



Designing of Multi Account Embedded Smart ATM Card with Enhanced Security

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ABSTRACT

The idea behind this project is to pull several bank accounts into a single smart card so that the user can do business as he wishes with a single tap. It provides more convenience for users to access multiple accounts. The device used is a PIC microcontroller. Here, the microcontroller acts like a smart card with a unique code. It is used in the system management module and user module of this contract. The management module is responsible for accessing user details, user company information, and ATM card details. It also monitors all accounts of club users and updates information frequently. The user module is an interactive module where the user can enter the system and complete the action selected by the user. Therefore, users can access multiple accounts by entering a single password.

Keywords: Multiple account access, ATM Cards, Smart cards, One-time password (OTP).

I. INTRODUCTION

The automated teller machine, or ATM, is a type of electronic banking device that enables individuals to perform simple transactions without the help of a branch representative. ATMs are commonly used by individuals with credit cards or debit cards to make quick cash withdrawals or deposit money. These convenient devices allow people to perform various self-service transactions, such as transferring funds between accounts or paying for utilities. The first known instance of an ATM was shown in London in 1967.

The use of ATMs quickly spread to all major nations on the earth. They are already in place in even the smallest island states like Kiribati and the Federated States of Micronesia. ATMs come in two main categories. Basic units simply let you obtain updated account balances and cash withdrawals. The more sophisticated machines enable line of credit payments and transfers, receive deposits, and access account data. You frequently need to be a customer of the bank that runs the machine in order to utilize the complicated machines' advanced capabilities.

This particular application's goal is to encourage users of different banks to utilize this solution to access their accounts and conduct transactions. They are not required to engage with several bank websites. The administrator can change the bank's current information and add new bank information. The admin will decide whether or not to accept a customer's registration to utilize this application. Customers should ask the Administrator for access to several bank accounts. He has access to account-related data.

II. LITERATURE SURVEY

"Design and Implementation of Multi-Application Smart Card for Banking and E- Payment System" by Oke A. O., Adeyemo S. A., and Onibere S. A. (2013): This paper discusses the design and implementation of a multi-application smart card that can be used for banking and e- payment systems. The authors describe the architecture of the smart card, which includes multiple security features to protect against fraud and unauthorized access [1].

"Smart Card Security: Threats, Risks and Countermeasures" by Abdul-Hameed A. O. and Jantan A. (2017): This paper provides an overview of smart card security threats and risks, and proposes a number of countermeasures to mitigate them. The authors highlight the importance of designing secure smart card systems, especially in the context of financial transactions [2].

"Multi-Bank ATM Card System" by S. Sivakumar and R. S. Thilagavathi (2011): This paper describes the design and implementation of a multi-bank ATM card system that allows customers to access their accounts at multiple banks using a single card. The authors discuss the challenges of designing such a system, including security and interoperability issues [3].

"A Secure Multi-Application Smart Card for Financial Transactions" by M. H. M. Arafa and H. El-Rewini (2011): This paper proposes a secure multi-application smart card for financial transactions, which includes a number of security features to protect against various types of attacks. The authors evaluate the security of the proposed system using a number of metrics, and show that it provides strong protection against attacks [4].

"Design and Implementation of a Smart Card-Based Secure Electronic Payment System" by H.M. Abdel-Qader, A. M. Al-Zoubi, and M. A. Abu-Soud (2016): This paper presents a card-based secure electronic payment system that can be used for online transactions. The authors describe the design and implementation of the system, which includes multiple security features to protect against fraud and unauthorized access [5].

III. EXISTING SYSTEM

The customer inserts a plastic smart card with a card identification number (CIN) and a few other pieces of information to identify themselves at modern ATMs. The private identifying number (PIN), which consists of four digits and is used by the customer to gain access to the ATM device so they can conduct transactions, serves as the primary authentication for ATM transactions. When using an ATM from one or more other financial institutions and going above their transaction charge threshold, it presents a problem for the customer of an alternative bank.

a. Existing Method Disadvantages

1. User has to hold more than one ATM card for a greater number of bank accounts and the user also has to not forget the password for every ATM card.
2. User has to pay extra fees when transactions are performed from different bank ATMs apart from ATM cards after the transaction is over.
3. There is no OTP (One Time Password) system technology.

