



Card less ATM Using 3-Level Authentication System

Velasiri Dwarakamayi Amareswari¹, Gopi Manoj Vuyyuru²

Tata Consultancy Services, Hyderabad, India¹

Tata Consultancy Services, Bangalore, India²

Abstract: The automatic teller machine (ATM) was invented back in the 1960s to provide users with 24x7 round the year with banking services likes withdrawing cash, depositing, balance enquiry and many other services. Initially, banks provided users with cards to access these services at atm. But there are many disadvantages associated with using cards. So, many researchers developed various ways of accessing these services without the help of any cards. Some of them used fingerprint-based techniques and while others used OTP based methods to improve security levels. This paper introduces a new way of withdrawal of cash from ATM's by improving the security levels compared to the existing methods. Here we use a 3-level authentication system for withdrawing cash without cards by various authentication techniques.

Keywords: ATM, Cardless transaction, Fingerprint, Security, OTP.

I. INTRODUCTION

In the year 1960, an American origin inventor and businessman named Luther Simijan developed the automated machine which could be used to deposit cash or check at any time o the day and named it as Bankograph. Then in 1967, a Scottish inventor named John Shepherd-Barron while he was in a bathtub got an idea that we can dispense cash similar to that of vending machines dispensing chocolate bars. This was implemented by the famous Barclays London Bank which used printed paper voucher with radioactive ink to dispense cash. Later a Dallas professional baseball player and engineer Donald Wetzel started using plastic card to dispense cash instead of printed paper. This method was implemented by a local chemical bank in the year 1969. After this, the usage of ATM's became popular across the world. In today's world, there are over 2 million ATMs and also over 2 billion cards have been issued with 900 million debit cards issued in India.[1]

Nowadays people are using Personal Identification Number simply called a pin to authenticate themselves. Whenever the user is about to do a transaction, he/she inserts the card and select the operation to perform and then authenticate themselves using a pin. If the pin is matched then the transaction is completed successfully. But as technology is improving the frauds in the ATM's are increasing rapidly. So many researchers started developing cardless ATM's by using major authentication methods like face recognition, fingerprints, OTP's. By using these methods, they have improved the level of security and also reduced the fraud and also improved the speed of the transaction. So, in this paper, we have developed a new 3-level authentication method which improves security and improve the speed of transaction than the existing methods.

II. TRADITIONAL METHOD TO WITHDRAW MONEY FROM ATM'S

The following are the steps involved to withdraw money from ATMs.

- 1) In the traditional method of withdrawing the cash from ATMs, one should be inserting the ATM card into the terminal of the Machine and leave it until the end of the transaction or just slide the card until it stops and pull it back, and that is when the actual transaction will get initiated.
- 2) Need to choose the language preferences at first, and should follow the instructions displayed on the screen of the ATM Machine.
- 3) As an initial level of authentication, one should enter the PIN (personal identification number) on the keypad as shown in the above image, to get the access of account level details or to perform the required operation.
- 4) Once the PIN is confirmed, ATM Screen will be displaying the list of actions like withdraw cash, deposit and balance enquiry. Since it is withdrawal of the cash in this case, one should be selecting the Withdraw cash option, and mention the amount which is desired to be dispensed from the machine.
- 5) After selecting the option, cash will be dispensed from the slot as shown in the image above, and will be collected.
- 6) Finally, the transaction will be finished by collecting the receipt and checking if the transaction's session has ended. [2][3]



Figure.1 A sample graph

Advantages of using traditional method

- One can avoid a long waiting lines, filling the withdraw/deposit forms in bank, and save time by using ATM as a go to option to withdraw cash, cash deposit, and check account balance.
- It is a 24X7, 365 days convenience (Though it is a non-working hour for banks, ATM serves all the time).
- It can be used anywhere in the globe.
- The usage of the ATM Card is confined to only one person who is aware of the PIN details of that particular card.

Disadvantages of using traditional method

Though there are many benefits of using an ATM Card in performing transactions, it does have potential risks. Here are the same:

- The major disadvantage of using Card Present transaction is ATM Skimming. Criminals can install invisible spy cameras in the ATMs, and can steal the confidential details like account number, card number and PIN number, and further withdraw the money from the machine.
- An identity fraud might also happen, where the robbers steal your wallet which consists of you ATM card, and your identification cards like social security number, passport number etc., which can be used to change the PIN of the CARD.
- After performing the transaction and cash withdrawal, any thief might attack the card holder and threaten with any powerful weapon to grab the money, as the ATM will be open and isolated most of the times, which helps the thief to enter.

