Smart ATM Supervision System Using GSM

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***Abstract* –Automated Teller Machine (ATM) Surveillance System is used to provide protection against the frauds. Frauds related to the ATMs are increasing day by day which is a serious issue.ATM is a Smart System based on the embedded technology that provide multiple points of protection against physical, electronic theft and protecting their installations. This Paper proposes a system which aims to design real time monitoring and controlling system. The system is implemented using various sensors, GSM and GPS technologies. The sensors are continuously monitoring for any illegal activities happening in its ATMs surroundings. Also discussed about the implementation of the proposed system, the sensors and the other supporting hardware that are being used to improve this system.**

***Keywords*—ARM controller LPC 2148, Global system for Mobile communication, GPS, MEMS SENSOR, Passive infrared sensor (PIR), Force sensitive resistor (FSR).**

I. INTRODUCTION

Automated Teller Machines (ATM) offers much convenience to everyone in life due to their easy and readily available cash. Frauds related to the ATM are increasing day by day which is a serious issue.ATM is equipped with surveillance monitor, criminals can usually break it down and robbery its wealth by occluding their faces. The attacks on ATMs are steadily rising and this is a serious problem for law enforcement and banking sectors. This paper mainly focusing on protection of ATM machine using CCTV security cameras and emergency sirens.

The ATM machines are not safe since security provided traditionally by using RFID or security guards outside the ATM.This security is not efficient because RFID card can be stolen and can be misused for robbery as well as watchman can be black mailed by the thief. To overcome this problem GPS and GSM modules are used.

This security system can alarm automatically it will greatly improve financial security and acts as detective work of the police. There is variety of ATM attacks because it is such an attractive target. Basically there are various types of attacks like Physical attack, ATM fraud and Software attack.

So this security system has to be developed and put in to place that will make sure the ATM is safeguarded and also gives customers the confidence when using the ATM. The following Figure 1 shows the Reported ATM crimes in Europe.

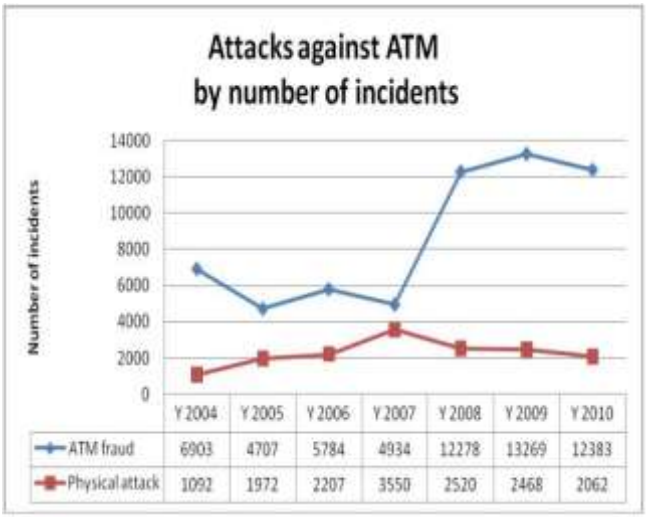

FIGURE 1: ATM Crimes in Europe

II. PROPOSED SYSTEM

A. Architecture of the proposed system:

The architecture of the proposed system is shown in the Figure 2.When MEMS sensor detects any movement of ATM; it sends signals to the LPC 2148 via GPIO pins. Someone tries to hit on the ATM Machine

Force sensors senses the pressure, then buzzer will activated and send a message to the concerned person through the GSM. The applied force is greater than the threshold value, the above operation will be activated.The controller used here is the popular ATMEGA-328 from ATMEL.

This system is built around the ATMEGA328 microcontroller which belongs to the ATMEL family. The system continuously monitors its surroundings by sensing temperature changes, force and orientation of the ATM using the sensors.

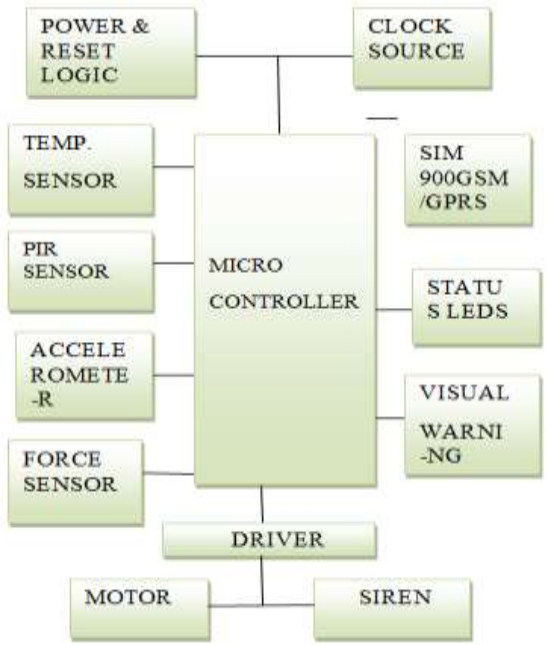

FIGURE 2: The Basic Block Diagram of the Proposed System

B. Working of the proposed system with the help of flowchart:

When the pressure is applied on ATM machine, the LPC 2148 receives a valid input from the MEMS, the following sequence of events takes place.

