

Money to ATM – Fake Currency Detection

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Abstract- Now a days, we are aware of the ATM which make the task of money withdraw more flexible. But, to deposit money into a bank account, we have some traditional methods like the manual procedure of deposit in a bank and a modern method of e-banking (online money transfer). The former one is time consuming and the latter requires a minimum knowledge of net banking. Most of the people in general and those in rural areas in particular are well aware of using ATMs. Why can't we deposit the money also in ATM? The answer is yes and here is the model named MTA. The goal of this project is to construct a simulation model to deposit money to an account in ATM itself.

Keyword-- ATM, Rural Banking, Deposit, Currency Test, Transfer

I. INTRODUCTION

The invention of ATM machine marked a revolutionary change in the Banking sector. It made the money withdraw an easier and flexible task. Also it is very easy to understand such that the people of the rural India feel it very easy to operate. This changed the acronym of ATM from Automated Teller Machine to Any Time Money. This popularity was gained only with a single feature WITHDRAW. Most of the citizens of rural India have their lively hood from early morning to late night. So they feel it difficult to deposit the money to a Bank account through the traditional method of going to the bank, writing the slip, Stand in the queue and deposit the money. So, what if DEPOSIT is also made possible in an ATM? This paper deals with it.

WHAT IS AN ATM?

ATM is the acronym of **Automated Teller Machine**. It is an interactive kiosk for perform banking remotely. An **Interactive Kiosk** is a computer terminal featuring specialized hardware and software designed within a public exhibit that provides access to information and applications for communication, commerce, entertainment, and education. The major transactions that can be performed by the existing ATM machine are Withdraw and Cheque Deposit. The former one is efficient but the latter is not. Cheque deposits a major hindrance in an ATM machine because the machine is inefficient in identifying whether the envelope contains white paper or currency.

II. EXISTING SYSTEM

The existing system here is nothing but the ATM machine in use. The general usage of this system starts with the user entering the debit card and login to the system using valid PIN number. Later the transactions page is displayed and by selecting the withdraw option and then enter the amount to withdraw. If the user has sufficient balance in their account the cash is withdrawn. If the user opts for cheque deposit, the amount to deposit is asked by the machine and cheque is to be deposited in the cheque counter.

In addition to these, State Bank of India has recently launched a new ATM machine named "**Bunch Note Accept**" which is imported from US which costs 14 Lakhs per machine. The feature of this machine is that user logins with the traditional method using the debit card and the opts for Deposit. Then the deposit counter is opened and requests the currency to deposit. The denominations accepted by the machine are 100s, 500s and 1000s.

III. PROPOSED SYSTEM (DEPOSIT)

This task of deposit can be accomplished using the existing debit card. Using the existing card and make the automated system to ask for the type of transaction either withdraw or deposit and then proceed accordingly. Using either of the above method, the deposit can be done as follows:

- ✓ Validate User/ATM Card
- ✓ Ask for Essentials like PIN
- ✓ Validate Cash
- ✓ Deposit

The validate cash step is the essential step where the entered currency is checked for validity using some algorithms like Hidden Markov Models for Pattern Recognition. If the entered currency is valid the cash is deposited. Each of the above steps can be briefly illustrated as follows:

Validate User/ATM Card:

- i. Request ATM Card
- ii. Validate Card using PIN number
- iii. If valid, do (iv). Else (v)
- iv. Start Asking for Essentials.
- v. Eject Card.

Ask for Essentials:

- i. Ask for Amount to be deposited
- ii. Check if the amount is less than or equal to Limit
- iii. If yes (iv) else (viii)
- iv. Ask for the denomination (1000, 500, 100, 50 notes only)
- v. Sum up the denomination and compare with the amount entered.
- vi. If sum equals do Start Validating Cash else do (vii)
- vii. Show "Invalid Denomination". goto (iv)
- viii. Validate Cash.

Validate Cash/Notes:

- i. Accept the notes in the descending order of the denomination.
- ii. Validate the originality of the notes using various algorithms.
 - White paper check
 - Fake note check
 - Acceptability check –eject out if rejected.
- iii. Compare the cash entered and denomination and the total sum

- iv. If equal deposit the money to the cash container, else display respective error notification.

Deposit: After the amount deposit is completed, notify the user with the amount deposited and the current balance. Later ask for any other transaction. If any proceed further else eject the card and complete the process. Thus the ATM Deposit can be implemented.

