

Controller Base ATM Security System

Devansh Khare¹ Dipak Tundaliya² Harsh Shah³

^{1,2,3}Department of Electrical Engineering

^{1,2,3}Gujarat Power Engineering and Research Institute, Mehsana, Gujarat

Abstract— The major purpose of this project is to provide an easy and reliable solution for the security of ATM machines in any adverse situations. To provide utmost security to ATM machine. The idea behind the project is to develop an advanced ATM security system. This system take action against any kind of theft attack, this security system acts very fast safe compare to any other system. Suppose any person tries to harm the ATM machine then security system will be activate and the mechanical shutter pulled down with the help of electric motor and it will interlock, and this security system will send emergency message immediately to the police station and bank manager.

Key words: PLC, Sensor, Limit Switch, Relay, Motor, Shutter, HTML page, GSM, GPS

I. INTRODUCTION

Modern ATM machines are implemented with high-security protection measures. They work under complex systems and networks to perform transactions. The data processed by ATMs are usually encrypted type, but hackers can employ discreet hacking devices to hack accounts and withdraw the account's balance. As an alternative, unskilled robbers threaten bank patrons with a weapon to loot their withdrawn money or account. As the number of ATM units increase, the machines are prone to hacker attacks, fraud, robberies and security breaches. In the past, the ATM machines main purpose was to deliver cash in the form of bank notes and to debit a corresponding bank account. However, ATM machines are becoming more complicated, and they serve numerous func-tions, thus becoming a high priority target to robbers and hackers. Presently the ATM machines have only one security system. It only provides security to the entrance door itself, by placing ATM card detectors near the door. Now a day, there is no proper security for ATM machines. Robbery of the ATM machines has been increased widely. By using the existed technology ATM machines are not safe in order to provide proper security for money. While figuring out these problems, we have gone through many research papers and patents which made us to think in the right direction towards our system.

- 1) If someone tries to cut the supply of ATM machine.
- 2) If any unauthorised person tries to damage, cut, open or break ATM machine.
- 3) Any person tries to misplace the position of ATM machine or tries to carry it with itself or in any other adverse condition.

II. BLOCK DIAGRAM

A. System Block Diagram

This system consists of several equipments like ATM m/c, camera, UPS, sensor, power source etc.. This system can be operated by two means of sources. The first one is power supply and the later one is UPS. If in case failure of power source, the UPS will automatically start and the power will

be continued. The UPS of the system can be charged from two different sources: one is directly from power supply and the other is from solar energy. To make the system energy efficient solar energy is use in system, which saves about 45% to 60% of energy. Thus the system is energy efficient. The controller consists of different programs which acts according to different situations like:

- 1) someone tries to damage ATM m/c or camera.
- 2) try to cut supply of ATM m/c or camera.
- 3) or anything else.

With the help of GPS system it is possible to keep the tracking of this entire system. It shows the exact location of machine and current status of ATM machine. If anything goes wrong in the system then the sensors will sense it, and the signal will be sent to the controller. As the nature of the problem will be, the controller will act accordingly, and the security system will become active. As soon as other security system receives signal from controller it gets activated. It consists of GSM module, motor, gear, relay and mechanical shutter. In this procedure firstly, the relay gets activated and it turns on the motor. Due to the motor and gear assembly the shutter will fall down and will interlock itself. Along with this process the GSM module will also work and will send emergency message to police station and bank manager.

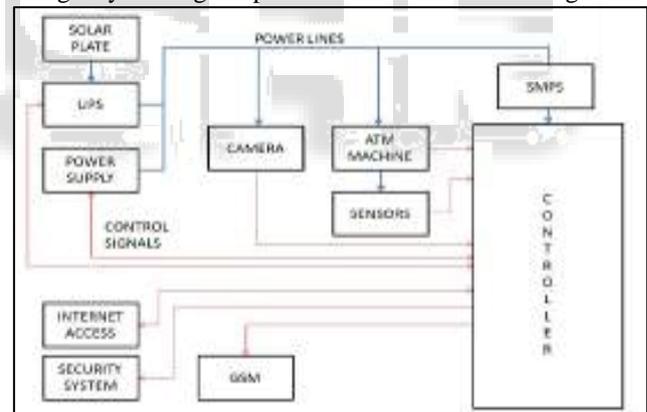


Fig. 1: Block Diagram of System

B. Security System Block Diagram

The above block diagram represents the main arrangement of a security system. This arrangement is the heart of the system. This arrangement is a combination of controller, sensors, limits switches, relays, GSM, motor and shutter. Now the working of this arrangement, whenever any sensor or limit switch get activated due to theft activity it send a signal to controller. According to programming of controller controller takes action and activates security system. When security system activate two things simultaneously work.