(i) An SMS "ATM MACHINE IS TRYING TO THEFT" will send to the nearest police station.

(ii)Buzzer gives a continuous beep sound.

The following Figure 3 shows the flow chart of the proposed system.

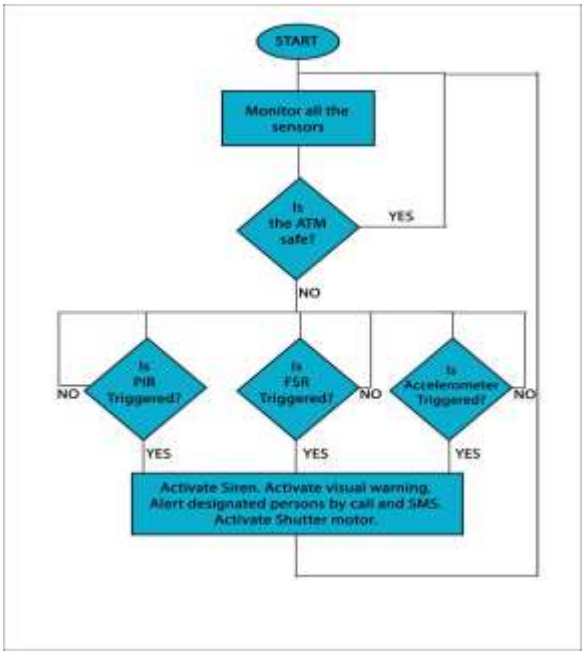

FIGURE 3: Flow Chart of Proposed System

The ATM is safe when no sensors are triggered and no action needs to be taken. But when any of the sensors are triggered then the ATM is vulnerable to attacks and necessary safety action should be taken. Here we active the siren, visual warning and we alert the designated persons by SMS and call using the SIM900 GSM MODULE.

III. HARDWARE MODULES

A. Power Supply: LPC2148 works on 3.3v power supply. LM 117 can be used for generating 3.3v supply. However, basic peripherals like LCD works on 5v.So AC mains supply is converted into 5v and after that LM 117 is used to convert 5v into 3.3v.

B. ARM7 LPC 2148 Development Board:

Figure 4: ARM 7 LPC 2148

LPC 2148 Pro Development Board is a powerful platform based on LPC2148 ARM7TDMI microcontroller with 512K on-chip memory. This developed board is powered by USB port and does not need external power supply. It is ideal for developing embedded applications involving high speed wireless communication. The on-chip USB controller provides direct high speed interface to a PC/laptop with speeds up to 12Mb/s. The UART boot loader eliminates need of an additional programmer and allows you to program using serial port. The on-chip peripherals and the external hardware on the development board are interconnected using pin headers and jumpers.

C. Accelerometer Sensor: The ADXL335 is a complete 3 axis acceleration measurement system. The accelerometer can measure the static acceleration of gravity in tilt sensing application as well as dynamic acceleration resulting from motion, shock or vibration. The output signals are analog values that are proportional to acceleration. When someone trying to theft the ATM the angle of the ATM machine changes then the accelerometer senses the buzzer gives continues beep sound.

D. Force Sensor: The Force sensor detector is designed for the security purposes that allows to detect physical pressure, squeezing and weight. FSRs are basically a resistor that changes its resistive value depending on how much it is pressed. The FSRs resistance changes as more pressure is applied. When there is no pressure, the sensor looks like an infinite resistor as the pressure increases, the resistance goes down.

By placing these sensors at appropriate locations in the ATMs body, we can easily detect large forces exerted on the body of the ATM, which might be one form of the attack.

E. PIR Sensor: Passive infrared sensor are widely used in daily life. They are a key component in motion detection and can be used for security systems, automatic doors, or automatic light control. They are commonly used to detect humans.

F. GSM MODULE:

Figure 5: GSM 800 Module

This is a plug and play GSM module with a simple to serial interface. It is used to send a SMS, make and receive calls and do other GSM operations by controlling it through simple AT commands from microcontrollers and computers. This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number.