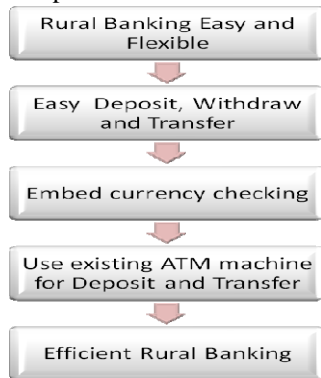


Figure 1: Proposed Idea of MTA

The main idea of MTA is to implement efficient rural banking thereby developing rural India by embedding the currency checking capability in the ATM machine and perform deposit and withdraw with the currency check included. When this idea comes into existence the banking sector is highly benefited which indirectly or directly leads to the economic development of India in general and rural India in particular.

IV. MODEL FOR MTA

The implementing view of MTA includes three modules which are listed and illustrated as follows:

- DEPOSIT Module
- WITHDRAW Module
- TRANSFER Module

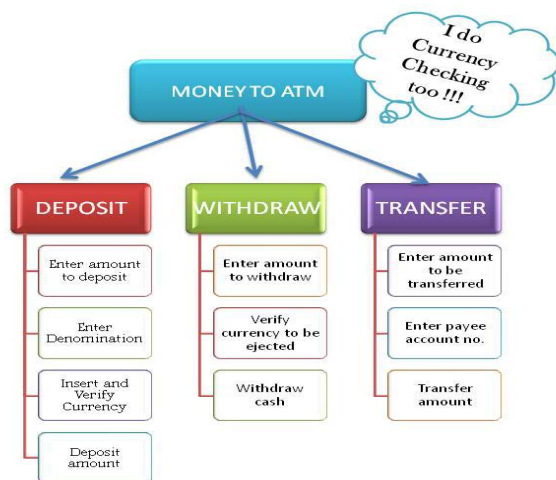


Figure 2: Proposed Architecture of MTA

We have presented a simple simulation model that illustrates all the features of MTA at a glance

Deposit Module:

The deposit module starts with the user login with a valid Debit card and its respective PIN number. Then there opens the menu display and the user selects Deposit. Then the

system requests user to enter the amount to deposit. The amount that can be deposited ranges from 1000 to 15000. When the valid amount is entered the denomination is requested. Based upon the denomination we will request the user to enter respective currency and check for its validity. The valid currency and the total is then deposited into the user account.

Withdraw Module:

The withdraw module is similar to the existing feature in the ATM machine. The enhancement done regarding this module is the currency checking before ejecting the cash out into the counter for withdraw. This solves the problem of getting fake notes on withdraw of amount from an user account.

Transfer Module:

This module is included so as to provide the facility of e-banking in general and transfer of amount from one account to another account in particular. To accomplish this task, the essentials required are the payee account number and the amount to transfer.

Algorithms Used

To perform currency checking in an ATM machine, we use two methods which are listed as follows:

Method #1: (An advanced mixed signal / pattern recognition system)

Logical Currency Checking System is an indigenously developed fast currency counting and checking Electronic Hardware Unit and it works reliably in almost all weather conditions. Mixed signal processing concept has been used to develop the strategy for checking the genuineness of Indian currency notes as per the specification brought out by the Reserve Bank of India. This technology could be extended to checking other currencies also.

Basic Technology

The checking and counting process comprises of the following steps: (i) Acquiring 1-D analog signals from optical, Ultra Violet, Infra Red and Laser sensors, (ii) Processing the discrete, analog and mixed signals, and (iii) Decision making whether the subjected currency is genuine or not. **The genuineness of a bill is ultimately decided by the fact whether the bill has the security thread or not.** Based on the decision, a Go - NoGo signal is generated and the currency is accepted or rejected. The throughput rate of this checking and counting process is about 900 bills per minute.

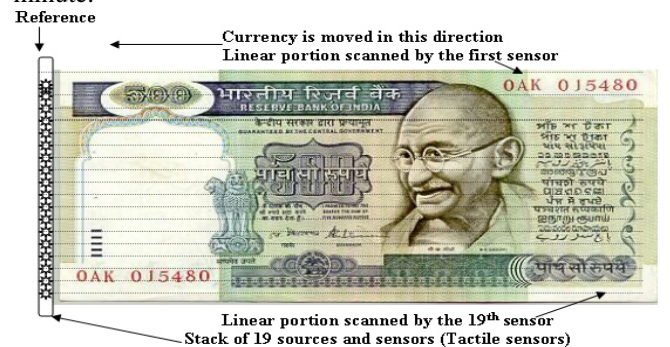
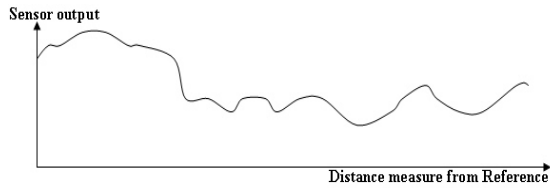


Figure 3: Processing of a currency note

Advanced signal Processing

The stack of tactile sensors consists of 19 or more light sources and optical / laser / UV / IR sensors. The following

image shows the arrangement. The bill is moved from right to left.