1st work- GSM send emergency messages first to police station and then to the bank manager.

2nd work- It turn on shutter down relay which activate the motor , so motor rotates, as motor rotates the shutter goes down to shut and very high decibel up to 80Db - 110Db siren will blow. Now the level sensor/switch detects

the position of shutter where it is totally closed or not. When the level sensor/switch detect shutter is totally closed, it will activate solenoid which attracts the steel roads which is mounted on shutter. When the roads are attracted the shutter will lock and only authorized person can unlock this locking of shutter.

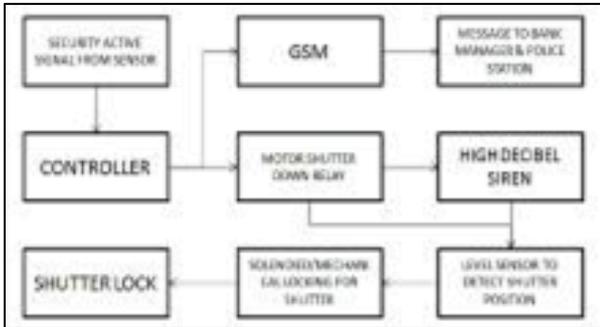


Fig. 2: Block Diagram of Security System

C. Block Diagram of to See Current Location and Status of a System

This arrangement of a system is used for determining the location of ATM m/c and also sees the current status of a system. For this arrangement several things are require which is GPS, controller, internet and monitor. Here with the help of GPS and internet it is possible to keep tracking on ATM m/c as well as the system of it. For monitoring of a system only authorized person can get access through internet, authorized person first login to security system server and give ID and password, if password is true then and then he/she will be able to monitoring this system. This arrangement is to see the current status of a system. For current status of this system colour coding is use which is green/ yellow and red.

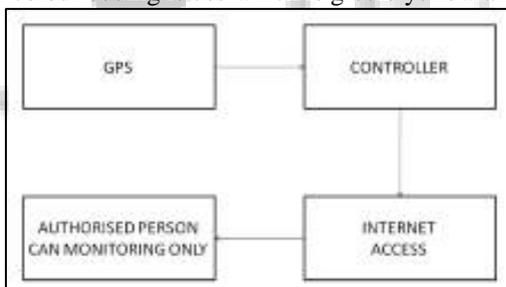


Fig. 3: Block Diagram of GPS and Monitoring System

D. Block Diagram of Maintenance Feature

The process of maintaining of security system is quite simple. The person in charge can handle all the system simultaneously each and every machine can be maintained by sending commands only. In this system provide maintenance feature, because when there is no money in ATM m/c then this arrangement is used to avoid falls activation of a system. This arrangement stops the system when banker wants to fill money in ATM m/c and for any other work. Authorized person give command through internet and then and then this arrangement is going to work, but for activation of this command authorized person give his/her ID and password to security server, if the Id and password is true then and then it will activate. When this arrangement is activate the GPS send or shows yellow signal on monitoring system, it means system is in under maintenance or else to bank purpose. After

the completion of work authorized person can restart this system only through an internet command.

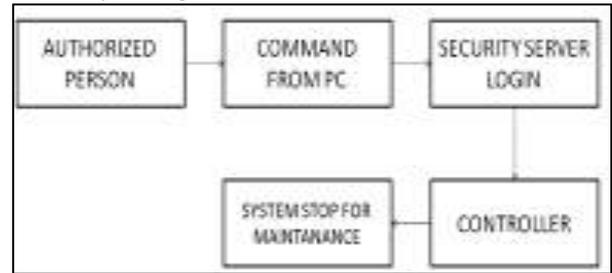


Fig. 4: Maintenance feature Block Diagram

E. Shutter Open Logic Block Diagram

After the automatic interlocking of close shutter only the authorized person can unlock it by sending the commands from his/her computer. For this bank security server is used to send command on banking network to system. To send the commands authorized person first login in the system via Bank server and then person is able to send the opening command to system.

