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Smart Apartment Management: A Scalable Android Application for Modern Residential Solutions

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***Abstract* - The Smart Apartment Management System (SBMS) is an Android application designed to enhance the management of residential and commercial buildings by addressing common social issues such as communication gaps, inefficient maintenance processes, and lack of community engagement. Developed using Android Studio and Firebase, the app offers features like real-time communication between residents and management, automated maintenance requests, and a platform for community interaction. By leveraging cloud- based storage and realtime data synchronization, the application aims to improve operational efficiency, enhance resident satisfaction, and faster with stronger sense of community. This project focuses on using technologies like Java, Android Studio, and Firebase to create a user-friendly and scalable solution for building management.**

Keywords: Android Application, Android Studio & Firebase.

I. INTRODUCTION

This literature review presents a conceptual framework that creates questions to guide the purpose of this study. It involves review of a number of publications and referred academic journals organized under central themes. This will lead to reduction in energy consumption in buildings –most especially commercial buildings such as factories, hospitals, hotels, office complexes, shopping malls etc. by 30 – 40% (ARUP, 2016). [2]This research investigates the importance of building management systems (BMS), its processes, workflows, current trends, available technologies, and the future of BMS utilization. Specific areas to determine which factors may predict successful adoption, integration and deployment in commercial buildings was also reviewed. In this era, where energy management is the concern of everyone, buildings are being constructed in a manner to provide maximum comfort and ease to the people with minimum energy utilization.

This is only possible with the help of controlling devices that are to be installed in a building during construction. This control can be of any type, from simple switching on and off of lights, to water motor control and many more. Therefore the main idea of designing the system is to automate these building operations in the resourceful manner (Swarnalatha, 2011). Besides controlling, security factor has also been kept as a concern with the password protection and QR ID. Cameras control, fire alarms systems, main gate security and main gate barrier automation system has been put at priority in this systems (BMS).[5]

The Smart Building Management System is an innovative Android application aimed at revolutionizing the way buildings, particularly apartments, are managed. Traditional building management methods often face challenges in communication, service delivery, and community engagement. This project seeks to address these challenges by providing a digital platform that streamlines communication between residents and management, facilitates maintenance requests, and enhances community interaction. Developed using Java in front end and Android Studio, and utilizing Firebase for real-time data synchronization and cloud storage, this application is designed to be both scalable and user-friendly. The project targets the field of smart building technology, specifically focusing on software solutions that improve the quality of life for residents and the efficiency of building management.[6]

The necessity for a Apartment Building Management System arises from the increasing complexities in managing large residential and commercial buildings or apartment.[8] Communication breakdowns, delayed maintenance responses, and the lack of a cohesive community platform often lead to resident dissatisfaction. By providing a centralized digital solution, the proposed Android application aims to solve these issues, making building management more efficient and responsive. The app will enable residents to communicate directly with management, report issues in real-time, and participate in community discussions, thus fostering a sense of belonging and improving the overall living experience.[3]

The SBMS application provides real-time access to critical building systems such as lighting, HVAC (Heating, Ventilation, and Air Conditioning), security, and energy management. Users can adjust settings, receive alerts, and view performance metrics from anywhere, enhance the responsiveness and efficiency of building operations and functions.[4] The application is designed with an intuitive

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interface, making it accessible to users with varying levels of technical expertise. Furthermore, the SBMS app promotes sustainability by offering insights into energy usage patterns and recommending actions to reduce waste.

This not only the lower operational costs but also contributes to environmental conservation efforts. Enhanced security features ensure that building access and surveillance can be managed remotely, providing peace of mind to both managers and residents. In summary, the Smart Building Management System Android application is a cutting-edge solution that simplifies building management, enhances operational efficiency, and fosters a smarter, more sustainable living and working environment.[6]

A Smart Apartment Management System (SBMS) is an innovative solution designed to manage and optimize various functions within a building using technology, automation, and real-time monitoring. This system can be particularly powerful when integrated into an Android application, offering convenience, efficiency, and control at the fingertips of building managers, occupants, and administrators. The primary goal of a Smart Building Management System is to enhance the overall comfort, security, energy efficiency, and operational performance of a building by providing centralized control over various subsystems like lighting, HVAC (heating, ventilation, and air conditioning system), security systems, access control, and energy management.[7]

