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Ensuring ATM Security and Privacy

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ABSTRACT: Designing and Implementation idea of Security Based ATM theft project is born with the observation in our real life incidents happening around us. This project deals with prevention of ATM theft from robbery and so as to overcome the drawback found in existing technology in our society. Whenever robbery occurs, Mems sensor is used here which senses vibration produced from ATM machine. This system uses Pic microcontroller based embedded system to process real time data collected using the mems sensor. Temperature sensor is used to detect any temperature variations such as welding in the ATM..Once the vibration is sensed the beep sound will occur from the buzzer. Stepper Motor is used for closing the door of ATM.. Camera is always in processing and sending video continuous to the PC and it will be saved in computer. The message is send to the nearby police station and corresponding bank through the GSM. Here LCD display board using showing the output of the message continuously. This will prevent the robbery and the person involving in robbery can be easily caught. Here micro c pro and Embedded c are used to implement the idea and the results are obtained.

KEYWORDS: PIC microcontroller-16F877A, Mems Sensor, Temperature Sensor, GSM Technique, Stepper motor, Buzzer, LCD Display , Embedded C, Micro C pro

I. INTRODUCTION

In today's technically advanced world, autonomous systems are gaining rapid popularity. As the social computerization and automation has been increased and the ATM and credit card has been installed and spread out to simplify the activity for financial activity, the banking activity has been simplified, however the crime related with financial organization has been increased in proportion to the ratio of spread out of automation and devices. Those crimes for the financial organization have been increased gradually from year 1999 to 2003, little bit decreased in 2004, and then increased again from year 2005.

In the year of 2007, 212,530 of theft and 4,439 of robber cases are happened, and 269,410 of theft and 4,409 of robber cases are happened in year 2010 and also in the year 2011, 270,109 of theft and 4,509 of robber cases are happened .so that the cases of theft and robber have been increased gradually during past 12 years.

Among the crime for financial organization, the cases of theft and robber have very high proportion of over 90% and the crime for the ATM has been increased because the external ATM has been increased and it is always exposed to the crime.

Therefore, this study is going to suggest the method of rapid reaction and minimization of loss by detecting the ATM machine at real-time when it has been stolen can be found through GSM technology.

So by using the GSM technology, Mems sensor, Stepper Motor, theft of external ATM machine can be predicted. In this project we are using buzzer to give signal for corresponding bank and police station. Temperature Sensor is used to sense the temperature variation and it is indicated by beep sound. Camera is used to take the continuous video clips. Here Stepper Motor is used to close the door of the ATM .

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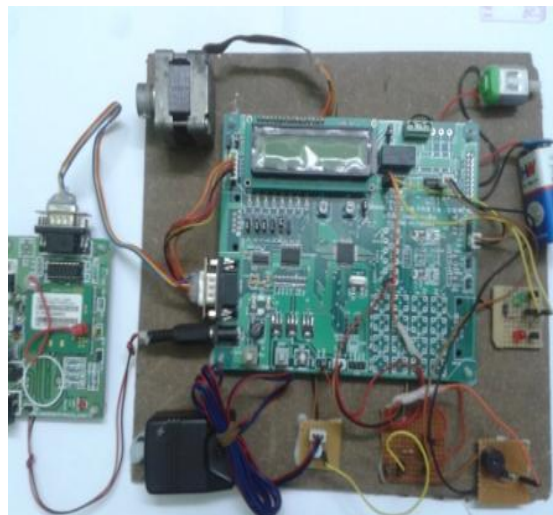
II .BLOCK DIAGRAM

Functional Block diagram of the proposed system in which how the PIC 16F877A is interfaced with Mems sensor, Temperature Sensor,MAX232 , GSM Modem, Stepper Motor, buzzer and LCD display.

1 .Practical GSM Modem:



2. Complete hardware development of this project for ATM Security system



IV . RELATED STUDY

1.ATM:

The first ATM in Korea was installed by Korea exchange Bank in 1975, and after installation of ATM by Shinhan Bank in 1982, the civilian can use the ATM of various banks with Starting of operation of common CD network which is controlled by Korea financial telecommunications & clearings institute. The number of installed ATM machine has shown the trend of increasing continuously with the high increasing ratio in the first half of year 2000s, and gradual increase after the year. Especially external ATM machine has been increased continuously.

The external ATM machine is located in the entrance of kiosk booth and sidewall generally. The security system of those external ATM protects the 1st stage with the signal lamp installed in the machined itself, and covers the others



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with the open and impact detecting sensors. The impact detecting sensor generates and sends the signal to the security center immediately to protect the ATM machine. The control center has a rule if the emergency signal is sent and order to dispatch to the agent, the agent shall be the location within 25 minutes at the latest, however the late dispatch due to the lack of responsibility of agent and lack of number of agent and equipment will not be done of proper and rapid reaction for the ATM theft.

Therefore, GSM Technology with addition of some more components already mention above which is to suggest in this study is installed in the ATM, the advanced security System can be setup with the rapid reaction implementing in real-time even the theft is happened.

2. GSM (Global System for Mobile Communications):

The GSM which is one of the representative wireless networks which has low-power, low-cost and convenience to use .Global System for Mobile Communications originally from Groupe Special Mobile is the most popular standard for mobile telephony systems in the world. The GSM Association, its promoting industry trade organization of mobile phone carriers and manufacturers, estimates that 80% of the global mobile market uses the standard. GSM is used by over 1.5 billion people across more than 212 countries and territories.