III. ERA OF CARDLESS ATM TRANSACTIONS

In order to overcome the risks mentioned above, many financial institutions came up with the idea of supporting CARDLESS ATM transactions. Unlike using the cards as the mode of transactions, here the user will be using a pre-downloaded mobile application of the bank at selected ATMs. Here is the implementation flow of the same.

1. The user should download the bank defined mobile application in their mobiles, and should LOGIN to their respective accounts.
2. User should define the amount that needs to withdraw from the ATM in the application, by bank's advised section.
3. Bank then will send a OTP (one time password) to the user mobile which is registered at bank's end, and till will be valid for a certain number of hours.
4. In that timeframe, user should visit the nearby ATM machine which supports the cardless transactions, and select for the CARDLESS Transaction option in the ATM screen.
5. Using the keypad, user should enter the mobile number, for which user received the OTP.
6. Then user should select the option which redirects to enter the OTP received earlier, and should enter the same, following with PIN entry as well.



7. After the authentication stage passed, ATM machine will dispense the cash from the slot and should be collected, which completes the transaction. [4][5]

However, this is not the only method the banks are opting. They even explored various options, and stepped a bit forward by using Barcodes. Below are the steps that users follow to perform a transaction in ATM without using cards.

Cardless atm transactions using Barcode

- 1) The user should download the bank defined mobile application in their mobiles, and should LOGIN to their respective accounts.
- 2) After logging into the bank application, user should choose the QR cash withdrawal option , and enter the desired amount to be dispensed at ATM.
- 3) Then user should go to the nearby ATM Machine convenience and scan the barcode, which is displayed on the ATM Screen as shown below.
- 4) User should then continue further, and enter the PIN of the respective account as a second level of authentication using the keypad.
- 5) The ATM machine then will dispense the amount requested in the mobile application, and the same will be collected by user.[6]



Fig.2 Cardless atm transactions using Barcode

Advantages of using existing methods

- The usage of mobile application (be it using Barcode scanning or receiving OTP) for the cardless transaction, has erased the major security issue of ATM Skimming, since there is no inserting/sliding of the card, the devices installed by criminals will not be able to capture anything. Also, the OTP and Barcode are used only for single time. So, by the time the criminal copies the OTP/Bar Code through the installed Spy Cameras, the session would be expired and transaction will be completed by actual user.
- Also, we don't need to worry about the lost cards and forgotten PINs, as cardless transactions don't require the presence of cards.
- User can perform the transaction at their fingertips, at any moment without carrying the cards.

Disadvantages of using existing methods

Having many advantages of using the cardless atm transactions, they do have their own risks.

- Though the transaction is performed securely, one cannot avoid the unauthorized entry of a threatening burglar with a weapon, stealing the freshly withdrawn cash, which is a major drawback in card present ATM transaction.
- Also, the banks who have implemented the cardless transaction methods, also became a prey for phishing scams, where the criminals have sent a text of fake website to users, for which after clicking on it, users will be redirected to a page requesting for Account details, and users provided the same. Which then lead to a major scam of retrieving the amount from user accounts, using the cardless transactions.
- Any random person can steal our authentication details for our mobile application, and can change the mobile numbers and can add theirs easily, which can lead to another fraud as there is no presence of card.



IV. PROPOSED METHOD

To overcome the drawback of thefts in ATMs and improve security, we came up with a new 3 level authentication system, where every person's details are registered even before stepping into the ATM.

1) Authentication Levels

- In the first level the user needs to provide his finger print outside. This is necessary to identify whether the user has account in the respective bank or not. It also helps people to unnecessarily enter the room where ATM machine is placed.
- In the second level the user has to give his finger print after entering the bank account and his date of birth. This is necessary to know whether the person is using his own account or using others by stealing their details.
- In the final level the user has to enter pin to perform transaction.

