

Imminent Tools and Approaches for Safe Mode Alarm Reporting Technique in ATM

*Madhu Sharma

**Manoj Kumar Sharma

***Vijay Singh Rathore

Abstract:

It has been noticed that the number of users of the information and communication technology are increasing with high pace in the current era. Thus, the continuous updating of the systems and its components in use and in its surroundings is the need of the present globally changing world scenario. In this series, the usage of Automated Teller Machines is also increasing to meet the speedy monetary transactions of the users. Consequently, the cases of robbery and coerced cash withdrawing are also increasing with its increased usage. Various techniques and methods have been implemented and some innovative modules are in progress of development to maintain a safe and secure transaction through ATMs. The paper introduces the imminent gadgets and methods that could be utilized for the effective designing of our proposed Safe Mode Alarm Reporting Technique (SMART) ATM system.

Keywords: Automated Teller Machine (ATM), Global Positioning System (GPS), Personal Identification Number (PIN), Safe Mode Alarm Reporting Technique (SMART), nano-chip, coerced attack, security plane, emergency PIN.

1. INTRODUCTION

In this paper, a safeguarding system viz. Safe Mode Alarm Reporting Technique (SMART) for ATMs has been introduced, to protect customers who are forced to withdraw cash from ATM on gun-point and under threat by robbers or criminals [1][2][3][4][5]. Here, a security approach to handle the safety and security of customer through modifications in software and physical security system of the ATM for coerced cash withdrawal has been proposed. The imminent devices and methods found appropriate for the proposed SMART system are discussed for the effective designing of the system. The proposed system design has been introduced with the aim of customer safety and security on priority while facing a duress or coerced cash withdrawal. The proposed system is expected to provide safety to customer's life and nullify the financial loss of customer and bank, as it involves the tracking of looted money even it is taken

far away from the ATM location. Section II of the paper presents the working model of a general ATM; Section III introduces the basic framework of the proposed SMART in ATM, and Section IV presents the innovative devices and methods that could be utilized for the designing of an effective SMART ATM. Section V concludes the discussion and presents the future scope of the research.

2. WORKING MODEL OF AN ATM

ATMs are implemented to facilitate the transactional activities for the customers. The machine has a simple and user friendly interface with two input and three output terminals. The Customer interacts with the ATM through the input terminal and responses through output terminals. An ATM has two input devices: Card reader and a Keypad and three common output devices: Display screen, Receipt printer, Cash dispenser. But, the ATM cannot work independently; instead it is connected to the host processor which acts as a mediator between ATM and the Banking system. The host processor is similar to an Internet Service Provider which helps in accessing the ATM networks to the customers [6][7][8][9]. A basic ATM work model is shown in figure 1.

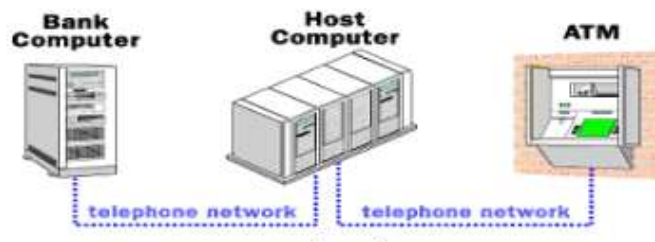


Figure 1: Basic ATM Work Model

An authorized ATM user performs transaction through ATM's user interface, initiated with the entry of Personal Identification Number (PIN) issued by the ATM and banking authorities. The PIN entered by the user is verified from the bank's database through high speed network connections like Internet Virtual Private Network (VPN) connection between ATM and the bank's server[10][11]. Protocols like Systems Network Architecture (SNA) over Synchronous Data Link Control (SDLC), TC500 over Asynchronous X.25, and TCP/IP over Ethernet are also preferable for effective network setup in the system[12][13].

3. SMART ATM'S FRAMEWORK

To provide safety and security to customers in case of specific robbery like forced or coerced cash withdrawal and to get assistance for tracing the looted cash withdrawn from ATM in such forced situations, we have proposed a Safe Mode Alarm Reporting Technique (SMART), in ATMs [14]. The

SMART ATM system's working begins with the entry of special PIN number in emergency situation provides withdrawal of secretly coded cash from emergency cash repository instead from general cash repository. A GPS enabled nano-chip is supposed to be embedded along with the strips of cash notes, that are stored in emergency cash repository for such emergency situations[16][17][18]. Thus, when the customer would go for coerced cash withdrawal, the police will get secret alert message along with the entry of the emergency PIN entered by the customer under attack. If the criminal somehow manage to escape far away from the ATM location before the arrival of security officers, the nano-chip of emergency cash notes would help and assist police in tracing the cash hid by criminals, after its activation and connectivity with the GPS network. The development, insertion and activation of such nano-chip is a challenging task module of the SMART ATM system. The SMART ATM's Framework could be divided into an Eight-Planar structure [14][15], as shown in figure 2.

