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Smart Door Lock to Avoid Robberies in ATM

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ABSTRACT

The integration of Internet of Things (IoT) technology with smart security systems has significantly enhanced the safety and reliability of critical infrastructure, such as Automated Teller Machines (ATMs). This project presents an IoT-based smart door lock system designed to prevent robberies and unauthorized access in ATM facilities. By leveraging advanced IoT platforms and secure access control mechanisms, the system enables real-time monitoring and remote operation of ATM doors. It features smart locking hardware, sensors, and a cloud-based interface that verifies user credentials and processes access requests instantly. Eliminating the limitations of traditional mechanical locks, the system provides a hands-free, tamper-resistant solution—particularly valuable in safeguarding cash handling environments. In addition, the system can send alerts in case of suspicious activity, enhancing surveillance and response time. Its modular design allows integration with CCTV,

alarm systems, and biometric authentication for layered security. Overall, this solution marks a significant advancement in smart security, demonstrating the crucial role of IoT in protecting public financial assets and infrastructure.

INTRODUCTION

The integration of voice control with IoT technology is revolutionizing ATM security through the development of smart door lock systems designed to prevent robberies. By combining real-time IoT connectivity with advanced voice recognition, this system allows authorized personnel to access ATM enclosures securely and hands-free using verified voice commands. This enhances operational efficiency while significantly increasing security by preventing unauthorized access. The smart lock system can be integrated with AI-based voice assistants or proprietary voice authentication modules to enable

centralized and secure control. IoT capabilities ensure continuous communication between the door lock, surveillance cameras, and central monitoring systems, enabling real-time alerts, remote access, and automatic lockdowns in case of suspicious activity. Additionally, the system supports access logs, multi-factor authentication, and remote monitoring via smartphones or control centers, enhancing both accountability and response time. Overall, this voice-controlled IoT-based smart lock represents a proactive step toward safer, more intelligent ATM environments that deter criminal activity and protect financial infrastructure.

LITERATURE SURVEY

A smart door lock system enhances ATM security by restricting unauthorized access and deterring robbery attempts. It integrates sensors and authentication methods such as keypad, RFID, or biometric verification. The system can send real-time alerts via GSM or IoT platforms during suspicious activities. Motion or vibration sensors help detect forced entry attempts at the ATM premises. The lock activates only when valid credentials are entered, preventing access by intruders. Smart door locks can also be remotely monitored and controlled through mobile apps or cloud servers.

Integration with cameras and alarms strengthens overall security. These systems are energy-efficient, reliable, and work in both day and night conditions. They are cost-effective solutions suitable for banks and financial institutions. This technology ensures better protection of cash and customer safety at ATMs.

EXISTING SYSTEMS

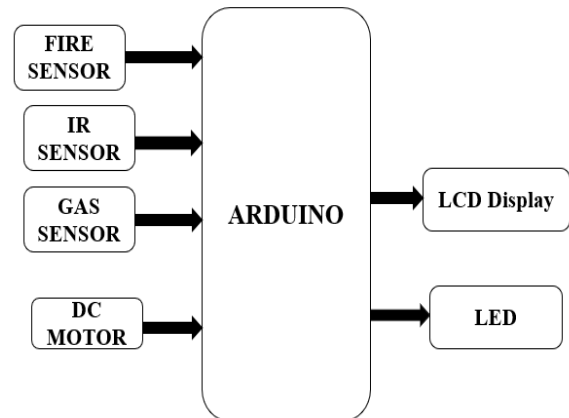
Current IoT-based home automation systems come with several limitations that impact their efficiency and flexibility. Many of these systems depend on manual operation through smartphone applications or remote controls, requiring users to actively manage their devices. Although voice control has been integrated using platforms like Amazon Alexa, Google Assistant, and Apple's Siri, these solutions are largely cloud-dependent, necessitating continuous internet connectivity and offering limited customization for voice commands or compatibility with a broad range of IoT devices. A significant barrier is device interoperability, as many systems are confined to specific ecosystems, making it challenging to connect products from different manufacturers and hindering overall scalability. Security is another major concern—cloud-based operations introduce risks such as data breaches and unauthorized access, along with privacy

issues surrounding the collection and handling of voice data. These challenges highlight the need for more flexible, secure, and inclusive home automation solutions.

