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Smart Gate Monitoring System with Notification and Nameplate Display

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Abstract: ***This project focuses on the design and implementation of a Smart Gate Monitoring System that integrates real-time notification and nameplate display using advanced electronics and IoT technology. The primary objective is to enhance security and awareness by notifying the homeowner when a visitor lingers at the gate for 4-5 seconds. Additionally, a dynamic nameplate will display details like the owner's name, house members, and construction year. If no one is at home, the nameplate will indicate that the house is vacant. The proposed system combines PIR sensors, a camera module, an LCD/OLED display, a microcontroller (Arduino/Raspberry Pi), and IoT-based communication for real-time monitoring. This system enhances home security and adds a smart automation feature to residential properties. By integrating modern sensors and IoT platforms, it ensures a robust, real-time security mechanism. The effectiveness of the system makes it an ideal solution for contemporary security concerns in residential areas, ensuring not just security but also smart automation.***
Keywords: Smart Gate, IoT, Nameplate Display, Notification System, Security

I. INTRODUCTION

Smart homes of today places a premium on home security and guest reconnaissance in contemporary city environments. The older recognizer system and door video cameras needed ceaseless watching and/or hand intervention to work which does not work in instances where a prompt alerting of an automated system is needed. In response to these problems, the Smart Gate Monitoring System sends notification to the owners phone application when a guest approaches the gate. It also dynamically updates a digital nameplate with house information and marks the house as unoccupied if the residents leave. The system uses IoT technology, sensors and a display device, providing information for keeping the house under Sherif supervision, which means zero intervention from the user. From the traditional security framework, which is based on manual inspection and delayed system activation, this system works in a forward monitoring intelligence mode, quickly updating the security level and rapidly providing information on visitors.

II. LITERATURE SURVEY

This research notes that different home processes have previously been automated with the utmost focus on security and access control. Because of the remote control and real time alerts, IoT surveillance systems are becoming more common. Earlier work done includes motion capturing based on passive infrared technology, access control using RFID technology, and facial recognition based on neural networks. This work demonstrates that automated security systems can effectively function in a household environment. However, a lot of these solutions are inadequate because they do not incorporate real time display mechanisms, such as the nameplate concept put forward in this project. The majority of the IoT based monitoring solutions are focused on area intrusion detection systems, and only a few are attempting to combine visitor registration and automated notification systems. This makes it a special solution in smart home security systems.

III. METHODOLOGY

Smart Gate Monitoring System have many components and processes. Motion Detection is done through a PIR sensor that can tell whether or not a visitor is present at the gate. Once a visitor is identified, a timer is started to see if the visitor remains at the gate for a certain amount of time. If the visitor stays longer than a threshold time, a GSM module is activated to sending a notification to the owner’s which is then relayed to the home-owners cell-phone through an IoT notification system like Blynk, Firebase, or via MQTT protocol. The dynamic nameplate display provides real time information about the house, such as the owner's name, members of the family, and the year the house was built. If there’s no one in the home, the display dynamically changes to read “Vacant House”. The System is managed by a microcontroller (Arduino or Raspberry Pi) that carries out all computing with the help of sensor inputs and manages the display and notification system. The system is also designed to function on Wi-Fi or GSM enabling remote opening of the house. To further improve detection precision and eliminate false alerts, the detection system can be made more reliable to home owners through the use of machine learning algorithms.

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IV. RESULTS AND DISCUSSION

Testing the prototype of the Smart Gate Monitoring System was successful. When a visitor approached, the device accurately registered the individual's presence and turned on the timer function. After a visitor stayed for the predetermined duration, their notification sent to the homeowner through the selected IoT platform. As expected, the digital nameplate updated the house details and displayed them. The system is able to offer greater security features such as real-time notifications of visitors and automated monitoring of the premises. Unlike conventional surveillance cameras, this technology provides more sophisticated services for real-time interaction with the homeowners which reduces false triggers. More advanced features could, however, include AI-controlled visitor face detection systems, and other smart home security systems, which offer automated home security. An additional feature could be enabling interaction through voice commands so that the homeowner could speak to the visitor.

V. FUTURE SCOPE

Smart Gate Monitoring System in the future can gain great benefits of the efficient and feasible options. One of the perfect methods is to save all visitors` related videos to cloud storage for the possibility of leak proof while watching from any part of the world. The most streamlined solution to control visitors and guards` time is by installing facial recognition. Another security level can be imbibed is through biometric authentication, allowing only a certain set of persons to enter as they are the only ones in the database. Plus, learning scenario-based AI, the camera, no more false alarm like swaying leaves, can send us a more targeted warning, which is a much better result. The system's combo features can involve the AI assistant of user liking like Google Assistant and Alexa to add another layer of the comfort say of voice command to the customer performing the security monitoring. The introduction of these new applications could make this system a complete AI control one and ensure the security and brains of each person's home.