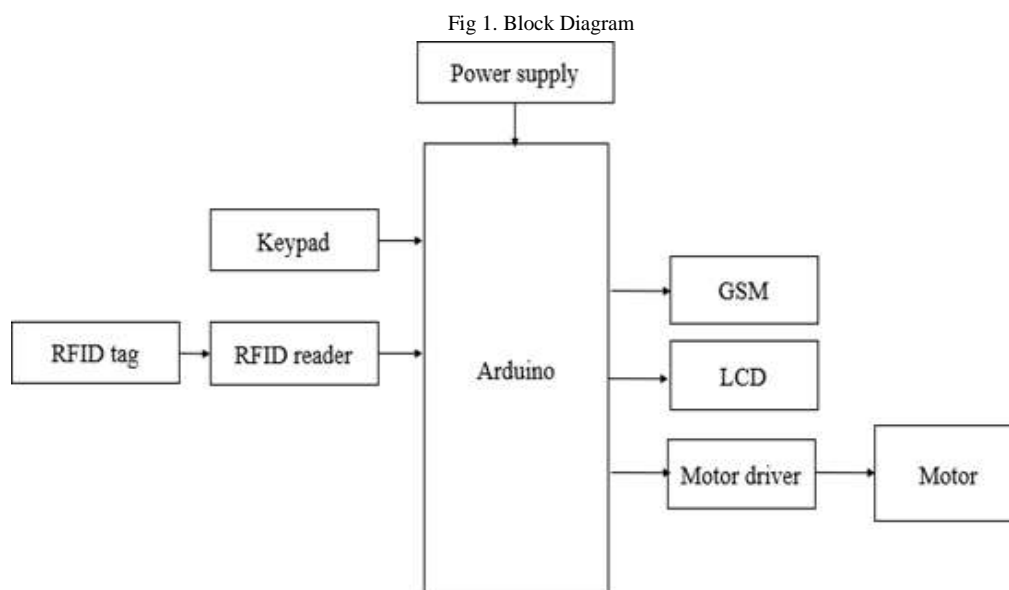
IV. PROPOSED SYSTEM

The concept behind this embedded smart ATM card is that the customer can use a single ATM card to operate different financial institution accounts instead of getting an individual card for every bank account. In this user swipes his/her smart card in the ATM device, then it requests for OTP on the server side. After choosing a bank, the request is sent to the corresponding bank through a network and links it with the bank's server for accessing the database of the user so that the transaction is processed.

Proposed Method Advantages

1. User can perform transactions for all his bank accounts using a single ATM card.
2. It is an enhanced security system.
3. It generates every time new password to the customer's registered mobile number.
4. More user-friendly than the present system.

V. METHODOLOGY



In this proposed method, the magnetic strip-based ATM card is replaced with RFID based card that has a unique number. The Arduino MEGA microcontroller is used to process the information from the sensor. The user can sign up for the bank information and also withdraw the amount from the registered bank card. An electricity supply of +5V is given to the circuit as input. Arduino Mega acts as a microcontroller that concurrently stores data given to it. The ATM card includes a magnetic strip containing a unique 12-digit number which acts as an RFID tag. This tag is read via a passive RFID

reader (right here EM-18 module) that is linked to the microcontroller through serial communication (UART). The money is deposited or withdrawn through a servo motor that rotates a hundred and eighty degrees if the password matches. However, if the password does not match, the buzzer starts ringing. In the end, no matter success or failure of the transaction a message is sent to the user via a GSM module (SIM800L) is a 4 G-based total network that uses AT commands.

VI. HARDWARE REQUIREMENTS

1. Arduino Mega
2. RFID Reader Module
3. Keypad
4. LCD Display
5. GSM Modem
6. Power Supply

DESCRIPTION OF HARDWARE

1. ARDUINO MEGA

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 Digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

