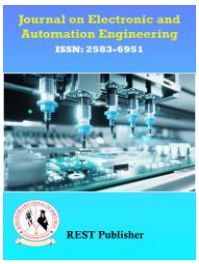
**Journal on Electronic and Automation Engineering**

**Vol: 4(2), June 2025**

**REST Publisher; ISSN: 2583-6951 (Online)**

**Website: https://restpublisher.com/journals/jeae/**

**DOI: https://doi.org/10.46632/jeae/4/2/16**




# Real-time SMS based ATM card security solution and blocking system through Arduino uno and GSM

**S. Ayesha Siddiqua, V. Sai Sandeep Reddy, N. Venugopal, P. Harshitha, *P Anjaneya**

Annamacharya Institute of Technology & Science (AITK), Kadapa, Andhra Pradesh, India

**Corresponding Author Email*: anjiaitsk@gmail.com.

**Abstract:** *As digital transactions continue to rise, ATM card fraud remains a major security concern, often resulting in financial losses. One key vulnerability is the misuse of lost or stolen ATM cards, which often goes undetected until unauthorized transactions occur. This project introduces a GSM-based smart security system that enhances ATM card protection by providing real-time notifications of unauthorized usage. The system integrates seamlessly with existing ATM networks and consists of three key components: an ATM machine, a GSM modem, and an embedded microcontroller. When a lost or stolen card is inserted into an ATM, the system detects it and immediately triggers an SMS alert to the cardholder and relevant authorities, such as the bank's fraud detection team. The alert includes critical details like the ATM location and transaction attempt, allowing swift action to block the card and investigate potential fraud. By offering real-time fraud detection and integration with the bank's lost card database, this system ensures accurate and reliable alerts, minimizing false alarms. Its low-cost, efficient design enhances ATM security, helping mitigate financial fraud risks while ensuring a safer banking experience for customers. Ultimately, this GSM-based system represents a low-cost, highly effective security solution that improves the overall security and integrity of ATM transactions. It provides a robust mechanism to address the growing problem of card misuse, helping to mitigate the risks of financial fraud while ensuring a safer banking experience for customers.*

## 1. INTRODUCTION

In today's technologically advanced world, autonomous systems are gaining rapid popularity. With increasing digitalization, automation, and technological advancements, banking operations have become more efficient. The widespread adoption of ATMs and credit cards has simplified financial transactions, making banking more accessible and convenient. However, alongside these advancements, financial crimes, particularly ATM-related fraud and theft, have also increased significantly. To address this growing security concern, we propose integrating GSM technology into ATM systems. By enhancing the existing software with GSM-based security features, we can provide an additional layer of protection. This system ensures real-time monitoring and instant alerts, significantly reducing the risk of ATM-related crimes and improving overall banking security. GSM technology, commonly used for mobile communication, can improve ATM security by enabling real-time alerts. This project proposes integrating GSM with ATMs to send instant SMS notifications whenever an ATM card is used. If the transaction is unauthorized, the cardholder can block their card immediately, and banks can take necessary action. This system enhances security, giving ATM users better control over their accounts while reducing fraud cases for banks.

## 2. LITERATURE REVIEW

The traditional ration distribution system faces several challenges, including the need for annual card renewals and fraudulent practices by ration store dealers, such as diverting food supplies to the open market for profit. To address these issues, various researchers have proposed automation solutions integrating modern technologies like RFID, GSM, and embedded systems. K. Bala Karthik proposed a "Cloud-Based Ration Card System Using RFID and GSM Technology" [1], which offers a more efficient purchasing method at ration shops. In this system, users authenticate their identity by scanning an RFID card and entering a random password received via SMS. Transactions are validated through a Windows application that stores user details and purchase records, reducing manual intervention and improving transparency. A.N. Madur et al. developed the "Automation in Rationing