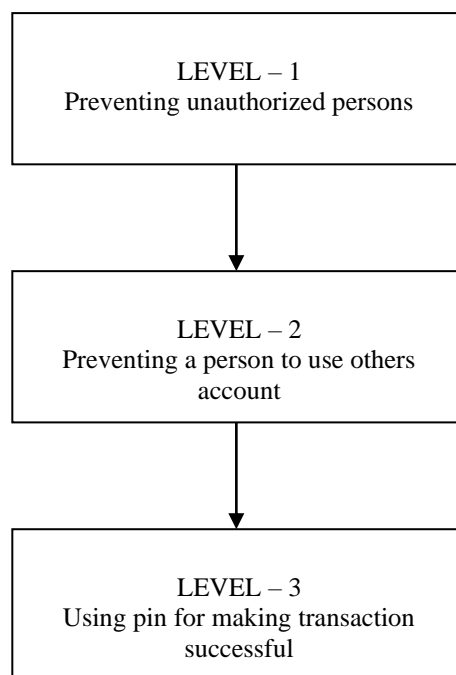


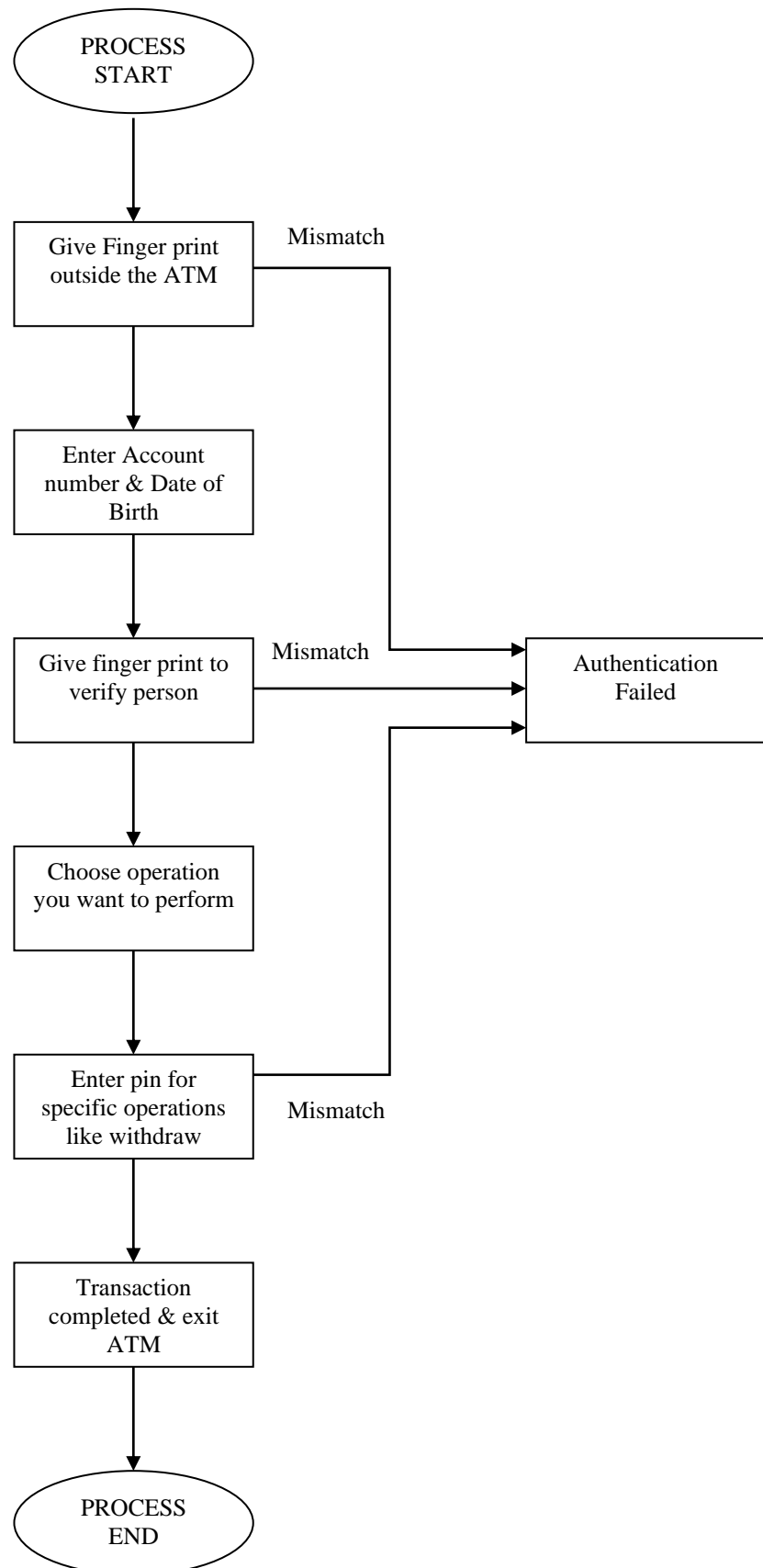
Fig.3 Three levels of authentication

2) Procedure to withdraw cash using proposed method

Here are the steps that user should follow in order to withdraw money without help of any card.