Features of the Smart Apartment Management System Android Application:- Real-Time Monitoring: The application provides live updates on various building parameters like temperature, humidity, energy consumption, air quality, and occupancy levels. [8] By using sensors installed throughout the building, users can visualize data in real time, enabling quick responses to any issues or anomalies. Automation and Scheduling: Users can set schedules for various building systems such as lighting and HVAC. Automation rules can be created to adjust settings based on occupancy, weather conditions, or time of day. For example, the application can automatically dim lights when no one is present or adjust the thermostat based on current temperature readings.[2]

Remote Access and Control: One of the most significant advantages of an Android-based SBMS is the ability to control building systems remotely. Users can operate HVAC systems, manage lighting, open or close doors, and monitor security cameras, all through their Android devices. This remote capability enhances user convenience and provides the flexibility to manage building systems from anywhere, anytime. Energy Management: The application includes energy monitoring and analysis tools that help users track energy consumption patterns and optimize usage to reduce costs. It provides all insights in how much energy each system consumes and offers recommendations for energy-saving measures. This feature is essential for buildings aiming for sustainability and reduced carbon footprints.[9]

Security and Access Control: Security is a most important component of smart building management. The application integrates with security systems, including surveillance cameras system, alarm systems, and access control mechanisms. Users can view live camera feeds, receive alerts for unauthorized access attempts, and manage building access by granting or revoking permissions. This ensures that the building is secure and that users have peace of mind regarding safety. User Management and Customization: The application supports multiple user roles and permissions, allowing administrators to control who has access to specific functions within the app. For example, facility managers may have full control over all building systems, while occupants may only have access to certain areas like lighting and temperature control in their own spaces. The customization options make it suitable for a wide range of users, from tenants and office workers to building operators.[9]

Advantages of a Smart Apartment Management System Android Application:- Increased Efficiency: By automating building functions, the system reduces manual interventions, lead to improved operational efficiency and energy savings. Enhanced Comfort: Occupants enjoy a better living or working environment, with the automated temperature and lighting control that adapts to their preferences and occupancy patterns.[11] Sustainability: The application promotes energy-saving practices, contributing to a building's environmental sustainability goals. It helps minimize energy wastage through intelligent systems that monitor and optimize energy usage.

Improved Security: With integrated surveillance and access control system, the system enhances security, providing occupants and building managers with the real-time updates and alerts to handle emergencies promptly. [15]Data-Driven Insights: The app collects valuable data, which can be analyzed to the identify patterns and optimize building performance further. Over time, building managers can make informed decisions that improve building efficiency and reduce to the operational costs.

In a Smart Apartment Management System (SBMS) that operates without IoT, several alternative technologies and approaches can be used to achieve efficient building management. These technologies focus on integrating existing systems, using advanced software solutions, cloud computing, mobile applications, and other automation techniques to monitor and to control building functions without relying heavily on Internet of Things (IoT) devices. Here is a detailed

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overview of the technologies that can be used in such a system: Building Automation System (BAS) Integration: A Building Automation System (BAS) is a centralized platform that controls and monitors the core functions of a building, such as HVAC system, lighting, security system, and energy management system. Unlike IoT systems that use wireless sensors and devices, a BAS typically connects through a wired network, such as BACnet (Building Automation and Control Network) or Modbus, to communicate with different building subsystems.[14]

Wired Communication Protocols: BACnet and Modbus are widely used for building management systems, providing a stable and secure means of connecting various building components.[12] Integration with Legacy Systems: A BAS can integrate with existing legacy systems that are not IoT-enabled, allowing the SBMS to control traditional building equipment and sensors.