System Using ARM 7" [2], which integrates automation into the rationing process to minimize corruption and illegal smuggling. Similarly, S. Valarmathy et al. proposed the "Automatic Ration Material Distribution System Based on GSM and RFID" [3], where customers use RFID cards for authentication. Once verified, the system displays the user's balance, allowing them to withdraw a specified amount of rationed goods. A weight sensor monitors the dispensed quantity, ensuring accuracy and updating the user's account in real time. Another approach, proposed in the "Automatic Rationing System Using Embedded System Technology" [4], leverages PLC-based automation to replace conventional ration cards with smart cards. The system is connected to the government database via GSM modules, enabling real-time updates on transactions for both consumers and authorities. Additionally, the "e-Ration Shop: An Automation Tool for Fair Price Shops under the Public Distribution System" [5] highlights the role of Information and Communication Technology (ICT) in preventing supply chain leaks and improving transparency in food grain distribution. This study demonstrates the successful application of ICT-based automation in public distribution systems, enhancing efficiency and minimizing fraud. These research efforts collectively emphasize the importance of automation in ration distribution, demonstrating how RFID, GSM, and embedded technologies can improve security, transparency, and operational efficiency.

## 3. METHODOLOGY

**COMPONENTS USED:**

- Power Supply
- RFID
- Arduino UNO
- Liquid Crystall Display (LCD)
- BUZZER
- 5G GSM Module

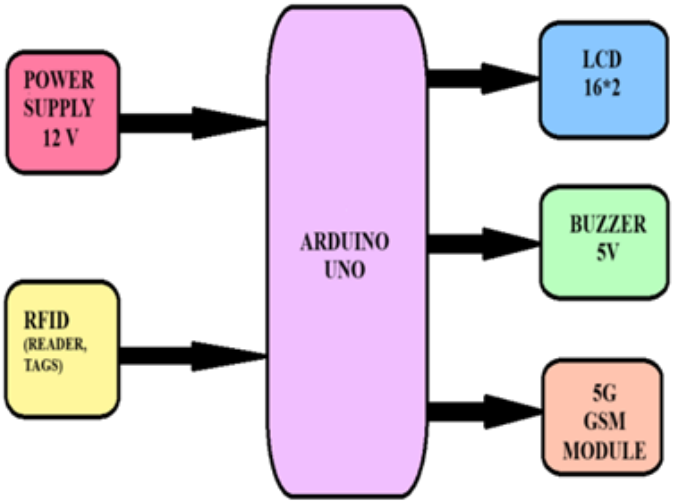



**FIGURE 1.** Block diagram of 5G GSM Based Smart Information System using lost Atm Cards.

**POWER SUPPLY:** An AC/DC power supply enables a device to operate from different voltage sources, making it versatile and easy to replace. This not only extends the lifespan of the device but also functions as a battery charger. As an adapter, it efficiently converts power while minimizing heat generation, leading to lower energy consumption. For example, 12V battery chargers and other voltage options are designed to enhance efficiency and safety.

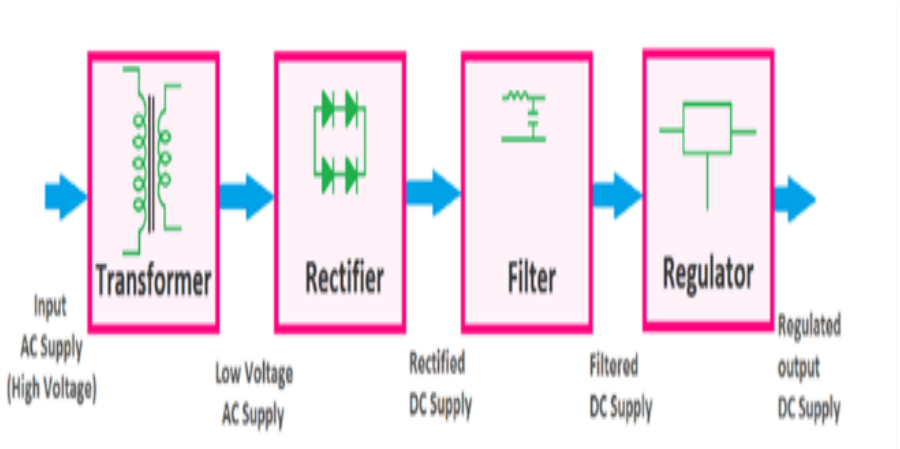



**FIGURE 2.** AC to DC power supply

**RFID:** It is a method of identifying unique items using radio waves. Typical RFID systems are made up of 2 major components: readers and tags. The reader, sometimes called the interrogator, sends and receives RF data to and from the tag via antennas. A reader may have multiple antennas that are responsible for sending and receiving the radio waves.

