

Advanced Security System for ATM with Tracking and SMS Indication - An advance and viable approach

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Abstract—The inspiration for our project is got from newspapers and issues which are happening in our routine life. Nowadays stealing of ATM is too much increased so due to that we are just trying to find out solution for it. At some ATM centres there is no availability of security man, due to it some circumferences get chance at there. Police investigation exposed that nevertheless the bank had employed guards for round-the-clock duty, the night time guards in no way turned up. Besides, the police say, rather than setting up or fixing the ATM device to the ground, the financial institution had kept it on a desk like a TV arranged, creating it much easier for that robbers. At present thieves are not just stealing the rupees from ATM but they take away the whole cash box so because of it the security of ATMs failed to stop them, so we want to find out how we can make that cash box safe as much as possible and also will apply some security systems if we will get that something going wrong there. Nowadays money is the important thing for all the human being so that protection of it is also very important. Concentrating just on these we have choose this project.

Key words: component, GSM, Microcontroller, GPS, ATM, Intrusion, ATM theft, sensor.

I. INTRODUCTION

Over the past number of years real-time tracking and monitoring is one of the areas of escalating interest where a lot of work has been done and a lot of developments have been made to use it for the benefit of mankind. Now-a-days security is one of the key issue and basic need of our society. With fleeting time crime rates are also on the rise and will continue to increase as time passes. So, for present and future, security and authentication is the need of the hour [1]. A lot of progress has been made in this regard and most of the implementation can be seen in our daily lives in face of vehicle monitoring and tracking systems, weather forecasting, weapon detectors, heat sensing devices etc. This paper explains an effective and advanced security system for ATM with tracking and SMS indication. Due to continuous rise of crime in past.

- No sensors like vibration, pressure, door locking, SMS Sending, Tracking system.
- Alarms can be made to disabled.
- No sensing system for sensitivity level.
- Alarm sound is mitigated in crowded areas.

The proposed system has been designed to work with GSM technology, which will generate a message, every time an intruder tries to get unauthorized access of the ATM. GSM being one of the most popular and used mean of mobile communication makes it viable and unique in a way that many of the systems/applications designed can be made to work with GSM because it is a worldwide used, implemented and followed standards [4][5]. The proposed

system, on intrusion, triggers the location of the vehicle to the owner via SMS and continues to do so with a constant interval of time. One of the distinguished features the system provides is that it allows the owner to prompt an action via SMS from a far off place like door locking or cause a cash box to seize etc. The tracking feature has been incorporated using a GPS Tx/Rx module which serves the purpose of information gathering about the position of the vehicle. Sensors are used for the purpose of sensing if anyone disturbs the stationary state of the vehicle it prompts microcontroller to cause an action. It gives continuous readings to the microcontroller on the basis of which decisions are taken. A set of predefined messages are stored each for a particular reading and to prompt a particular action.

II. METHODOLOGY

The methodology adapted in the proposed model is that an interface of different sensors, GPS module, and GSM module is being developed with a microcontroller. The communication between the microcontroller and other components of the system takes place serially. The microcontroller continuously receives data from the sensors or switches and GPS module, takes decision on the basis of the readings collected onto the microcontroller. On intrusion the microcontroller will generate a message to the bank owner or to a set of predefined numbers stating the current location of the vehicle and what sort of an intrusion has been made, has it been made with doors, body and cash box. On reception the message the user will have the option to prompt an action from a far-off place like locking the doors, seize the engine, or cut the supply line. A message from the owner will be collected on to the microcontroller via GSM module, Based on the message collected a relay will be switched to take an action like locking the doors, seize the cash box or cutting the supply line.

III. SYSTEM ARCHITECTURE

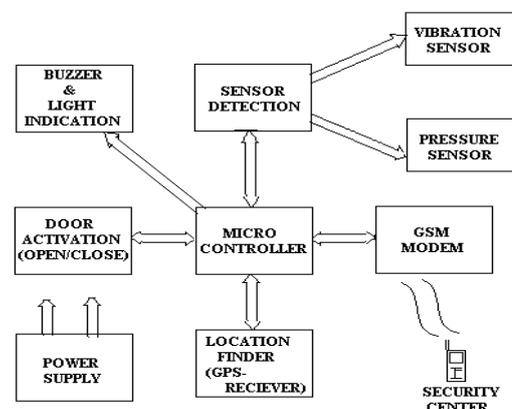


Fig 1: Block Diagram of the proposed model

Following are the building blocks of the proposed model integrated together to make a complete system, a general block diagram of the project can be seen in the figure 1.