PROPOSED SYSTEM

This system is a safety and alert mechanism using an Arduino microcontroller to monitor environmental hazards. It integrates a fire sensor to detect flames or sudden heat, enhancing fire safety. An IR sensor is used for motion detection or object presence near the setup. A gas sensor monitors the presence of harmful or combustible gases like LPG or methane. A DC motor can be used to open/close vents, windows, or activate exhausts during emergencies. Sensor data is processed by the Arduino and critical information is displayed on the LCD screen. The system uses an LED as a visual indicator to alert users of potential danger. It provides real-time environmental monitoring for fire, gas leaks, or intrusions. The design ensures quick response and automatic activation of safety mechanisms. It is suitable for applications in homes, industries, and public spaces. This Arduino-based project is low-cost, efficient, and easy to expand for smart automation.

BLOCK DIAGRAM



HARDWARE REQUIREMENTS

ARDUINO



Arduino is an open-source electronics platform designed to make it easy for users to create interactive hardware projects. At its core, Arduino boards are built around microcontrollers, such as the ATmega328P, which allow for control of various input and output components like sensors, LEDs, and motors. These boards operate on 5V power and can be powered via USB or an external adapter. Programming is done through the Arduino IDE, which uses a simplified version of C/C++ and offers a user-friendly

environment for writing, compiling, and uploading code.

FIRE SENSOR



The fire sensor used in the smart door lock system is designed to detect the presence of flame or a sudden increase in temperature, indicating a fire hazard. It typically works using infrared (IR) flame detection or temperature-based thermistor modules. When a fire or high heat is detected, the sensor sends a digital signal to the Arduino controller. This feature ensures early warning and can automatically trigger alarms, activate safety protocols, or shut down systems to prevent damage to ATM infrastructure and cash.

IR SENSOR



The Infrared (IR) sensor is primarily used to detect motion or the presence of an object in front of the ATM security door. It operates by emitting and receiving infrared light, detecting changes caused by movement or obstruction. This sensor is ideal for identifying unauthorized access or intrusions near the ATM machine, especially during non-operational hours. When movement is detected, the IR sensor sends a signal to the Arduino, which can trigger further actions such as locking mechanisms, alert systems, or surveillance activation.

GAS SENSOR



The gas sensor in the system is used to detect the presence of hazardous gases such as methane, smoke, ammonia, or benzene that may indicate an attempted explosion or gas leak. These sensors, like MQ-2, MQ-7, or MQ-135, generate analog signals based on gas concentration, which the Arduino processes to determine risk levels. In the context of ATM security, the gas sensor can detect foul play involving chemical agents or sabotage attempts. Once a dangerous gas

level is detected, the system can alert authorities, activate ventilation, or lock down the area.

DC MOTOR



The DC motor in the smart door lock system serves as the actuator responsible for locking and unlocking the ATM door automatically. Controlled by the Arduino, it receives electrical signals and converts them into mechanical motion to operate the locking mechanism. The motor responds quickly to input from sensors like gas, fire, or motion detectors, enhancing real-time security. With the use of an H-bridge circuit, the motor's direction can be reversed to lock or unlock as required.

LCD Display

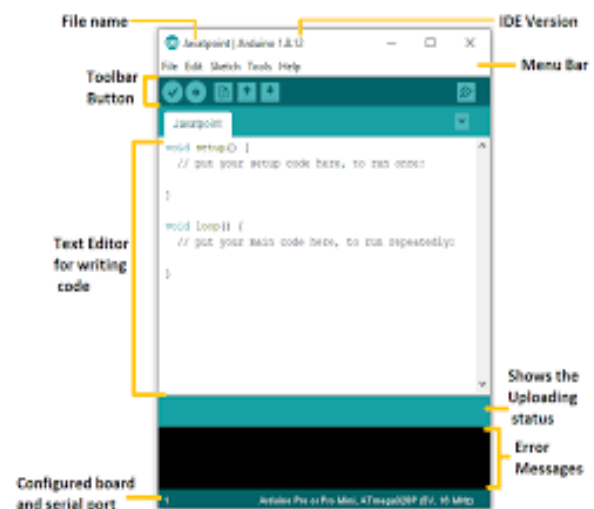


The LCD display acts as the primary output interface in the smart ATM security system, presenting real-time data and alerts. It displays readings from various sensors such

as gas concentration, fire detection, and intrusion signals, allowing quick monitoring of the environment. A commonly used 16x2 or 20x4 LCD screen is connected to the Arduino, often via I2C or parallel communication. This setup allows the display of clear, readable messages, making the system user-friendly. Whether it's a status update or a critical warning, the LCD ensures that all relevant information is visible. It also aids in testing and debugging by showing system operations during setup and maintenance.

