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# **Smart-Home Automation using IoT-Based Sensing and Monitoring Platform**

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**ABSTRACT:** This project focuses on designing a smart home automation system using ESP32, MIT App Inventor, and Firebase. The system enables users to control home appliances remotely through a mobile app and voice commands. The integration of CCTV footage streaming enhances security. By utilizing Firebase for data transfer, the system ensures real-time response and data storage. This project aims to make home automation affordable, efficient, and accessible to users.

**KEYWORDS:** Smart Home, IoT (Internet of Things), Automation, Sensing, Monitoring, Smart devices, Real time Monitoring.

## **I. INTRODUCTION**

Home automation has become an essential component of modern smart homes, offering enhanced convenience, security, and energy efficiency. As the demand for intelligent living spaces increases, the integration of smart systems is becoming more widespread. This project presents an advanced home automation solution that enables users to control their home appliances both through a mobile application and voice commands. By allowing remote access and management, the system not only simplifies daily tasks but also promotes efficient energy usage and improved home security.

## **II. LITERATURE SURVEY**

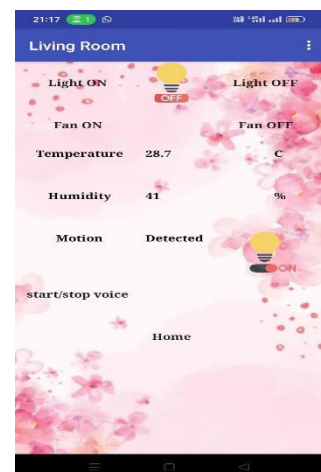
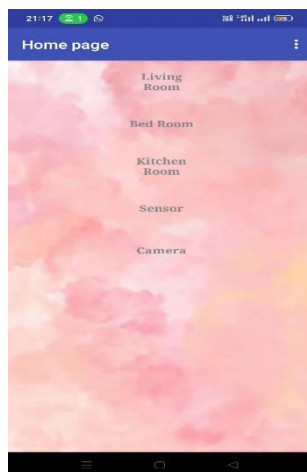
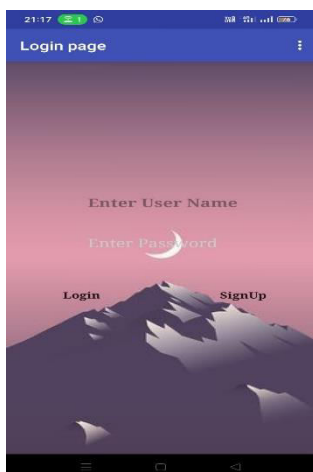
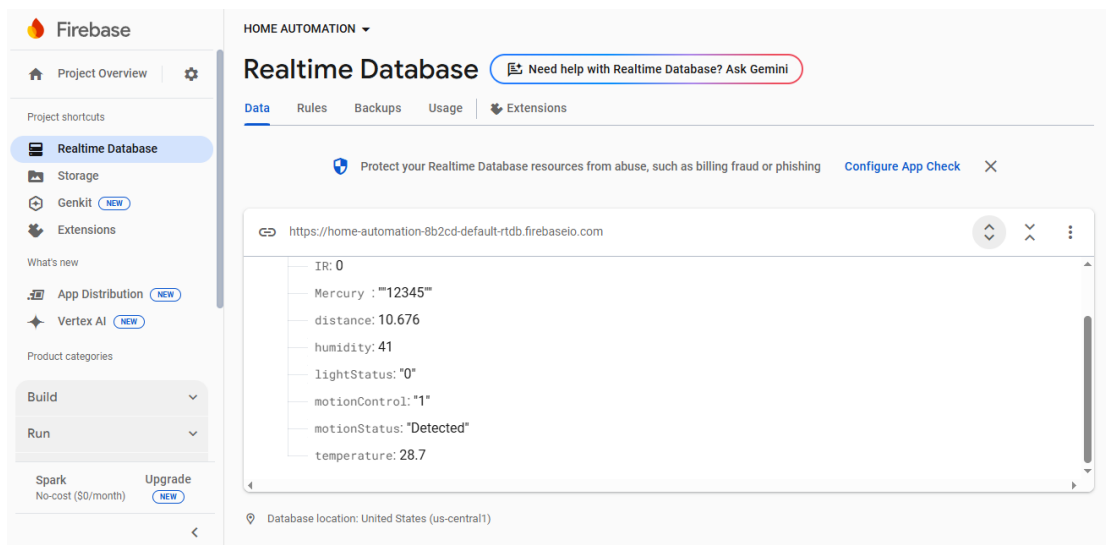
Recent advancements in home automation have been driven by the integration of IoT and microcontroller-based solutions. Nath et al. (2021) presented a smart home system utilizing IoT and a microcontroller to enhance automation capabilities, focusing on user convenience and energy efficiency. Shah et al. (2020) explored a security-enhanced smart home model that leverages IoT devices to bolster safety, demonstrating robust security mechanisms to protect against unauthorized access. Voice-controlled automation has also been a focal point, as highlighted by Alkar and Buhur (2022), who developed a system using voice commands for controlling various home appliances, significantly improving user interaction. Further integrating IoT with microcontrollers, Velasco-Medina et al. (2020) implemented a home automation system using the ESP32 and Firebase, emphasizing real-time data management and cloud integration. Additionally, Teymourzadeh et al. (2019) addressed the implementation of home automation using the ESP8266, focusing on cost-effective and easily deployable solutions. These studies collectively underline the trend towards smart, secure, and user-friendly home automation systems.