Cloud Computing and Centralized Data Management: Cloud computing plays a crucial role in the non-IoT-based SBMS by offering the platform for data storage, processing, and analysis. Cloud-based solutions provide flexibility, scalability, and accessibility for building management applications. Data Centralization: The cloud stores data collected from various building systems (e.g., HVAC, lighting, and access control). This centralized approach allows for comprehensive data analysis and reporting without the need for IoT devices. Remote Management: Cloud platforms enable remote monitoring and management through the Android application, allowing users to access building data and control the systems from anywhere. [12]Data Security: Cloud providers often offer robust security measures such as encryption, multi-factor authentication (MFA), and secure data backup solutions to protect building information.

Mobile Application Development (Android): The SBMS Android application serves as the primary interface for building managers, facility operators, and occupants to interact with system. The application is designed to provide comprehensive control and to monitoring capabilities for building functions. User Interface (UI) Design: The Android application is developed with a user-friendly interface, ensuring that users can easily navigate through building systems, to check data, and to make adjustments as needed. API Integration: The mobile app integrates with backend systems and cloud platforms using RESTful APIs or other communication protocols to access and update information. This approach provides seamless connectivity without relying on IoT devices.[10]

Custom Automation Settings: The application allows users to customize settings and create automation rules for building operations. For instance, users can set schedules for lighting or HVAC systems based on occupancy or time of day, even if these systems are not equipped with IoT sensors. Artificial Intelligence (AI) and Machine Learning (ML): AI and ML technologies can be employed in the SBMS to enhance building management through intelligent automation and predictive capabilities. These technologies analyze historical data from building systems to optimize performance and reduce energy consumption.[10] Predictive Maintenance: AI algorithms can identify the patterns in equipment performance, allowing the system to predict and alert facility managers of potential failures before they occur in system. This reduces downtime and maintenance costs.

Energy Optimization: ML models can analyze data from past usage patterns and external factors like weather conditions to optimize HVAC and lighting systems. The SBMS can automatically adjust settings to achieve the most efficient energy consumption without requiring real-time IoT sensor data. Occupancy and Behavioral Analysis: AI can utilize data from access control systems (e.g., entry and exit logs) to estimate occupancy levels and adjust building conditions accordingly. This technology helps maintain a comfortable environment while minimizing energy use. SCADA (Supervisory Control and Data Acquisition) Systems: SCADA systems are commonly used for monitoring and controlling infrastructure in industrial and commercial buildings. An SBMS can leverage SCADA technology for remote supervision and control of various building systems.

Real-Time Monitoring: SCADA systems provide a centralized interface for monitoring real-time data from different building components, such as HVAC systems, lighting, and elevators, through sensors and actuators connected by wired networks. Control Mechanisms: The system can be configured to automate responses based on set parameters (e.g., temperature thresholds) and execute commands remotely, using the Android application as the interface. Data Logging and Reporting: SCADA systems store historical data, which can be analyzed to generate reports on building performance, energy usage, and operational efficiency. This information can be accessed via the mobile app for strategic planning and management.[8]

Wireless Communication Technologies (Non-IoT): While IoT typically relies on wireless communication protocols like Zigbee or LoRaWAN, non-IoT systems can still make use of traditional wireless technologies such as Wi-Fi, Bluetooth, or RF (radio frequency) for data transmission between building systems and the SBMS. Wi-Fi Networks: Many modern building systems are equipped with Wi-Fi capabilities, allowing them to connect to the building's central management system without IoT infrastructure. The Android

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app can communicate with these systems over Wi-Fi for monitoring and control. [7]Bluetooth Low Energy (BLE): BLE can be used for short-range communication between the Android app and specific building components, such as lighting systems or access control devices. This approach is useful for personalizing spaces based on user proximity without requiring a full IoT setup.

RF Communication: RF modules can connect various building systems over longer distances, ensuring reliable communication even in environments where wired connections are impractical. RF-based control systems are effective in controlling and monitoring subsystems like HVAC or lighting without direct IoT involvement.