SOFTWARE REQUIREMENT

Arduino Software (IDE)



The Arduino IDE (Integrated Development Environment) is a user-friendly and versatile platform designed for programming Arduino boards. It supports C and C++ languages, offering a simplified syntax suitable for microcontroller-based applications. The interface is clean and

intuitive, allowing users to write, compile, and upload code directly to Arduino hardware with ease. It comes equipped with a variety of built-in libraries that simplify tasks like reading sensor data, controlling actuators such as LEDs or motors, and managing communication protocols. The Serial Monitor feature enables real-time debugging and interaction between the Arduino and the computer. Compatible with Windows, macOS, and Linux, the IDE ensures cross-platform usability. Its Library Manager provides access to a wide range of community-contributed libraries for expanded functionality. As an open-source platform, it can be customized to suit different project requirements. The Arduino IDE is widely adopted in educational settings, IoT development, and embedded systems due to its balance of simplicity and power. This makes it an excellent tool for both beginners and experienced developers.

CONCLUSION

The integration of various sensors such as fire, IR, and gas sensors in a smart door lock system for ATMs significantly enhances the overall security, safety, and reliability of the environment. Each sensor plays a vital role—fire sensors detect potential fire hazards, IR sensors monitor unauthorized movements, and gas sensors identify the presence of harmful or explosive gases.

When connected to an Arduino microcontroller, these sensors enable real-time monitoring and automated responses, such as activating alarms, displaying warnings, or locking doors. This system not only prevents potential robbery attempts but also safeguards against accidents like fires or gas leaks. By providing early detection and prompt action, the smart door lock system helps ensure the protection of both ATM infrastructure and users. As ATM-related crimes and risks increase, such intelligent, sensor-driven solutions represent a proactive step toward creating safer and more secure financial service environments.

REFERENCES:

- [1] Ravi Kishore Kodali, Vishal Jain, Suvadeep Bose and Lakshmi Boppana (2016), "IoT Based Smart Security and Home Automation System." International Conference on Computing, Communication and Automation, 1286–1289.
- [2] Lalit Mohan Satapathy, Samir Kumar Bastia, Nihar Mohanty (2018), "Arduino based home automation using Internet of things (IoT)." International Journal of Pure and Applied Mathematics, Volume 118 No 17, 769-778.

- [3] A.S.Biradar, S.B.Dhage, V.V.Jamadar,H.S.Kasar, Prof.Javed Shaikh(2016), “Smart Home Automation System.” International Journal of Advanced Research in Computer Engineering & Technology Volume 5, Issue 4, 1220-1223
- [4] Shweta Singh, Kishore Kumar Ray, “Home Automation System Using Internet of Things”, International Journal of Computer Engineering and Applications, Special Edition,1-9.
- [5] Achal S Kaundinya, Nikhil S P Atreyas, Smrithi Srinivas,Vidya Kehav ,Naveen Kumar M R,(2017) “Voice Enabled Home Automation Using Amazon Echo”, International Research Journal of Engineering and Technology, Volume: 04 Issue: 08,682-684
- [6] Timothy Malche ; Priti Maheshwary, “Internet of Things (IoT) for building smart home system”2017 International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), DOI: 10.1109/I-SMAC.2017.8058258
- [7] Zaied Shouran, Ahmad Ashari, Tri Kuntoro Priyambodo” Internet of Things (IoT) of Smart Home: Privacy and Security” International Journal of Computer Applications (0975 – 8887) Volume 182 – No. 39, February 2019.
- [8] Akram Khan ; Abdullah Al-Zahrani ; Safwan Al-Harbi ; Soliman Al-Nashri ; Iqbal A. Khan “Design of an IoT smart home system” 2018 15th Learning and Technology Conference (L&T) 10.1109/LT.2018.8368484
- [9] Majid Al-Kuwari ; Abdulrhman Ramadan ; Yousef Ismael ; Laith Al-Sughair ; Adel Gastli ; Mohieddine Benammar “Smart-home automation using IoT-based sensing and monitoring platform” 2018 IEEE 12th International Conference on Compatibility, Power Electronics and Power Engineering (CPE-POWERENG 2018) 10.1109/CPE.2018.8372548