Now this signal is sampled, quantized and converted to discrete form as shown below.

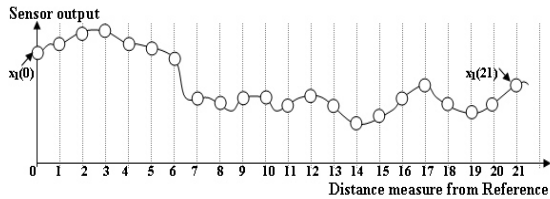


Figure 4 Mapping values of one sensor

The input signal received from 19 sensors and the histogram is drawn. Based on the values the parameters are checked

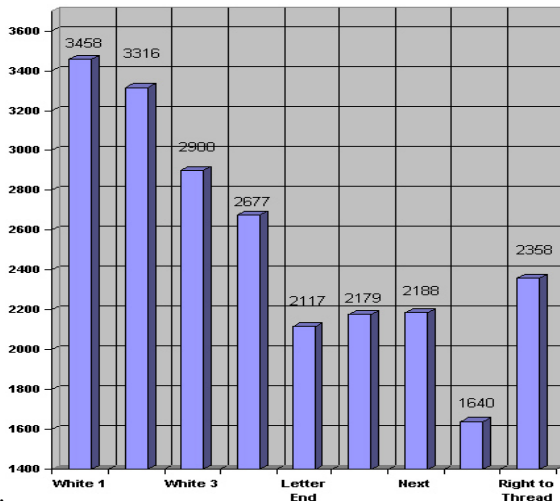


Figure 5: Histogram for the values from sensors

Now we have a set of 19 discrete signals as shown above in the left. These discrete signals are represented as $x_1(n)$, $x_2(n)$, $x_3(n)$, $x_4(n)$, $x_5(n)$, , $x_{19}(n)$ and these are matched with template signals in the decision process. Now, the arithmetic sum of each discrete number sequence is calculated. Thus we have 19 sums. The bar chart corresponding to these 19 values is shown above in the right.

This chart is obtained by actually measuring the sums while checking a 500-rupee currency bill in our research laboratory. The smallest of these 19 values (for example, the value 1640 milli volts shown in the chart) corresponds to the thread embedded in the currency.

Method #2: An advanced pattern recognition system

This has been developed as a fast operating currency counting and checking Electronic Hardware Unit fitted with an Expert System Software and it works reliably in almost all weather conditions. **Mixed signal processing, Pattern recognition and Image processing** concepts have been used to develop the strategy for checking the

genuineness of a currency note, be it a U.S. Dollar bill or a Euro Currency or any other note of any origin.

Basic Technology:

- (i) Acquiring 1-D analog signals from optical, Ultra Violet, Infra Red and Laser sensors,
- (ii) Acquiring the image of the currency in Ultra Violet and / or panchromatic light ambience from the scanners / digital cameras,
- (iii) Processing the discrete, analog and mixed signals,
- (iv) Processing the 2-D image of the currency using High-throughput Cellular Logic Array Processing principles
- (v) Decision making whether the currency under investigation is genuine or not. Based on the decision, a **Go - NoGo** signal is generated and the currency is accepted or rejected.

A genuine currency note should have certain parameters specified by the Reserve Bank of India.

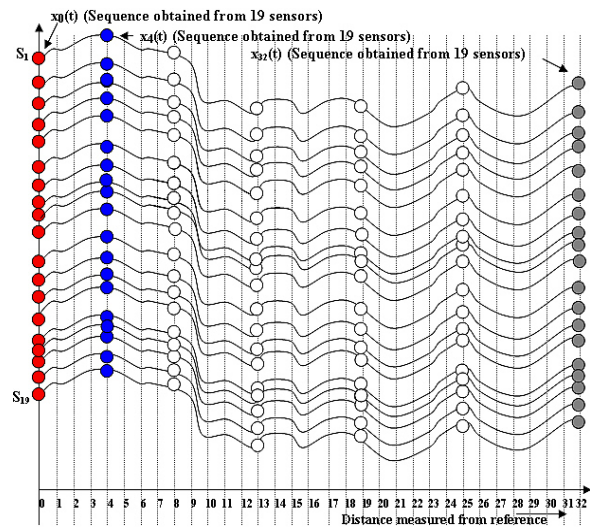


Figure 6 Combining values of 19 sensors

Watermark: The Mahatma Gandhi Series of banknotes contain the Mahatma Gandhi watermark with a light and shade effect and multi-directional lines in the watermark window.