Database Management Systems (DBMS): A robust DBMS is crucial for managing the vast amount of data collected from different building systems. In a non-IoT SBMS, the DBMS stores and processes data from centralized building control networks and legacy systems. SQL Databases: Relational databases such as MySQL or PostgreSQL can manage structured data, allowing for complex queries and efficient data retrieval. This is useful for analyzing energy usage patterns, occupancy data, and performance metrics of various building systems. [6]Data

Analytics Tools: Advanced analytics tools are integrated with the DBMS to extract actionable insights. These tools can generate reports and visualizations to help building managers make informed decisions and optimize operations. Access Control and Security Systems: Access control and security management are critical components of a smart building. These systems can be integrated into the SBMS without using IoT devices by relying on existing security technologies such as RFID (Radio Frequency Identification), biometric scanners, and CCTV systems.

RFID and Biometric Systems: These technologies allow for secure access to various building areas. The Android app can interface with these systems, providing users with real-time alerts and access logs. [11] CCTV Integration: The SBMS can connect with CCTV systems to offer live video monitoring through the Android application. By using a centralized video management system (VMS), the app provides a comprehensive view of building security without relying on IoT cameras. Automation and Control Software: Software solutions such as programmable logic controllers (PLCs) and building management software (BMS) play a key role in automating building functions and integrating different subsystems.

PLC Systems: PLCs automate building processes based on preset logic, such as activating ventilation when CO_2 levels reach a certain point. These systems operate independently of IoT and can be controlled via the Android application. Building Management Software: Specialized software can integrate with existing building infrastructure, providing a platform for scheduling, controlling, and monitoring all building systems. This software communicates with the Android application via APIs or direct network connections, offering a unified interface for building management.[11]

II. LITERATURE SURVEY

While BMS have become smart or IOT-Based in recent years, the concept is certainly not new and has gradually evolved over the last 50+ years and into the 21st century systems as at today. BMS has always been boosted by technological developments of the time, but today‘s smart building technology is influencing BMS like nothing before.[6] BMS is essentially a computer-based control system that monitors and manages building‘s mechanical and electrical equipment, including ventilation, lighting, power, fire and security systems. Various subsystems in a building have traditionally been operated separately, each with their own IT structure. However, as the number of subsystems increased the case for integrated solutions also grew. In particular, the addition of fluctuating renewable energy generation and energy storage capacity added a new level of complexity, one which demanded a new form of management in buildings, in order to reduce rising overall costs [3].

S. No	Paper name	Author	Description
1.	Mobile Application for Building Management	Wang et al [year-2023]	Reviews various mobile application and their features. Proceeding of Building Research.
2.	User-Centric Design in Smart Building Apps	Gupta and Patel [year- 2022]	Focuses On user experience and interface Design.
3.	Real-Time Monitoring SystemsFor Buildings	Chen et al. [year-2022]	Highlights real-time monitoring benefits for maintenance
4.	Smart Building Management Using IoT	Smith et al. [year-2022]	Explores IoT Integration For Energy Management

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5.	Energy Efficiency in Smart Buildings	Johnson and Lee [year- 2021]	Discusses Strategies For Energy Consumption Reduction.
6.	Development of a Smart HVAC Control System with Mobile Interface	Khan and Ahmed [year- 2021]	Enhanced user control over HVAC settings and improved energy management.
7.	Building Automation Using Smart Android Application	Brown et al [year- 2020]	Enhanced building automation with remote monitoring and control capabilities
8.	A Comprehensive Review Of Smart Building Technologies.	G.Wong, H Lee [year- 2021]	Analyzed various IoT, AI, and cloud-based platforms, comparing strengths and weaknesses.
9.	Low-cost Android- based Smart Building System for Small Offices	Rahman et al. [year- 2017]	Designed for small-scale installations with cost- effective sensors and an Android-based app

The listed research papers explore diverse aspects of smart building management systems (SBMS), emphasizing mobile applications, user-centric design, IoT integration, and energy efficiency. Papers such as Wang et al. (2023) and Gupta and Patel (2022) focus on mobile app features and user experience. Wang et al. reviews mobile applications, analyzing their functionalities for building management, while Gupta and Patel highlight interface designs tailored to enhance usability and accessibility, ensuring seamless interaction with SBMS. Chen et al. (2022) discusses the role of real-time monitoring systems in improving maintenance through timely data-driven interventions. Several papers delve into IoT-based solutions and their contributions to energy efficiency and automation. Smith et al. (2022) examines IoT integration for optimizing energy management, aligning with Johnson and Lee's (2021) strategies for reducing energy consumption in smart buildings. Khan and Ahme (2021) focus on HVAC systems, offering enhanced user control via mobile interfaces to improve energy management. Additionally, Brown et al. (2020) explores building automation facilitated by Android apps, providing remote monitoring and control for a more connected and responsive management system.

