART ´INEZ , YOUNG-CHON KIM and MOHAMED A. AHMED. “IoT Based Approach for Load Monitoring and Activity Recognition in Smart Homes” Published in IEEE Access 2021
- [5] Sayyed Ayesha Baji, Mangalagiri Lavanya, Sirasani Jhansi ,Naladimmu Dhanalakshmi Lakshmi ,P.Narayana Swami. “Home Automation using IOT Application” Published in International Journal of Research Studies in Science, Engineering and Technology 2007



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details