G. BUZZER:

Figure 6: Piezo Electronic Buzzer

It is a type of Piezo electronic buzzer, any illegal activities happening in the ATM it will make a sound around the ATM machine. A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezo electric. A piezo buzzers exhibit the reverse piezo electric effect, piezoelectric element may be driven by an Oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier.

IV. SOFTWARE IMPLEMENTATION

For the software implementation, we are using Kielvision 4.0, Flash magic simulator, Embedded C, and AT commands. The Kiel µVision Debugger accurately simulates on-chip peripherals of ARM7device. Simulation helps to understand hardware configurations and avoids time wasted on setup problems. With simulation, we can write and test applications before target hardware is available. The system program written in embedded C using KEIL IDE software will be stored in Microcontroller. The Kiel Development Tools are designed to solve the complex problems facing embedded software developers. AT commands are instructions used to control a modem. Flash magic is used to dump the code to Microcontroller from PC. Flash Magic is a free, powerful, feature-rich Windows application that allows easy programming of Philips FLASH Microcontrollers.

V. EXPERIMENTAL RESULTS

Screenshot of the data coming from the FSR sensor when the ATM is hit, is as shown in Figure **7**.When the FSR sensor senses the pressure, we are getting a reading proportional to the force applied. We get null readings, when no force is applied.

Figure 7. Readings from the Force Sensitive Resistor

Screenshot of the data (in degrees) coming from the accelerometer when the sensor is placed on a leveled surface is as shown in Figure 8.

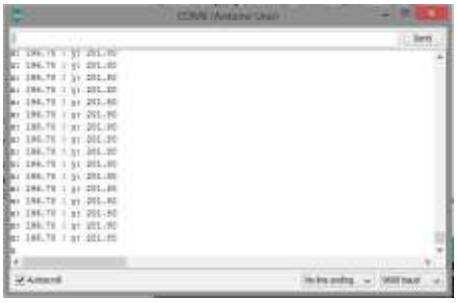

Figure 8. Readings (in degrees) from the Accelerometer when on a leveled surface.

When a person tried to theft the ATM machine, the angle of the ATM machine titled towards left. The Figure 9 shows the screenshot of the Accelerometer Sensor readings.

Figure 9.Readings (in degrees) from the Accelerometer when tilted left.

When a person tried to theft the ATM machine, the angle of the ATM machine titled towards right. The Figure 10 shows the screenshot of the Accelerometer Sensor readings.

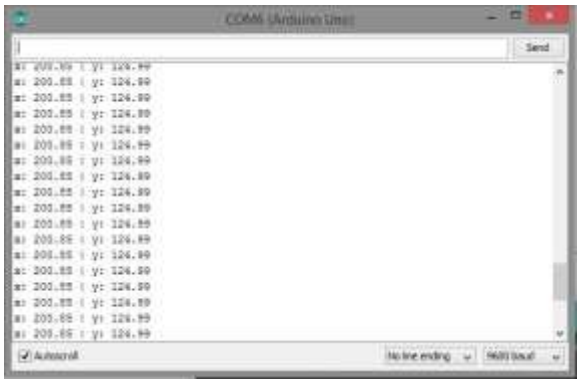

Figure 10. Readings (in degrees) from the Accelerometer when tilted right.

The following Figure 11 shows the screen shot of the proposed model.

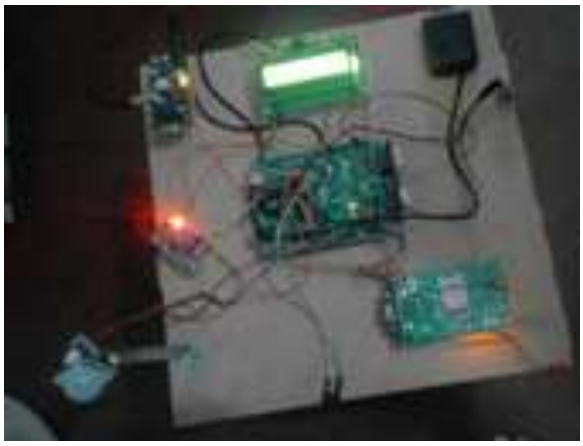

Figure 11.The Proposed System.

VI. CONCLUSION

As we all know, these days most of the ATM has been attacked by the robberies. The implementation of ATM surveillance by using smart sensors and GSM/GPRS modem took advantages of the stability and reliability of sensor characteristics. The whole system will be built on the technology of embedded system which makes the system more safe, reliable and easy to use.

Prevention of ATM from robbery/theft can be implemented using GPS and GSM technology, sensors, LED display, Relay and buzzers with Keil software. Implementing this technique in ATM Machine we can easily catch the thief and robberies.

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