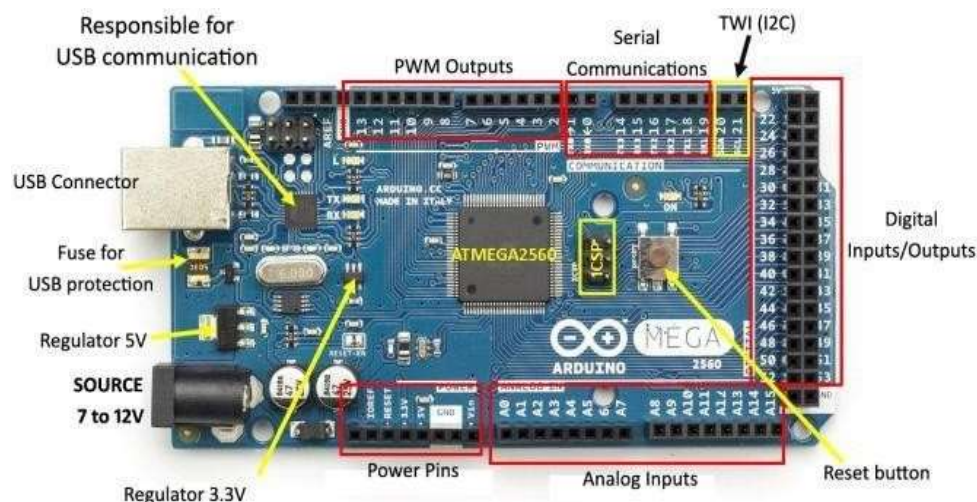


Fig 2. Block Diagram

2. RFID Reader Module

A Radio Frequency identification (RFID) reader module is a tool used in an automatic Teller machine (ATM) to read information stored on an RFID card normally includes a small integrated circuit that can be used to store information, such as account details, personal identity information, or transaction history. In an ATM, an RFID reader module reads the information stored on the RFID card when the card is inserted into the card reader. This information is then transmitted to the ATM's processing unit, which verifies the card's authenticity and initiates the requested transaction. Using RFID technology in ATMs afford a more secure and convenient manner for customer to get entry to their bank accounts, as the generation enables the quick and accurate identification of the person and decrease the risk of card skimming or other forms of fraud.

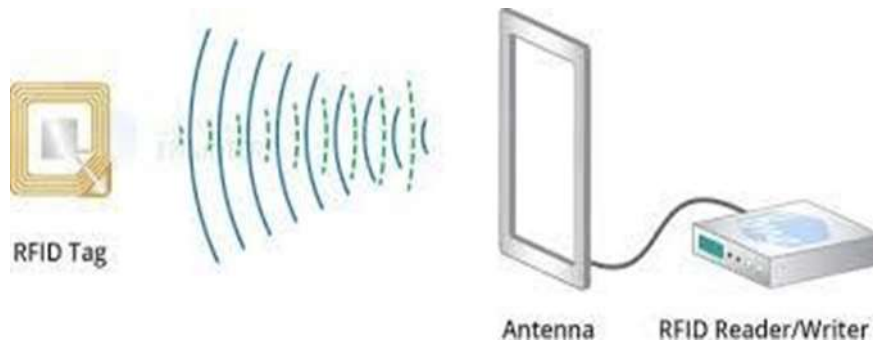


Fig 3. Working of RFID Reader with Tag

3. Keypad

A Matrix keypad is the most commonly used input device in many of the application areas like digital circuits, telephone communications, calculators, ATMs, and so on. A matrix keypad consists of a set of push buttons or switches that are arranged in a matrix format of rows and columns. Keypad 3x4 is used for loading numeric into the Arduino. It consists of 16 buttons arranged in a form of an array containing four lines and four columns. It is connected to the development system by a regular IDC 10 female connector plugged into some development system's port.



Fig 4. 4x3 Keypad

4. LCD Display

The model described here is for its low rate and amazing possibilities most frequently used in practice. It is based on the HD44780 microcontroller (Hitachi) and may display messages in two traces with 16 characters each. It presents all the alphabet, Greek letters, punctuation marks, mathematical symbols, and so forth. Similarly, it is viable to display symbols that a person makes up on his personal. Automatic transferring message on display (shift left and right), the appearance of the pointer, and backlight are a consideration as useful characteristics of liquid crystal display.



Fig 5. LCD Display

5. GSM Modem

GSM mode refers to the ability of an ATM to communicate with the bank's servers using GSM (Global System for Mobile Communications) technology. When an ATM is in GSM mode, it uses a wireless network to establish a connection with the bank's servers. This allows the ATM to perform transactions, such as cash withdrawals or balance inquiries, even when the primary communication channel is (usually a wired network) not available or experiencing issues. GSM mode is particularly useful in remote areas or locations where wired networks may not be available or reliable. It ensures that the ATM is able to maintain a connection with the financial institution's servers and provide customers with uninterrupted service.



Fig 6. GSM Module

6. Power Supply

The electricity supplies are designed to transform high-voltage AC mains energy to a suitable low-voltage supply for digital circuits and other devices. electricity supply can be broken down into a series of blocks, each of which performs a particular function. A DC electricity supply that keeps the output voltage steady irrespective of AC mains fluctuations or load variations is called a "Regulated DC electricity supply".