1. The user should place the finger at the fingerprint scanner, before stepping into the ATM which is placed at the entry point. The scanned finger print is authenticated with bank database and identify user. If it doesn't match then the user doesn't have account in his bank or finger print is not given correctly. Once the user enters into the ATM, the door will be locked until the user complete transaction and comes out. But security person can go to and from for some security reasons.
2. Then the user has to give his account number and then his date of birth. Then the user needs to give his finger print for the second time.
3. Once the finger print is matched the machine will request for the language preferences, and should follow the instructions displayed on the screen.
4. Post that ATM machine will be asking for the type of the operations like deposit, withdraw the cash or the balance enquiry to perform further, and the user will choose for the desired option and continue forward.

Fig.4 Flow Chart of Proposed Method





5. In order to withdraw the cash, user will choose the CASH WITHDRAWAL option and continue forward and enter the PIN on the keypad when prompted on the display screen, and enter the desired amount to be dispensed. It goes the same with Deposit and Balance Enquiry options.
6. Once the user enters the PIN, ATM will verify the Fingerprint and PIN combinations, and dispense the requested amount selected. In case the funds available are less than the displayed amount it will show insufficient balance. In the case of Balance Enquiry, the display screen will be either displaying the funds available in the user's account or provide the receipt.
7. Once the user completes the transaction, the user steps out of the ATM, and only then another user will be able to enter into the machine and use it.

Advantages of Proposed Method

- Since the proposed method do not include the revealing or usage of the card/account details anywhere, the criminals may not be able to steal the confidential details by hidden cameras, and will not be able to do any skimming.
- Also, as mentioned in the above steps, only when the user who has finished the transaction and leave the ATM, then another user will be able to enter in, which could avoid the unauthorized entry of burglars who threaten with harmful weapons.

To enter into the ATM, one should first register their fingerprint at the entry level. So, if at all any intruder try to pull any crimes by hacking the ATM, the criminal would be caught immediately by their finger print.

CONCLUSION

In the proposed 3-level authentication method to withdraw cash without using a card, we have improved the level of security and also improved the speed of transaction compared to that of a traditional method. The fingerprint is used to improve the security of the transaction by identifying the correct person. Because using OTP and pin the level of security decreases because any person who steals pin or mobile phone of others can easily withdraw cash. Also using this method, we have reduced the frauds inside the ATM and also no other person can enter the atm until the other person comes out.

REFERENCES

- [1] M. A. Imran, M. F. Mridha and M. K. Nur, "OTP Based Cardless Transaction using ATM," 2019 International Conference on Robotics, Electrical and Signal Processing Techniques (ICREST), Dhaka, Bangladesh, 2019, pp. 511-516, doi: 10.1109/ICREST.2019.8644248.
- [2] Nischaykumar Hegde, Sharath K R, "Card less ATM Cash Withdrawal: A simple and Alternate Approach", (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 7 (1), 2016, 126-128.
- [3] Shyamsundar Bhairam, Deepak Agrawal, "Method and System for Performing Card Less Cash Money Withdraws in ATM Machine", International Journal of Modern Engineering and Research Technology (IJMERT), Volume 6, Issue 1, January 2019.
- [4] "Yono - Personal Banking", Sbi.co.in, 2020. [Online]. Available: <https://www.sbi.co.in/web/personal-banking/yono>. [Accessed: 01- Jul- 2020].
- [5] "Cardless Cash withdrawal through Internet banking", Iicibank.com, 2020. [Online]. Available: <https://www.icicibank.com/Personal-Banking/insta-banking/internet-banking/cardless-cash-withdrawal-through-internet-banking.page?#toptitle>. [Accessed: 01- Jul- 2020]
- [6] S. Dhawan, "Wary of using ATM? Now make a cardless cash withdrawal by scanning QR code", The Financial Express, 2020. [Online]. Available: <https://www.financialexpress.com/money/wary-of-using-atm-now-make-a-cardless-cash-withdrawal-by-scanning-qr-code/1984713/>. [Accessed: 02- Jul- 2020].
- [7] "Automated teller machine", *En.wikipedia.org*, 2020. [Online]. Available: https://en.wikipedia.org/wiki/Automated_teller_machine. [Accessed: 01- Jul- 2020].