**FIGURE 3.** RFID Reader & Tags

**ARDUINO:** Arduino is an open-source electronics platform that integrates both hardware and software, making it ideal for a wide range of projects. Arduino boards are equipped with microcontrollers that can read inputs from sensors, buttons, and other components, then process and respond to them by controlling outputs such as LEDs, motors, and displays. With a vast community of developers and enthusiasts, Arduino has been used in thousands of applications, including robotics, home automation, IoT, and interactive art. The Arduino Integrated Development Environment (IDE) is beginner-friendly yet powerful enough for advanced users, supporting multiple programming languages and libraries. It is compatible with Windows, Mac, and Linux, making it accessible across different operating systems. Additionally, the open-source nature of Arduino allows users to customize both hardware and software, fostering innovation and collaboration in the tech community.

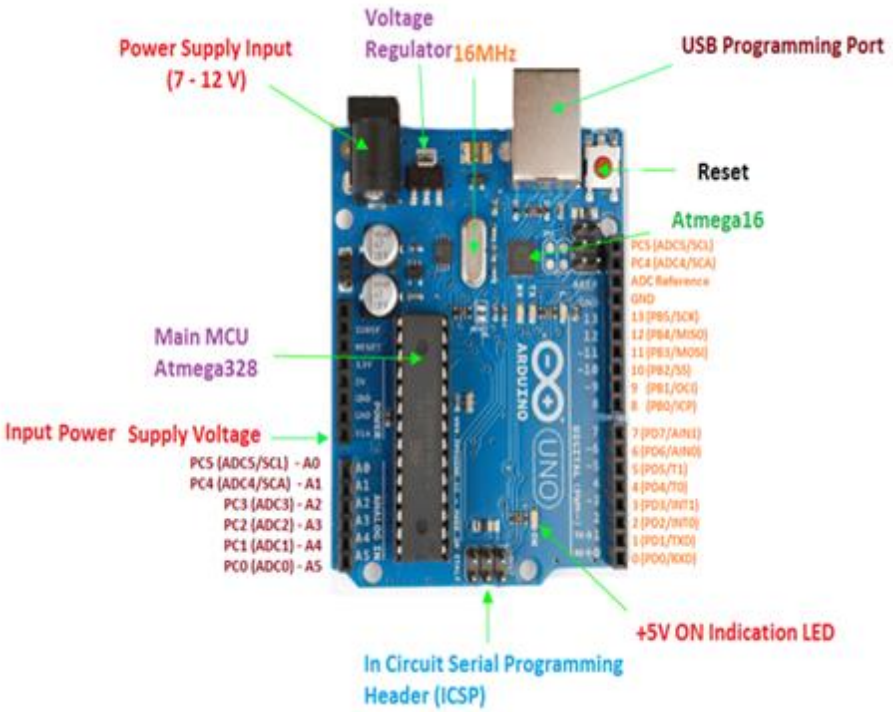



**FIGURE 4.** Arduino uno pin configuration

**GSM:** A GSM modem is a wireless communication device that connects to a GSM network to send and receive data. It functions similarly to a traditional dial-up modem, but instead of using a fixed telephone line, it transmits data wirelessly via radio waves. This allows GSM modems to provide mobile connectivity, making them useful for applications such as remote monitoring, machine-to-machine communication, and mobile internet access.

**FIGURE 5.** 5G GSM Module

**BUZZER:** Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play". A buzzer is an audio signaling device that generates sound when an electric signal is applied. It is commonly used in alarms, notifications, and sound effects in various electronic applications. Buzzers can be classified into two main types: active buzzers and passive buzzers.

**FIGURE 6.** Buzzer

**LCD:** An LCD (Liquid Crystal Display) is a type of screen used in TVs, computers, phones, and other devices. It works by using tiny liquid crystals to control light and create pictures. Since these crystals don't produce light on their own, an LCD screen needs a backlight to make the display visible. LCDs are thin, lightweight, and use less power compared to older screens like CRT monitors. There are different types of LCDs, such as TN, IPS, and VA, which affect things like color, brightness, and viewing angles.


