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IoT BASED AN EFFICIENT ATM SECURITY SYSTEM WITH NOTIFICATION MECHANISM

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Abstract:

With rising ATM security breaches, this paper proposes an IoT based Efficient ATM security system with a notification module using proximity sensors, Arduino, GSM, and IoT to detect unauthorized metal objects. Upon detection, the system automatically locks the outer gate and alerts bank authorities in real time. A secure authentication mechanism ensures only authorized personnel can reopen the gate. Leveraging IoT for remote monitoring, this system enhances security, prevents theft, and protects ATM users and assets.

Keyword---**ATM security, proximity sensors, Arduino, GSM, IoT, real-time alerts, authentication mechanism, remote monitoring, theft prevention, asset protection.**

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I.INTRODUCTION

With the rise in ATM security breaches, traditional surveillance methods often fail to prevent theft and vandalism. This paper proposes an efficient **ATM security system** integrating **proximity sensors, servo motors, an Arduino microcontroller, and GSM technology** to enhance security. The system detects unauthorized metal objects near the ATM, automatically **closing the outer gate** and sending **real-time alerts** to bank authorities via GSM. A **secure authentication mechanism** ensures only authorized personnel can reopen the gate. Leveraging **IoT for remote monitoring**, this proactive system strengthens ATM security, reduces theft risks, and ensures customer safety.

II. AIM & OBJECTIVE

The aim of this project is to design and implement an IoT-based smart ATM security system that enhances ATM security by detecting unauthorized or suspicious activities, automatically restricting access, and sending real-time alerts to authorities to prevent theft and vandalism.

- **To develop a proximity-based detection system** capable of identifying suspicious metal objects, such as weapons or tampering tools, near the ATM.
- **To integrate a servo motor-controlled gate mechanism** that can automatically restrict

access to the ATM area upon detecting a security threat.

- **To implement a GSM-based alert system** that notifies bank authorities in real-time when a potential security breach occurs.
- **To enhance ATM security using IoT technology**, enabling remote monitoring and instant response to security threats.
- **To ensure restricted access control**, allowing only authorized personnel to reopen the ATM area through a secure authentication process.
- **To improve overall ATM security** by reducing the risk of theft, fraud, and vandalism, ensuring the safety of both users and assets.

II. SYSTEM ARCHITECTURE

The **IoT-based Smart ATM Security System** architecture integrates multiple components to enhance ATM security. At the core, the **proximity sensors** detect unauthorized metal objects, signaling potential threats such as tools used for physical attacks. The **Arduino microcontroller** processes this sensor data, triggering the **servo motor** to automatically close the ATM's outer gate, trapping the suspect and preventing further access. The **GSM module** immediately sends real-time SMS alerts to bank authorities or security personnel, notifying them of the incident for swift action. Additionally, the system can be remotely monitored via an **IoT platform**, which provides continuous updates on the ATM's status, including sensor activity and overall security health. Secure authentication ensures that only authorized personnel can reopen the outer gate after a threat is neutralized. This architecture efficiently combines real-time threat detection, automated response, and remote oversight, offering a robust solution for ATM security.

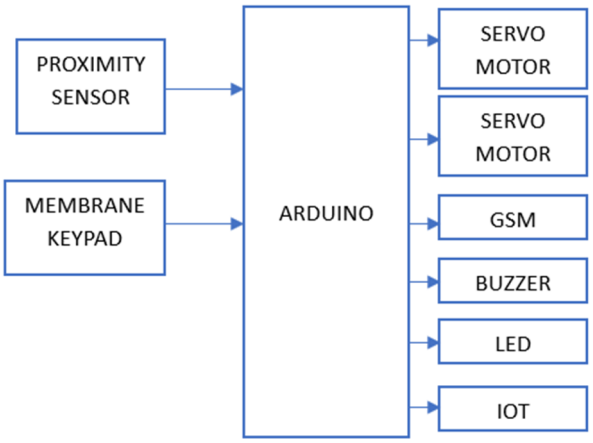

Fig.1: System Architecture

III. MODULES

1. Intrusion Detection Module

This module is responsible for detecting unauthorized metal objects near the ATM. It helps in identifying potential threats, such as weapons or tools used for ATM tampering.

Components:

- Proximity Sensor (Inductive/Capacitive) – Detects metal objects near the ATM.
- Arduino Microcontroller – Processes signals from the sensor.

Main Functionality:

- Detects metal objects near the ATM.
- Sends a signal to the Arduino microcontroller upon detection.
- Initiates security protocols, such as closing the ATM gate.

2. Automated Gate Control Module

This module automatically controls the opening and closing of the ATM's outer gate based on security triggers. If a threat is detected, the gate closes to prevent unauthorized access.

Components:

- Servo Motor – Controls gate movement.
- Outer Gate Mechanism – Physical gate that locks/unlocks.
- Arduino Microcontroller – Sends signals to control the servo motor.

Main Functionality:

- Closes the gate automatically when a threat is detected.
- Prevents unauthorized individuals from entering or leaving.
- Reopens the gate only after successful authentication.