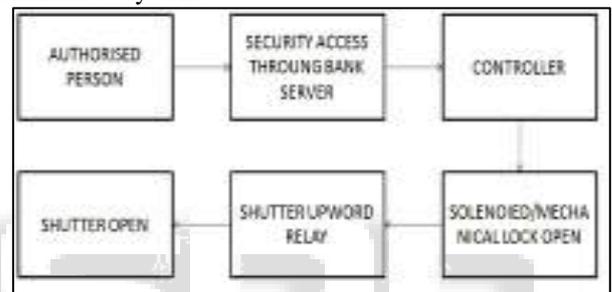


Fig. 5: Block Diagram of Shutter Open Logic

III. CONCEPT OF SYSTEM WORKING

A. Supply Concept of Security System

Normally This Security system takes power from the supply source, but in case of failure of power source, the UPS will supply power to the security system. In this situation, the whole security system is given supply through UPS. This UPS will supply power for at least 45 to 60 minutes, and when the power comes back, the system will automatically switch on power source and UPS will be disconnected.

In case of Power failure occur for more than 1 hour, the UPS will not be able to give power to security system as it does not have that much sufficiency. In case the power remaining in the UPS is less than 10%, the system will send the alert message to bank authority.

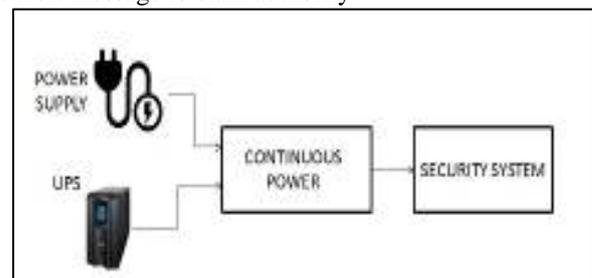


Fig. 6: Continuous Supply Concept

B. When Thief Tries to Cut Supply of ATM Machine

This concept is expressing that, whenever thief cuts the supply of the ATM m/c or of the camera, this system gets signal from sensing unit which activates the security system.

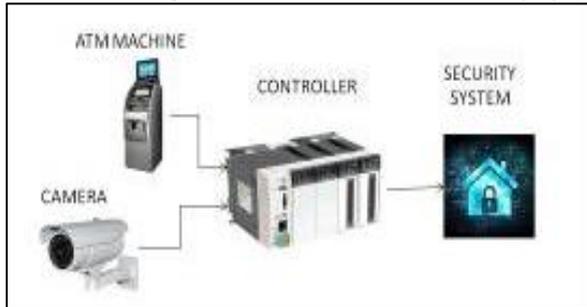


Fig. 7: Supply Cut Concept

C. Destroy of ATM Machine

When thief tries to damage ATM m/c or the camera with help of hammer or any other tool, the sensing unit or pressure sensor which is mounted on body of m/c and on the body of the camera will sense the pressure. After that the pressure sensors will send the signals to the controller. Now the controller will activate the security system.

In this system, the pressure sensor sends signal to system if the pressure is more than 18kg/cm².

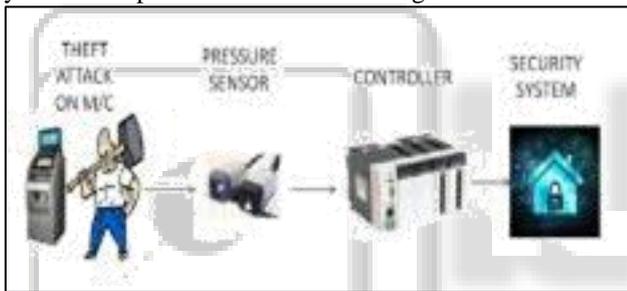


Fig. 8: Machine Destroying Concept

D. Displacement Concept

If someone tries to carry the ATM m/c, security system has an arrangement of limit switches and displacement sensors. If thief try to carry the ATM m/c the sensor senses it, and sends signal to controller which activates security system.