A broader perspective on smart building technologies is offered by Wong and Lee (2021), who compare IoT, AI, and cloud-based platforms, highlighting their respective strengths and weaknesses. Rahman et al. (2017) cater to smaller-scale implementations, presenting a cost-effective Android-based solution tailored for small offices. Collectively, these studies emphasize the evolving role of mobile interfaces, IoT integration, and user-centric designs in shaping modern SBMS, while also addressing energy efficiency and cost-effectiveness for diverse scales and applications.

With advancements in technology, BMS evolved into smart systems, integrating IoT and providing remote access through mobile applications. Key studies, such as those by Yang and Wang (2020), highlight the transition from traditional BMS to SBMS, emphasizing the role of IoT in enabling real-time data collection and remote management. This evolution has paved the way for mobile applications that allow users to manage building systems from anywhere, anytime. The integration of mobile applications into SBMS represents a significant leap in building management. Android applications, in particular, have gained popularity due to the widespread use of Android devices.[6]

These applications offer a user-friendly interface, allowing building managers and occupants to control various systems, such as HVAC, lighting, and security, from their smartphones or tablets. Research by Ali et al. (2019) indicates that mobile applications enhance the accessibility and usability of SBMS by providing a portable, intuitive interface that simplifies complex operations. The study also discusses the benefits of real-time notifications and remote access, which are critical for immediate response to system alerts. One of the primary objectives of SBMS is to promote energy efficiency and sustainability.[4] Studies by Ghahramani et al. (2018) have shown that smart systems can significantly reduce energy consumption in buildings by optimizing the use of resources. Mobile applications play a crucial role in this process by allowing users to monitor energy usage in real time and adjust settings to minimize waste. For example, a study by Zhao and Liu (2021) demonstrated that the integration of machine learning algorithms with SBMS mobile applications can provide predictive analytics, helping users to anticipate and prevent energy inefficiencies before they occur. This proactive approach of system not only reduces operational costs but also contributes to the environmental conservation efforts.[9]

III. SYSTEM ARCHITECTURE

The mobile application also provides features like easy access for guests to enter the society through One Time Password generated by the user via the app. The application also enables the essential people like household helpers, dairy

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– men, laundry servicemen to enter the premises of the apartment with the help of the same OTP System. The profiles of the above mentioned would be created well in hand as and when they are hired for the services. The records of these people would be stored in the database which can be viewed in the mobile application. Online deliveries also can be scheduled by the user so that the delivery men can leave their packages at the security center and can be collected by the security man on behalf.

Figure 1: System Architecture

Dashboard: Provides all an overview of building status, including energy consumption, security alerts, and HVAC status. Control Panels: Interface for managing specific systems like lighting, temperature, and security cameras. Notifications: Alerts for critical events such as security breaches or system failures. SMART APARTMENT MANAGEMENT SYSTEM Settings: Allows users to configure preferences, schedules, and system behaviors. RESTful API Calls: Facilitates communication between the Android app and the backend server for data exchange. WebSocket/MQTT: For real-time updates, such as instant alerts or status changes. SQLite/Room: For offline data caching, user settings, and preferences. Encryption: Secure sensitive data like login credentials and access tokens.

Mathematical model for the Smart Apartment Management System (SAMS) in cludes an average maintenance request per resident, indicating the workload for management. It also provides an average response time for maintenance requests, reflecting the efficiency of the management team.

Additionally, the model yields a resident satisfaction score, which assesses the overall resident experience based on response times and community engagement.