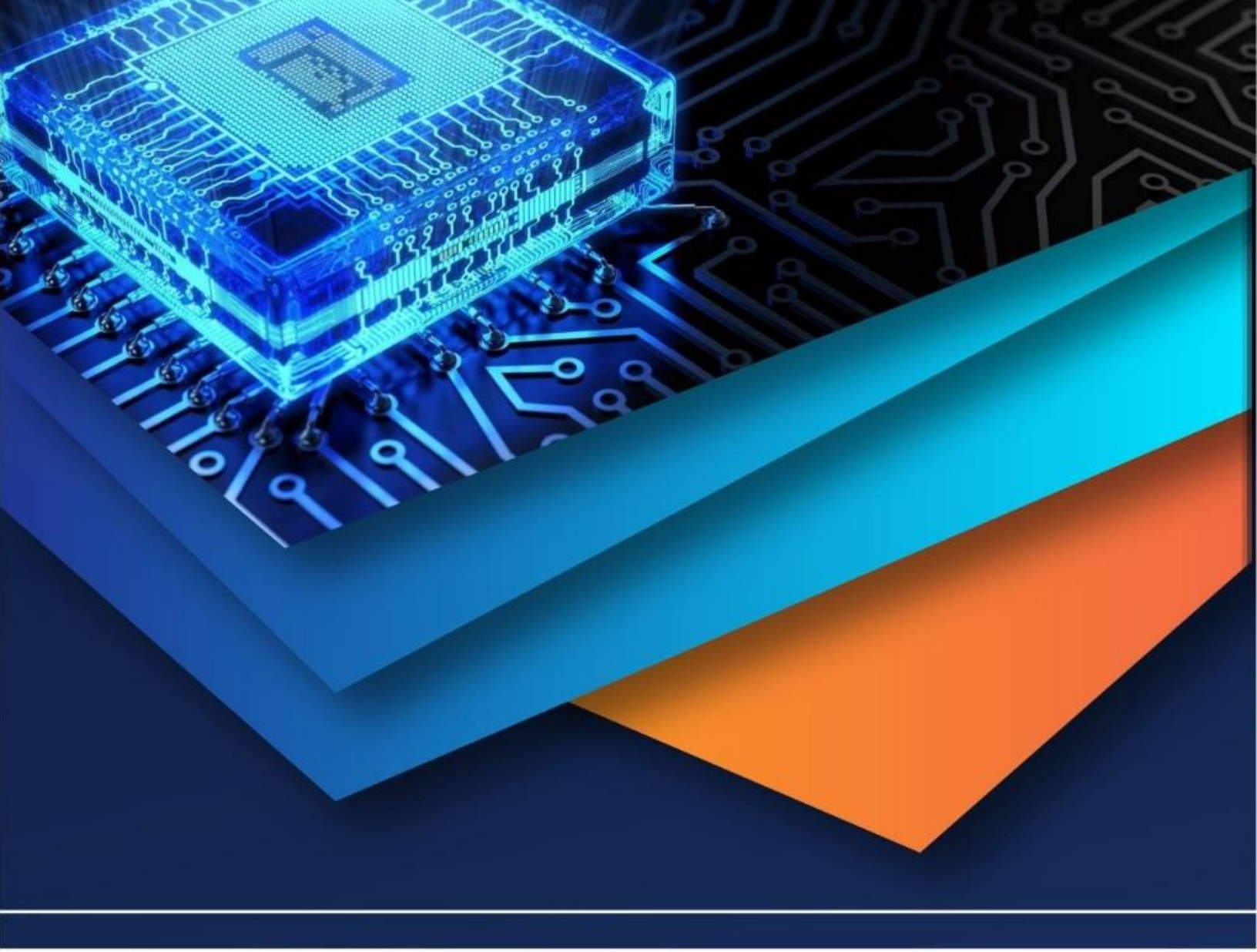
VI. CONCLUSION

The Smart Gate Monitoring System Smartly is one of the IoT, sensors, and display technology platforms successfully used for the provision of real-time notifications on the arrival of visitors at doors and the display of dynamic nameplate information. The practical realization of smart security by the use case even can be upgraded by the addition of cloud storage, AI, and stronger security features. The system operating entirely self-directs home security as an option, therefore, making it a necessary feature of any digital house. The system is highly involved in user convenience as it observes real-time alerts, identifies visitors, and automates nameplates. The complete affiliation of AI to facial recognition and cloud storage harnessed under proper home automation will prove to be a driving force behind this secure house system, predicting an intelligent trend of the future.

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