A. GSM Module SIM300

SIM300CZ is a powerful tool which can work on frequencies EGSM 900 MHz, DCS 1800 and PCS 1900 MHz's. It is a tri-band GMS/GPRS device. It can also support GPRS coding schemes like CS-1, CS-2, CS-3 and CS-4. With small size it is suitable for industry requirement. For example in Machine-to-Machine, and mobile data communication systems SIM300CZ is best option. As it has an integrated charge circuit built-in; best option for circuits use batteries. In this project SIM300CZ sends SMS to owner of car when microcontroller commands it to send SMS.

B. Microcontroller 8051

Microcontroller 8051 is a very significant part of this system. It is like PC on chip. Its basic features are; it has 8KB ROM, 256 Bytes RAM, and 3 timers built-in. It is a cost effective and low power consumption device. With serial link connected to PC, it can be programmed directly or program can be uploaded after writing offline program on PC [6] [7]. It receives alarm signal from sensors and after execution it sends command to SIM300 to send SMS.

C. GPS Transceiver

To determine the exact location of car GPS module Receiver GR89 has been used. It is a small size low weight and low power consumption device. Some technical details are as under; it has 49 MHz processor, 20 Channel GPS receiver, and 200,000 effective correlates for fast time to first Fix (TTFF), even at poor satellite signals. It Supports NMEA-0183 v2.2 data protocol: SiRF binary code. It has 4Mbit integrated program Flash and ARM7TDMI processor. It sends location to GSM module to include in SMS via Microcontroller.

D. Sensors / limit Switches

There are so many sensors available in market. Limit switches are being utilized for this project. Reason for using mercury switch was its working. Mercury switch is also called Mercury tilt switch. It works as; mercury is sealed in glass bulb or tube along with two or more electrical contacts. Mercury is constantly forced to go to the lowest point in bulb by gravity. When it flows towards electrical contacts and touches them and causes close switch. And when it is on other side of electrical contacts; causes open circuit. In vehicle this switch is deployed as a sensor in bonnet, doors and trunk. Whenever someone tries to open the ATM door, bonnet or trunk, switch is placed in such a manner that it will close and send the alarm signal to Microprocessor.

E. Solenoid valve/Relays and motor displacements

Relays are being used to trigger an action; if an intrusion is being made the owner of the car can prompt an action from a far-off place through an SMS. Relays used works as a switching unit. One end of the relay is connected to the microcontroller while the other end is being connected to the battery, gear unit or the supply line to the engine. An action can be taken depending upon the user. Microcontroller will generate a signal depending upon the message signal send

by the owner of the car to the microcontroller via GSM module.

Additional or supporting circuitry like power supply and snubber circuit is being used. Snubber circuit is used to control the surge of current that passes through the switch when it is closed and also to avoid the burning out of the switch when the circuit is open and all the voltages are acting. On the terminal of the switches. The power required to the system is being drawn from the battery of the vehicle; a rheostat is being deployed in between the battery and the

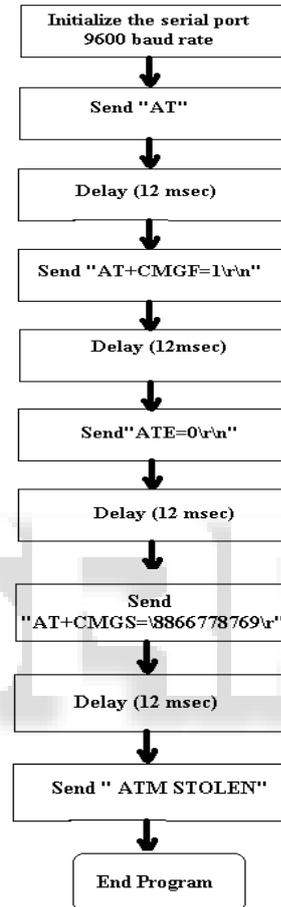


Fig. 2: Flow chart of the proposed system

IV. PROGRAMMING INTERFACE

Assembly language is being used for the purpose of programming the microcontroller. On intrusion, the numbers to which the message is to be sent and what message is to be sent and in return when the owner of the vehicle sends an SMS then what kind of an action is to be taken on what message, all of it is fed into the microcontroller.