E. Forcefully Try to Open ATM Drawer

When thief try to open money cage forcefully, there is arrangement of limit switches and sensor which sense this activity and sends signal to the controller, which activates the security system.



Fig. 9: ATM Machine Drawer Safety Concept

F. Assessment of Security System

This concept is for how authorized person access security system. For security access authorized person first go on bank server, and give ID and password, if ID and password is true then and then authorized person can access security system. After the access of security system authorized person is able to monitor and send commands to the security system.



Fig. 10. System Assessment Concept

IV. COMPONENT DESCRIPTION

A. Controller

Controller is an electronics device which is useful for multipurpose function. It consist input ports, output ports, timer, comparators, ADC etc., controllers are programmed according to application of system. For this system Siemens S7-1200 PLC (Programmable logical controller) is use.

The S7-1200 controller provides the flexibility and power to control a wide variety of devices in support of your automation needs. The compact design, flexible configuration, and powerful instruction set combine to make the S7-1200 a perfect solution for controlling a wide variety of applications. The CPU combines a microprocessor, an integrated power supply, input and output circuits, built-in PROFINET, high-speed motion control I/O, and on-board analog inputs in a compact housing to create a powerful controller. After you download your program, the CPU contains the logic required to monitor and control the devices in your application

B. GSM Module

Wireless modules transmit and decode data over a cellular network. It can be differentiated by the cellular standard (GSM/UMTS/CDMA), the cellular data standards (GSM, UMTS, GPRS, EDGE, HSDPA), as well as by technologies. This is an ultra-compact and reliable wireless module. The SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module. With a tiny configuration of 24mm x 24mm x 3mm, SIM900A can fit in almost all the space requirements in user applications, especially for slim and compact demand.

C. GPS Module

GPS or Global Positioning System is a network of orbiting satellites that send precise details of their position in space back to earth. The signals are obtained by GPS receivers, such as navigation devices and are used to calculate the exact position. The GPS system does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. The GPS system provides critical positioning

capabilities to military, civil, and commercial users around the world.

D. Relay

Relays are switches that open and close circuits electromechanically or electronically. They control one electrical circuit by opening and closing contacts in another circuit. When a relay contact is normally open (NO), there is an open contact when the relay is not energized. Relay receive signal from PLC and it will turn off and on, particular equipments according to programming of PLC.

E. UPS

An Uninterruptible Power Supply (UPS) is an important thing to have if you live in an area where power outages are at all common, especially if you run a mail/DNS/Web server that must be up 24/7 most UPS units also provide power conditioning, like a power strip or a surge protector. They prevent power spikes from coming through and hitting sensitive computer components. UPS is a battery backup for system PC. When the power goes off, the UPS kicks in and continues to supply power for some period of time to the particular system.

F. Pressure Sensors

A pressure sensor measures pressure, typically of gases or weight, it generates a signal as a function of the pressure imposed. A pressure sensor is a device which converts pressure into an analog electrical signal.

G. Limit Switch

The defining feature of micro switches is that a relatively small movement at the actuator button produces a relatively large movement at the electrical contacts, which occurs at high speed to achieve a clean and reliable interruption to the switched circuit.

H. Motor and Shutter Assembly

It is a combination of electric motor and mechanical shutter. When controller gives signal to security system, relay will operate and motor will push down shutter and it will interlock. The size of motor is depend on the weight of the shutter, weight of a shutter decided ratings and size of motor, which is useful to get high initial starting torque.

I. Siren/Air Horn

A siren (also known as an air-raid siren or tornado siren) is a siren used to provide emergency population warning of approaching danger and sometimes to indicate when the danger accrue. By use of varying tones or on/off patterns of sound, different alert conditions can be signaled. Electronic sirens can transmit voice announcements in addition to alert tone signals. Siren systems may be electronically controlled and integrated into other warning systems.

V. CONCLUSION

This system take corrective action , if anybody tries to ruin the ATM machine then this security system take action very fast and safe compare to any other system. When the thief tries to harm or break security system, the automatic shutter will fall and shutter will interlock so that theft remain inside the cage.

The ATM is very costly 2.35-2.5 crore. The main purpose is to provide an easy and reliable solution for security of ATM machine against theft and any adverse situation.

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