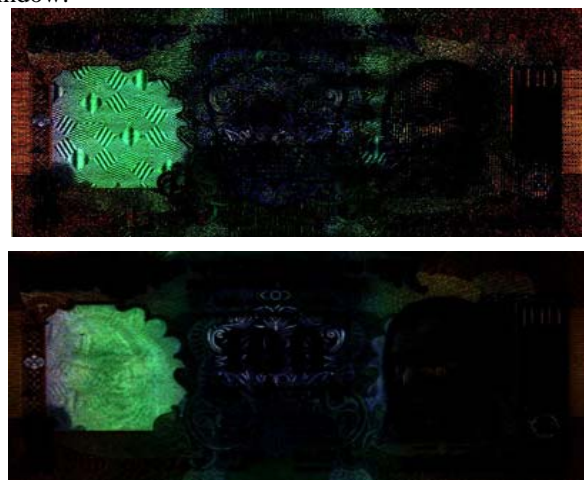


Figure 7 Watermark image of 100 rupee Note

Latent Image: On the obverse side of Rs.1000, Rs.500, Rs.100, Rs.50 and Rs.20 notes, a vertical band on the right

side of the Mahatma Gandhi's portrait contains a latent image showing the respective denominational value in numeral. The latent image is visible only when the note is held horizontally at eye level.



Figure 8 Latent Image of a 100 rupee Note

Intaglio Printing: The portrait of Mahatma Gandhi, the Reserve Bank seal, guarantee and promise clause, Ashoka Pillar Emblem on the left, RBI Governor's signature are printed in intaglio, that is, in raised prints, which can be felt by touch, in Rs.20, Rs.50, Rs.100, Rs.500 and Rs.1000 notes.

Identification mark: A special feature in intaglio has been introduced on the left of the watermark window on notes of Rs.20 and above denomination. This feature is in different shapes for various denominations (Rs. 20-Vertical Rectangle, Rs.50-Square, Rs.100-Triangle, Rs.500-Circle, Rs.1000-Diamond) and helps the visually impaired to identify the denomination.

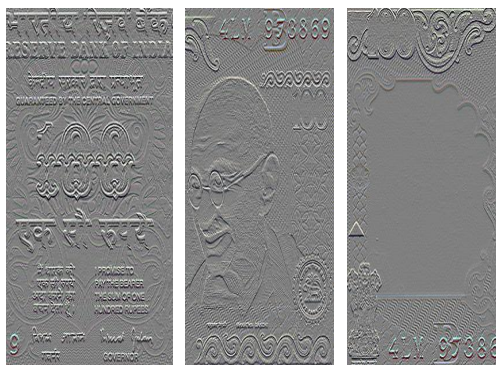


Figure 9: Intaglio and Identification Mark

Implementation View

The user interface of the proposed system is a web application, the snapshots of which are shown below:



Figure 10: Welcome Page of MTA



Figure 11: PIN Entry Page of MTA

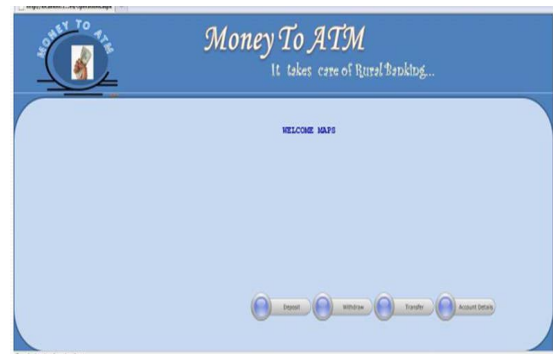


Figure 12: Transactions Page of MTA

Fig 10 is the Welcome page of the MTA application. It is the page that is displayed before the user inserts the debit card. After the card is inserted, the system prompts for the PIN number as in Fig 11. Here the users need to enter the 4-digit PIN number. If it is valid, then the transactions page i.e., Fig 12 is displayed. By selecting the required option, the user can perform the respective transaction.

Benefits of MTA

MTA makes the rural banking more flexible and easier. The following benefits made this possible:

- ✓ Portable and hence can be accessed wherever available.
- ✓ Perform all banking transaction with a single click.
- ✓ Secure as user login is validated.
- ✓ Currency checking makes MTA more efficient.

V. CONCLUSION

The system proposed in this paper makes rural banking more economic, flexible and optimal and time saving which indeed is an asset to India to make it a Developed Country.

The rural people need not to reach the banks to perform any transactions like with drawl or deposit. With this proposed system the banks can provide the best services to customers.

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