**FIGURE 7.** Pin Diagram of LCD

## 4. WORKING

The GSM-based smart security system functions by detecting and preventing the unauthorized use of lost or theft ATM cards. When a user reports their ATM card as lost via OTP like mobile SMS, the system updates the card's status in a database. If the reported card is later inserted into an ATM, an RFID reader scans the card's unique identifier (UID) and sends it to an Arduino Uno for verification against the database. If the card is flagged as lost, the system classifies it as invalid and triggers an immediate response. A GSM module sends an OTP like SMS alert to the cardholder with transaction details, notifying them of potential fraud. To enhance security, a buzzer sounds like an audible warning, and the ATM's LCD screen displays a message indicating that the card is invalid. These real-time notifications and alerts enable the cardholder and authorities to act swiftly, minimizing financial risks and ensuring a secure ATM transaction environment.

## 5. RESULT

The schematic diagram successfully represents the integration of key components in the GSM-based smart information system for lost ATM cards. The connections between the RFID reader, Arduino Uno, GSM modem, buzzer, LCD display, and the database ensure smooth functionality and efficient communication.

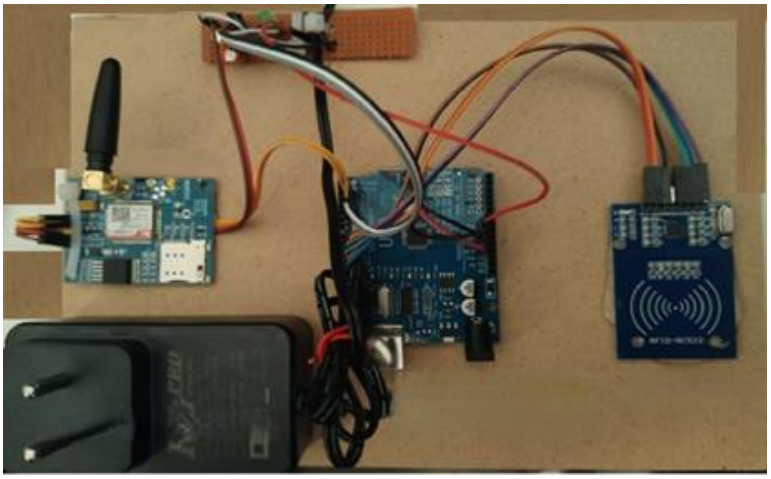


**FIGURE 8.** Hardware Kit

- Card Detection and Authentication: The RFID reader accurately scans ATM cards and sends the UID to the Arduino Uno for validation. The system effectively queries the database to determine if the card is lost or stolen.
- Real-time SMS Alerts: Upon detecting a lost card, the GSM module promptly sends alerts to both the cardholder and authorities. The OTP like SMS is delivered without significant delay, ensuring timely intervention.