The expected output of the Smart Apartment Management System (SAMS) encompasses several transformative improvements aimed at enhancing the management of residential and the commercial buildings. First and foremost, the system is expected to yield improved communication between residents and property management. By facilitating real-time communication channels, SAMS will enable residents to submit maintenance requests, provide feedback, and receive updates on community events seamlessly. Additionally, SAMS is anticipated to significantly enhance maintenance processes through automation. The system will streamline the reporting and resolution of maintenance requests, resulting in reduced response times. This automation is expected to foster a more organized and systematic approaches to maintenance, ultimately leading to a better living experience for residents.

3.1 Algorithm

Step 1: Login

Step 2: If new user then signup

Step 3: After authentication, the user will select who he/she is from the options: Watchman, Secretary, Flat Owner, Daily Help.

Step 4: If Flat Owner.

Step 4.1: Generate OTP for Guest Arrival. Add delivery details.

Step 5: If Secretary.

Step 5.1: Check Daily Help profile.

Step 5.2: Monitor Gardening System. Check Soil moisture level, temperature value from sensor. If the values are below threshold values, then it will switch on the motor. Once threshold values are attained, motor will be switched off.

Step 6: Daily Help.

Step 6.1: Create Profile.

Step 6.2: Will generate a unique Code.

Step 7: If Watchman.

Step 7.1: Authenticate OTP of Guest/Daily Help.

Step 7.2: It will check delivery details entered by the flat owner.

Step 8: End

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IV. IMPLEMENTATION

Implementation of the system starts with the front-end Java is a foundational programming language for Android application development, known for its platform independence, object-oriented design, and robust security features. It plays a key role in implementing essential Android components such as Activities, Fragments, all Services, Broadcast alerts, and Content Providers. Java language provides a rich set of APIs and libraries, enabling developers to handle UI design, networking, data storage, and more effectively. Supported by tools like Android Studio and Gradle, Java also offers a stable environment for developing scalable and secure applications. Its extensive community support and backward compatibility makes it ideal for targeting the wide range of the Android devices. While Kotlin has gained prominence, Java's ease of learning, reliability, and seamless integration of the Android SDK ensure its continued relevance in modern app development.

Service-Oriented Layer (SOL) in Android Applications for Smart Apartment Management Systems: The Service-Oriented Layer (SOL) in an Android-based Smart Building Management System serves as the middleware that bridges the interaction between the application and IoT devices. It provides a structured approach to managing services such as device control, data communication, and system monitoring. Using protocols like RESTful APIs or MQTT, the SOL ensures efficient communication between the app and backend servers or smart devices, enabling real-time control and monitoring of devices like HVAC systems, lights, and security system, cameras.

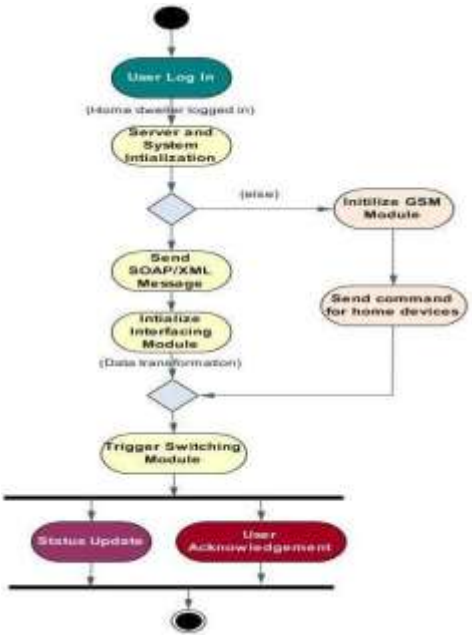

Figure 2

This layer also integrates authentication mechanisms, data synchronization, and event-driven triggers, ensuring that user commands from the app are securely and reliably executed. The SOL significantly enhances modularity, scalability, and maintainability in smart building systems by abstracting device complexities and offering a unified platform for managing diverse functionalities.

This image represents a flowchart for a home automation system or smart home device operation. Here's a description of the process illustrated: User Log In: The process begins when a home dweller logs into the system. Server and System Initialization: After logging in, the server and system initialize to set up the operation environment. Based on conditions, the system decides the next step. (Else Condition) Initialize GSM Module: If certain conditions aren't met, the GSM module is initialized. This step likely facilitates communication via mobile networks.