VII. SOFTWARE REQUIREMENTS ARDUINO IDE

Here the Arduino integrated development environment or Arduino software program (IDE)-consists of a text editor for writing code, a message region, a text console, a toolbar with buttons, for commonplace functions, and a series of menus. It connects to the Arduino hardware to upload applications and talk with them. The Arduino IDE is an open-source software, which is used to write and add code to the Arduino OS X, and Linux. It helps the programming language C and C++. Here, IDE stands for Integrated Development environment.

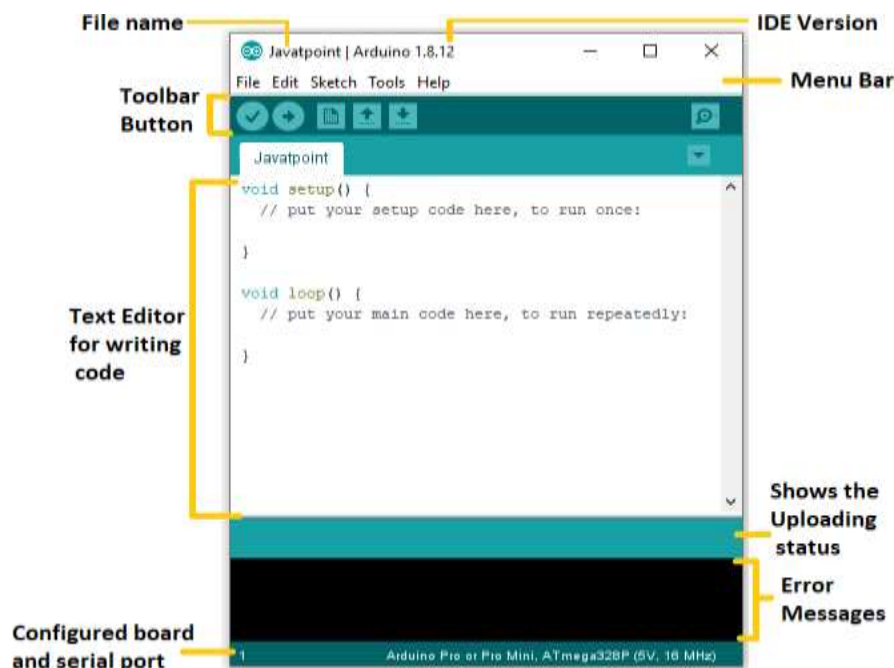


Fig 7. Arduino IDE Software

VIII. RESULT

The results are obtained as per the proposed plan on a single ATM card for multiple bank accounts. The main objective of this project which is to provide security by using low-cost is also achieved as the result.

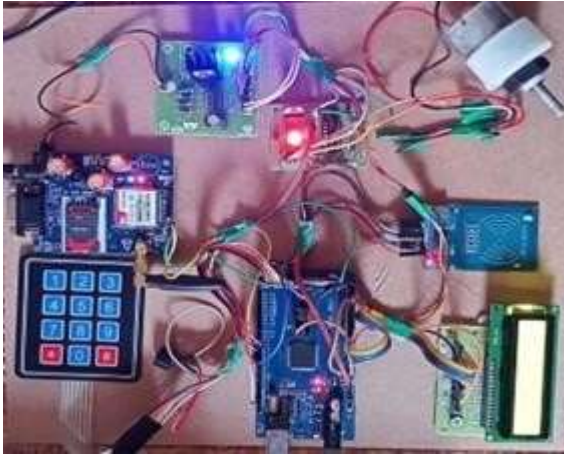


Fig 8. Hardware Implementation Fig 9. One-Time Password

CONCLUSION

In this project, user can control his/her multiple accounts in various banks with the help of a single smart card ATM which affords an easy-to-get right of entry and decreases the complexity of dealing with a couple of ATM cards and their respective passwords. The safety features were stronger in large part for the stability and reliability of the proprietor's reputation. The whole system is constructed in the era of an embedded system which makes the system secure, reliable, and clean to enforce. Consequently, the vulnerabilities of the ATM fraud can be reduced in destiny.

FUTURE ENHANCEMENT

Since more than one bank account is being introduced, the present PIN security isn't enough sufficient, so we are able to embed a biometric scan in this smart card i.e., a multicomponent card. In order that the consumer holds the card such that the finger rests on the biometric scan reader even as he swipes the card and the picture is authenticated in real-time. No one other than the user and his/her nominees can use the card. Most effective if the thumb influence fits the following step and is processed otherwise the transaction will not be allowed until the user is authenticated.

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