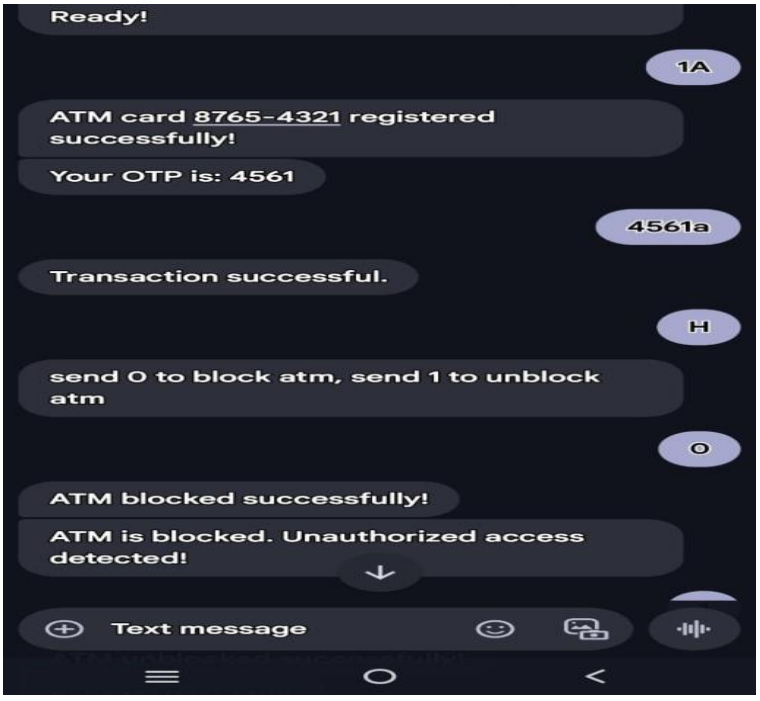



**FIGURE 9.** OTP received in mobile

- User Notification System: The buzzer emits a loud alarm upon detecting a lost card, alerting users and security personnel. The LCD display provides real-time feedback with clear status messages.
- System Performance: The schematic design ensures seamless communication between all components, demonstrating reliability in both controlled tests and real-world scenarios. The integration of RFID, GSM, and Database enhances and strengthens the account security and responsiveness of the system.

The schematic diagram effectively translates the proposed smart system into a functional circuit, confirming its feasibility and effectiveness in preventing unauthorized ATM card use.

**Advantages:**

- Enhances ATM Security by Integrating GSM Technology.
- Easy to Implement and Operate.
- Reduces Financial Fraud Significantly.
- Real-Time Card Blocking.
- Automated Alerts.

**Applications**

- ATM systems
- Locker systems
- Smart security

## 6. CONCLUSION

This system provides a secure and cost-effective method for authenticated financial transactions using GSM technology. By leveraging mobile-based authentication, account holders can perform secure transactions with ease, minimizing the risks associated with traditional banking methods. The only significant investment required is the initial setup of the GSM module, making it a viable long-term solution. With financial security being a major concern in the modern world, this system enhances trust in banking institutions while offering greater convenience to customers. As technology continues to advance, security remains an ongoing challenge. However, this solution plays a crucial role in mitigating risks and strengthening the reliability of digital transactions.

## Future Enhancements

- The integration of biometric authentication (such as fingerprint scanning or face recognition) could further enhance security by verifying the identity of the cardholder during transactions.
- Expanding the system to include GPS tracking of ATM machines could provide even more precise location-based alerts in case of suspicious card usage, improving fraud detection.

## REFERENCES

[1]. John Mashurano, Wang Liqiang, "ATM Systems Authentication Based on Fingerprint Using ARM Cortex-M3," International Journal of Engineering Research & Technology (IJERT), Vol. 2, Issue 3, March 2013, ISSN: 2278-0181.

[2]. M. Dinesh Kumar, M.S. Geethanjali, R. Karthika, M. Nagaraj, N. Vijayanandam, "Protected Cash Withdrawal in ATM Using Mobile Phone," International Journal of Engineering and Computer Science, Vol. 2, pp. 1346-1350, 2013.

[3]. R. Rasu, P. Krishna Kumar, M. Chandraman, "Security for ATM Terminal Using Various Recognition Systems," International Journal of Engineering and Innovative Technology, October 4, 2012.

[4]. Binachi A., Oakley I., Kwon D.S., "Using Mobile Device Screens for Authentication," Proceedings of the 23rd Australian Computer-Human Interaction Conference (OZCHI'11), pp. 50-53, 2011.

[5]. Agarwal C.C., Wolf J.L., Yu P.S., "Caching on the World Wide Web," IEEE Transactions on Knowledge and Data Engineering.

[6]. https://www.scribd.com/doc/169658843/GSM-Based-Smart-Information-System-for-Lost-ATM-Cards

[7]. https://www.researchgate.net/publication/308756839_Smart_ATM_Access_and_Security_System_using_RFID_and_GSM_Technology

[8]. https://forums.engineersgarage.com/forums/topic/gsm-based-smart-information-system-for-lost-cards/

[9]. https://projectsfactory.in/product/gsm-based-atm-security-system/

[10]. https://youtu.be/fI5mftWcB0?si=8KQfi2TQ3grqSfbB

[11]. https://ijirt.org/publishedpaper/IJIRT155102_PAPER.pdf

[12]. https://www.scribd.com/doc/169658843/GSM-Based-Smart-Information-System-for-Lost-ATM-Card