## III. METHODOLOGY

The proposed system includes:

- **Hardware Integration:** An ESP32 microcontroller serves as the central controller. It interfaces with relay modules to control appliances and collects real-time data from various sensors such as DHT11 (temperature/humidity), PIR (motion), MQ-2 (gas), and LDR (light).
- **Mobile App Development:** MIT App Inventor is used to develop a user-friendly Android application that enables users to control appliances, view sensor data, and access live CCTV streams. The app connects to Firebase to fetch and push data seamlessly.
- **Cloud Communication:** Firebase Cloud Database acts as the real-time data backbone. It facilitates two-way communication between the mobile app and ESP32, ensuring synchronization of commands, sensor values, and appliance statuses.
- **Real-Time Monitoring:** Sensor readings are periodically updated to Firebase, and alerts are triggered in the app when critical thresholds (like gas leaks or motion detection) are crossed. The app also displays the live CCTV feed for home surveillance.

## IV. EXPERIMENTAL RESULTS





**V.CONCLUSION**

The smart home automation system developed using ESP32, Firebase, MIT App Inventor, and Google Assistant successfully demonstrates the potential of IoT in transforming traditional homes into intelligent, responsive environments. The integration of cloud services enabled real-time monitoring and control of appliances through both mobile and voice interfaces. Sensor modules added safety features, while live CCTV streaming enhanced home security. The system proved to be efficient, cost-effective, scalable, and user-friendly. Its ability to automate tasks, reduce energy consumption, and provide remote access ensures a more convenient and secure living experience. This project lays a strong foundation for future enhancements and integration with more smart devices.

**REFERENCES**

- 1) Nath, S., Basu, M. and Ghosh, S. (2021) "Home Automation Using IoT and A Microcontroller," International Journal of Scientific and Research Publications (IJSRP), 11(7), pp. 442-448. DOI: 10.29322/IJSRP.11.07.2021.p11549.
- 2) Shah, S.A.A., Safwan, M. and Khan, Z.H. (2020) "Security-Enhanced Smart Home" IEEE Access, 8, pp. 197442-197453. DOI: 10.1109/ACCESS.2020.303433
- 3) Alkar, A.Z. and Buhur, U. (2022) "Voice Controlled Home Automation". IEEE Transactions on Consumer Electronics, 51(4), pp. 1169-1174. DOI: 10.1109/TCE.2021.1568756.
- 4) Velasco-Medina, J., Cantu, F.J., Perez, J.A. and Ríos, R.A. (2020) "Home Automation Using ESP32 Microcontroller and Firebase," International Journal Electronics and Communication Engineering (IJECE), 12(6), pp. 678-684. DOI: 10.5281/zenodo.3872022.
- 5) Anisha S C.
- 5) Teymourzadeh, R., Ahmed, S.A., Kok, W.C. and Chan, K.W. (2019) "Implementation of IoT ESP8266 Home Automation" IEEE Conference on Systems, Process and Control (ICSPC), pp. 306-309. DOI: 10.1109/SPC.2023.8314653.



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