3. Alert & Communication Module

This module is responsible for sending real-time alerts to bank authorities when a security threat is detected.

Components:

- GSM Module (SIM800/900) – Sends SMS alerts.
- Arduino Microcontroller – Controls message transmission.

Main Functionality:

- Sends an instant SMS alert to bank authorities.
- Ensures quick response from security personnel.

4. Authentication & Access Control Module

This module ensures that only authorized personnel can override the security system and reopen the ATM gate.

Components:

- Keypad or Fingerprint Scanner – Provides unique access credentials.
- Arduino Microcontroller – Verifies authentication data.

Main Functionality:

- Authenticates authorized personnel before reopening the gate.
- Prevents unauthorized access to the ATM area.
- Provides an additional layer of security.

5. Power Management Module

This module ensures uninterrupted operation of the security system during power failures.

Components:

- Voltage Regulator – Maintains a stable power supply.
- Power Supply Unit (AC to DC Converter) – Converts main power source to required voltage levels.

Main Functionality:

- Ensures continuous operation during power outages.
- Prevents system shutdown during critical security events

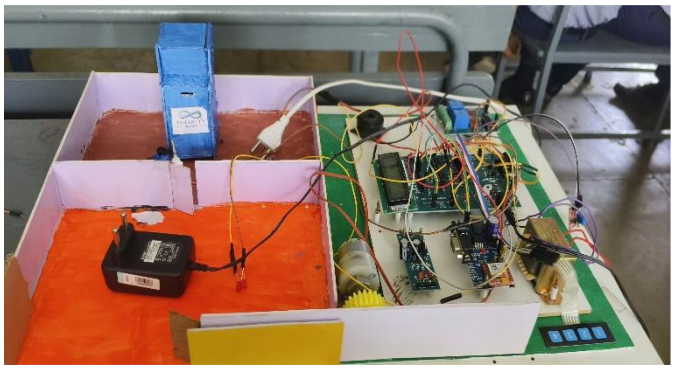

Fig.2: Overall View of the Project

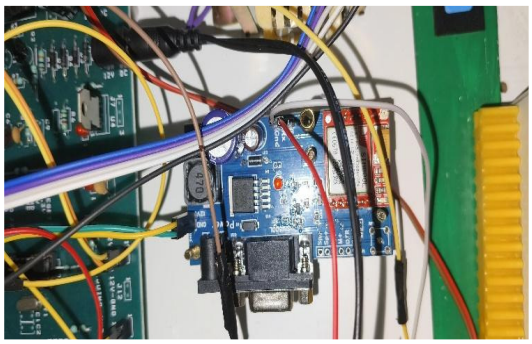

Fig.3: GSM Module – SIM 800L

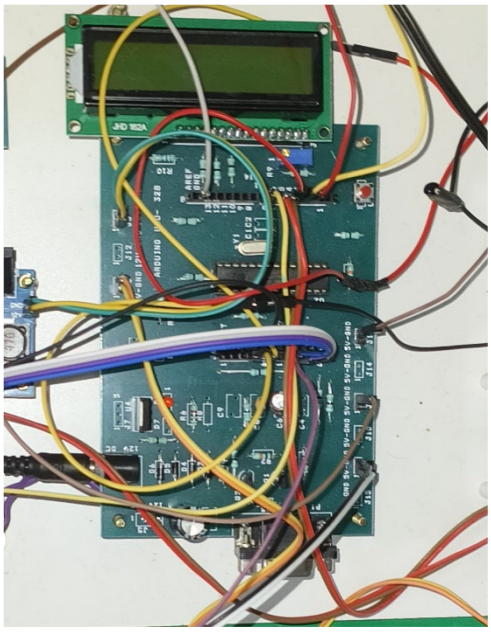

Fig.4: Arduino UNO 328

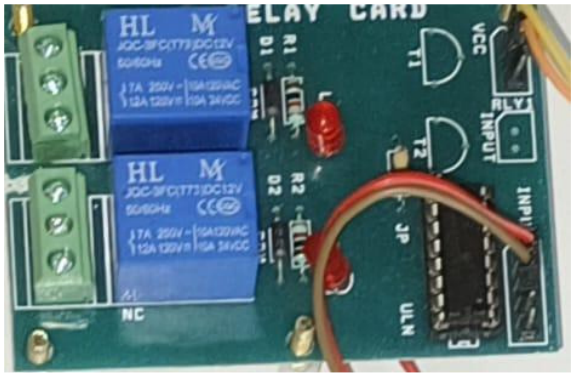

Fig.5: Relay Card

IV.CONCLUSION

This smart ATM security system uses proximity sensors, Arduino, GSM, and IoT to detect unauthorized metal objects, locking the outer gate and sending real-time alerts to bank authorities. A secure authentication mechanism ensures only authorized personnel can reopen the gate. The system enhances ATM security, prevents theft, and enables remote monitoring, ensuring safety for both users and assets.

V.ACKNOWLEDGMENT

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