Send SOAP/XML Message: If conditions allow, a SOAP/XML message is sent for communication and control of devices. These messages are typically used in structured data exchange. Initialize Interfacing Module: The interfacing module is initialized for data transformation, ensuring that the incoming data is in the correct format for further processing. Trigger Switching Module: System then activates all the switching module, responsible for sending the appropriate control commands to home devices. Send Command for Home Devices: If using the GSM module, it directly sends a command to the respective home devices. Status Update and User Acknowledgment: Once the command is executed, the system provides feedback: Status Update: Reflects the current state of the device. User Acknowledgment: Confirms that the action has been executed successfully. End of Process: The process concludes after acknowledgment is sent. This flowchart outlines a structured approach to remote home automation, emphasizing communication, interfacing, and feedback mechanisms.

Mathematical model for the Smart Apartment Management System (SAMS) in cludes an average maintenance request per resident, indicating the workload for management. It also provides an average response time for maintenance requests, reflecting the efficiency of the management team. Additionally, the model yields a resident satisfaction score, which assesses the overall resident experience based on response times and community engagement.

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and foremost, the system is expected to yield improved communication between residents and property management. By facilitating real-time communication channels, SAMS will enable residents to submit maintenance requests, provide feedback, and receive updates on community events seamlessly. Additionally, SAMS is anticipated to significantly enhance maintenance processes through automation. The system will streamline the reporting and resolution of maintenance requests, resulting in reduced response times This automation is expected to foster a more organized and systematic approach to maintenance, ultimately leading to a better living experience for residents.

V. COMPARTIVE STUDY

The Smart Building Management System is an innovative Android application aimed at revolutionizing the way buildings, particularly apartments, are managed. Traditional building management methods often face challenges in communication, service delivery, and community engagement. This project seeks to address these all challenges by providing a digital platform that streamlines communication between residents and management, facilitates maintenance requests, and enhances community interaction. Developed using Java in front end and Android Studio, and utilizing Firebase for real-time data synchronization and cloud storage, this application is designed to be both scalable and user-friendly. The project targets the field of smart building technology, specifically focusing on software solutions that improve the quality of life for residents and the efficiency of building management.

The necessity for a Smart Apartment Management System arises from the increasing complexities in managing large residential and commercial buildings.[8] Communication breakdowns, delayed maintenance responses, and the lack of a cohesive community platform often lead to resident dissatisfaction. By providing a centralized digital solution, the proposed Android application aims to solve these issues, making building management more efficient and responsive. The app will enable residents to communicate directly with management, report issues in real-time, and participate in community discussions, thus fostering a sense of belonging and improving the overall living experience.

VI. RESULTS

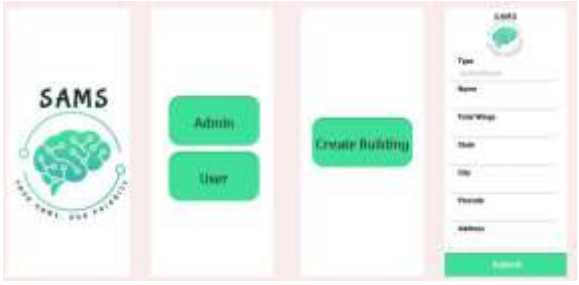

Figure 3: Results

VII. CONCLUSION

This Android application designed for Smart Buildings, offering users to data monitoring and to control capabilities, thereby providing the more immersive experience with the underlying processes. The application issues alerts when predefined limits for temperature, and light consumption are surpassed, alongside providing information on the latest detected movement in a room. Admin and Users can effortlessly customize their own virtual environment by adding as many buildings, floors, rooms, and sensors as desired. By identifying potential bottlenecks, future implementations can enhance the application's ability to function seamlessly across various mobile devices. This system will even reduced the human workload as the watchman does not have to maintain a register/logbook manually, all the data will be stored in the system the database and all the members can view the entries and exits of the building. The daily help workers will get a unique code and hence they will not have wait at gate for register entry. All the activities will be monitored online, from anywhere.

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