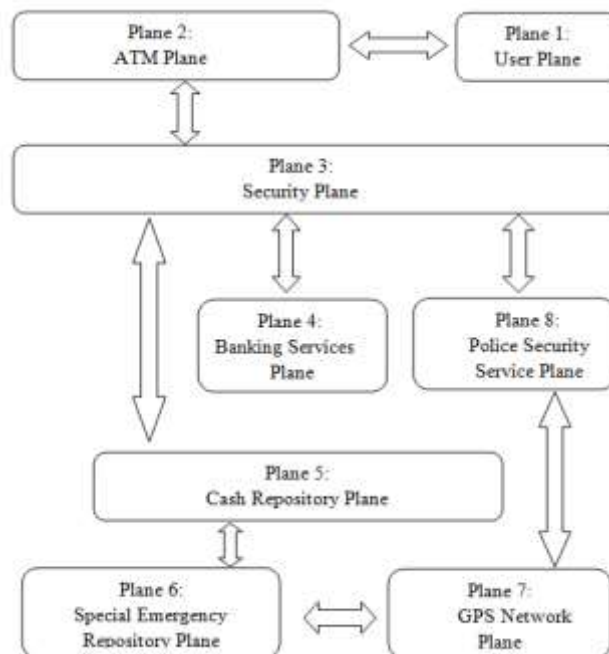


Figure 2: Different planes of SMART Framework

4. IMMINENT DEVICES AND METHODS FOR AN EFFECTIVE SMART ATM

a. Nano-chips Embedding

Nano chips are extremely fine strips to be used in special set of cash notes that are to be kept in the emergency cash repository. These nanochips are inserted along with the strips of the notes with extreme perfection during the printing and manufacturing process of those notes.

b. Emergency PIN System

For this system, a secret code is required to be issued from Banking Authorities along with the general PIN. The ATM holds the ATM_ID and the registered mobile numbers of the relevant security officers. This secret PIN when entered by the user or customer would call two methods, Method1: *Boolean* securityAlert(*ATMObject*). The *ATMObject* carries the information about the ATM_ID, ATM_location, ATM_registered_mobile_number. On successful call to this method *value=true* would be returned on screen.

Method2: *double* cashRequest(*Amount_entered*), this method receives the amount entered for cash withdrawal.

c. Software Security Alert System

This system on reception of call from Emergency PIN system must be able to make call to two methods simultaneously,

Method1: *secretAlarm(ATMObject)*, which in turn send the alert message carrying information about the robbery and ATM location to the registered mobile numbers.

Method2: *cashRepository()*, method closes the general cash repository and opens the emergency cash repository.

Method3: *chipActivation()*, method activates the nano chip embedded within the cash of the Emergency cash repository and would connect it with the local GPS network.

d. Emergency GPS Enabled Cash Release System

This system make calls to the method,

Boolean releaseEmergencyCash(*cashRequest(Amount_entered)*), which helps in releasing the cash through ATM cash dispenser and sends “transaction successful” message on screen. This system releases the cash from emergency repository consisting GPS enabled nano chip inserted within them[16][17].

e. Wireless Chip Activation and Recharging System

The activation and recharging of nano-chips in the absence of conventional sources of battery charging are the also challenging modules. For this, it has been found that the mechanical

vibrations in air could solve the issue of charging or activating battery. Harnessing the vibrations from the air using piezoelectric transducers, which could convert that mechanical energy into electricity could be utilized for a wireless charging or activation of nanochips embedded within emergency cash notes. act as a hotspot of energy and a receiver attached to nano-chip or any electronic device picks up that energy and converts it into electricity[19].

f. GPS Tracking System

The system would assist in adding the nano-chips within the local GPS network through signals received from the chips. Then the information gathered by the GPS would assist in tracking the looted or hid cash

5. CONCLUSION AND FUTURE SCOPE

Since, ATM machines are installed at public locations, high security is required at user end as well as banking system's end. Research on various security mechanisms have been implemented, but in particular, still there is need of more work for providing solution to the problems like coerced or duress cash withdrawals. Our proposed SMART ATM system is expected to provide a reasonable good solution for tracing the cash and criminals even after they are able to run far away from the robbery location. The proposed system could also assist in tracing robbed or stolen expensive precious things like gold or diamond jewelry or electronics items, but the manufacturers has to embed the chip in those items secretly along with their registration with the GPS network at a global level.

**Research Scholar, Suresh Gyan Vihar University, Jaipur*

***Professor, Suresh Gyan Vihar University, Jaipur*

****Director and Professor, Sri Karni College, Jaipur*

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