Project Title : RFID-Based ATM Security System with Dual Authentication Using OTP and Smart Access Control

Aim:

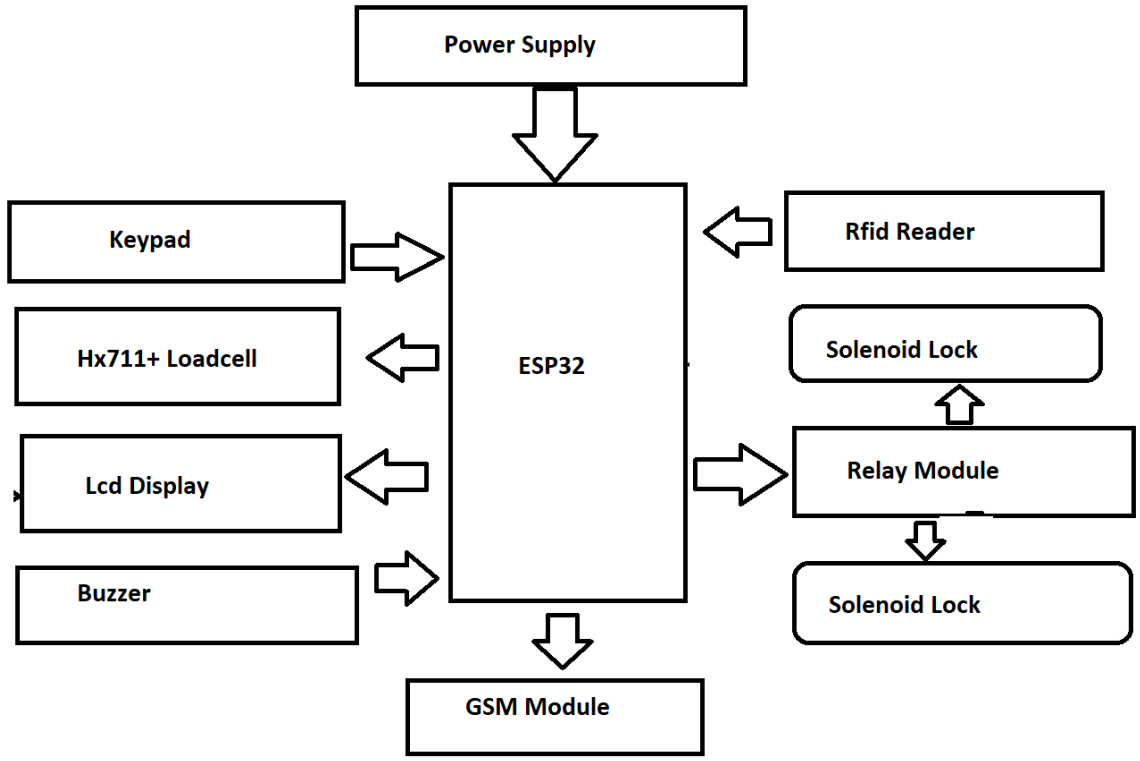
To design a secure ATM access system that uses RFID cards for primary identification and OTP-based verification for secondary authentication, ensuring smart and restricted access to authorized users only.

Objectives:

- To use RFID cards as the first level of authentication.
- To generate and send an OTP to the registered mobile number or app for second-level authentication.
- To allow ATM access only after successful dual verification.
- To prevent unauthorized ATM access and improve security.
- To implement smart control features such as alerts for failed attempts.

Working Principle:

When a user scans their RFID card, the system checks if the card ID matches a registered user. If valid, it triggers an OTP request, sending a unique code to the user's mobile number or Telegram. The user must then enter the correct OTP on the keypad or screen. If both steps are successful, the access mechanism (e.g., door, ATM interface) is unlocked. If either verification fails, access is denied and an alert may be triggered.



Hardware Components:

- ESP32
- RFID Module (RC522 or similar)
- Keypad
- GSM Module
- Solenoid Lock / Relay Module
- Buzzer and LED Indicators
- Power Supply

Software Used:

- Arduino IDE
- Telegram Bot API
- Embedded C/C++

Advantages:

- Provides secure dual authentication
- Prevents unauthorized ATM access
- OTP adds real-time user confirmation

- Scalable for use with multiple users
- Low-cost, contactless, and user-friendly

Disadvantages:

- Requires stable internet or GSM signal for OTP
- RFID cards may be lost or duplicated if not protected
- Slight delay due to OTP verification process
- Limited security if OTP is intercepted without encryption

Applications:

- ATM security access systems
- Bank safe rooms or locker room access
- Secure office or lab access
- Smart lockers in public or private spaces

Future Scope:

- Add biometric authentication for triple-layered security
- Use encrypted OTP for enhanced protection
- Integrate mobile app with usage logs and alerts
- Link with national ID or banking systems for identity verification
- Implement voice or face recognition for advanced access control

Conclusion:

The RFID-Based ATM Security System enhances ATM safety using dual-layered authentication: RFID and OTP. It ensures only authorized users gain access, helping prevent fraud and unauthorized transactions. This system offers a practical and scalable solution for modern secure banking and smart access applications.