The microcontroller takes its decision on the basis of the signals it receives from the mercury switches and the message it receives from the owner of the car [8] [9]. The general flow of the system from system to client and from client to the system has been described through flow charts in figures 3 and 4 respectively.

A. Assembly Language

Being a low-level programming language; Assembly language is the best option to program microcontroller. Its each code has one-to-one relation with that of

microcontroller's machine level instructions. Rather remembering exact location of data on physical memory, Assembly Language utilizes 'mnemonic codes' or 'symbols'.

B. Software interaction with GSM Module SIM300

When microcontroller receives alarm signal from sensor, it require GPS location from GPS receiver and send it to SIM300CZ to generate intrusion/theft alert SMS including location update. For the communication purpose AT commands are used. Table 1 shows some of the commands implemented using this system.

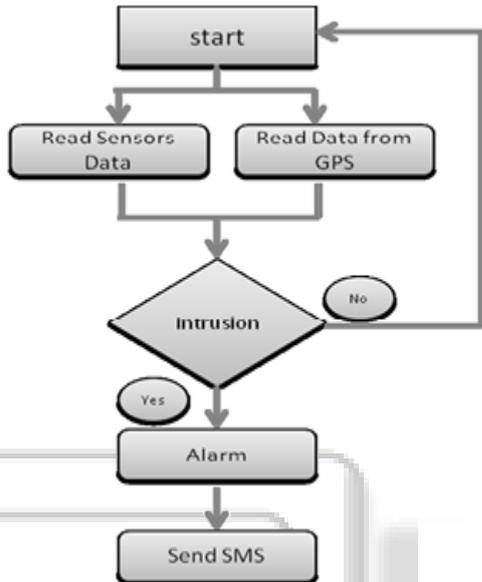


Fig. 3: Flow control from unit to authority

Command	Description
AT	Check if the serial interface with GSM modem is working.
ATE0	Turn echo off, less traffic on serial line.
AT+CNMI	Display of new incoming SMS.
AT+CPMS	Selection of SMS memory.
AT+CMGF	SMS string format, how they are compressed.
AT+CMGR	Read new message from a given memory location.
AT+CMGS	Send message to a given recipient.
AT+CMGD	Delete message.

Table. 1: Commands implemented using This System

V. BUILDING A GENERIC MODEL AND ITS IMPLEMENTATION

Complete circuit with all hardware was integrated. For our prototype model instead of a big ATM we used a small Demo of which had doors, body and cash box like other ATM. The limit switches/sensors were placed at the under body, trunk and doors. After activating the system, when one would try to open bonnet, trunk or door. An alarm would ring and a message will be immediately generated to the owner of the ATM [10]. In return the owner can take an action, which in our case we locking the door unit of the

ATM. The system will continuously to trigger a message after every 30 seconds until an action is taken.

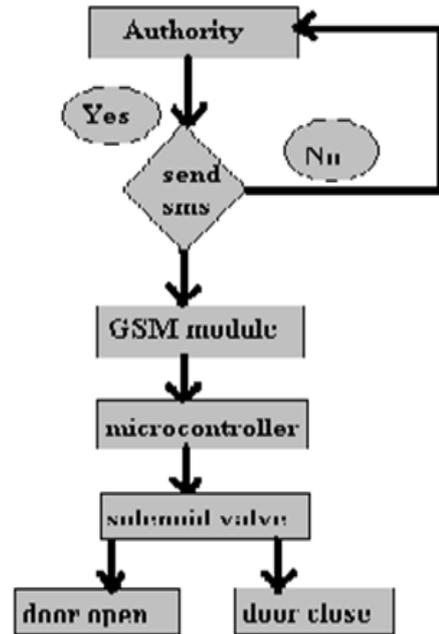


Fig. 4: Flow control from Authority to unit

VI. CONCLUSION AND FUTURE WORK

In this project an advance and cost effective approach for ATM security has been proposed. It can be installed in the ATM at some hidden place so that it cannot be approached by thieves. GSM and GPS technology has been utilized. It sends alarm signal to the owner of ATM via SMS, and through SMS ATM can be jammed. After that system still sends location update SMS after every 30 sec until system is disabled. Proposed system is distinctive in many ways from existing ATM intrusion and theft control systems; already used systems are either very expensive or ineffective from distance. It is reliable, inexpensive and appropriate design. In future this system can be implemented in all ATM's, and police numbers can also be added for intrusion notification. For further enhancements sensors with better performance level can be deployed to increase the efficiency and performance level of the system.

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