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.

2(i) Technical details:

Most GSM networks operate in the 900 MHz or 1800 MHz bands. Some countries in the Americas (including the United States and Canada) use the 850 MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated. The rarer 400 and 450 MHz frequency bands are assigned in some countries, notably Scandinavia, where these frequencies were In the 900 MHz band the uplink frequency band is 890-915 MHz, and the downlink frequency band is 935-960 MHz this 25 MHz bandwidth is subdivided into 124 carrier frequency channels, each spaced 200 kHz apart.

2(ii) Using GSM Modem in the ATM System:

In the system we will be using a GSM Modem to send and receive SMS. When the robbery occurs, it will send the message to corresponding banks and near police station (PS) according to the controller Response.

3.Temperature Sensor:

LM35 does not require any external calibration or trimming to provide typical accuracies of $\pm 1/4^{\circ}\text{C}$ at room temperature and $\pm 3/4^{\circ}\text{C}$ over a full -55 to $+150^{\circ}\text{C}$ temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies.

As it draws only 60 μA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to $+150^{\circ}\text{C}$ temperature range, while the LM35C is rated for a -40° to $+110^{\circ}\text{C}$ range (-10° with improved accuracy). The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C,



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LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package.



FEATURES:

- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60 μ A current drain

4. PIC MICROCONTROLLER (16F877A):

The PIC microcontroller [10] is used to interface the energy measurement unit and GSM module. The PIC microcontroller used here is PIC16F877A.

FEATURES:

All are single cycle instruction except branch instruction.

- Operating at DC – 20 MHz clock input.
- Timer-0 is an 8-bit timer/counter with 8-bit prescaler.
- Universal Synchronous Asynchronous Receiver Transmitter (USART) with 9-bit address detection.
- Brown - out detection circuitry for Brown-out Reset (BOR).
- 1,000,000-erase/write cycle EEPROM memory.
- Data EEPROM retention greater than 40 years.
- Power saving SLEEP mode.
- 100,000 erase/write cycle Enhanced Flash program memory typical 1,000,000 erase/write cycle Data EEPROM memory typical.
- Data EEPROM Retention > 40 years.
- Self-reprogrammable under software control.
- In-Circuit Serial Programming™ (ICSP™) via two pins.
- Single-supply 5V In-Circuit Serial Programming.
- Watchdog Timer (WDT) with its own on-chip RC oscillator for reliable operation.
- Programmable code protection.
- Power saving Sleep mode.
- Selectable oscillator options.
- In-Circuit Debug (ICD) via two pins.
- **PIC** is a family of modified Harvard system architecture microcontrollers made by Microchip technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "**Peripheral Interface Controller**".



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V. HARDWARE RESOURCES

A. Power supply circuit

The main building block of any electronic system is the power supply to provide required power for their operation. For the microcontroller keyboard, LCD, GSM, MemS Sensor, Temperature sensor +5V are required & for driving buzzer +12V is required. The power supply provides regulated output of +5V & non-regulated output of +12V. The hardware part consists of the components and the sensors used in the system. This part mainly collects the status of the sensors and stores it into the micro controller's EEPROM.

B. Stepper Motor

A stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft or spindle of a stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence. The motors rotation has several direct relationships to these applied input pulses. The sequence of the applied pulses is directly related to the direction of motor shafts rotation. The speed of the motor shafts rotation is directly related to the frequency of the input pulses and the length of Rotation is directly related to the number of input pulses applied.

Here we are placing this stepper motor for leak the gas inside the ATM to bring the thief into unconscious stage.



B (i) When to Use a Stepper Motor

A stepper motor can be a good choice whenever controlled movement is required. They can be used to advantage in applications where you need to control rotation angle, speed, position and synchronism. Because of the inherent advantages listed previously, stepper motors have found their place in many different applications. Some of these include printers , plotters , scanners ,high end office equipment ,hard disk drives, fax machines and many more.

C.LCD:

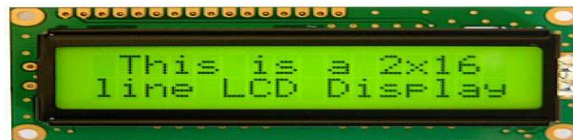
A **liquid-crystal display (LCD)** is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.



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D.MAX 232:

The MAX232 is an IC that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. The drivers provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single +5 V supply via on-chip charge pumps and external capacitors. This makes it useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to +5 V range, as power supply design does not need to be made more complicated just for driving the RS-232 in this case.

VI. SOFTWARE IMPLEMENTATION

For the software implementation, we deploy two software packages. First one is the Embedded C. Second one is the Micro C pro..

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 Micro C pro software will be stored in Microcontroller.

Pic Microcontroller Architecture support every level of software developer from the professional applications engineer to the student for learning about embedded software development

The Flash Memory In-System Programmer is a tool that runs under Windows 95/98/NT4/2K. It allows in-circuit programming of FLASH memories via a serial RS232 link. Computer side software called Flash Magic is executed that accepts the Intel HEX format file generated from compiler to be sent to target microcontroller. It detects the hardware connected to the serial port.

VII. CONCLUSION

As we all know, these days most of the ATM has been attacked by the robberies. Also gradual increases the theft of ATM after the year by year.

This paper demonstrates how an automation of “ATM THEFT” prevention from robbery (or) thief can be implemented using GSM Technology, Mems sensor, stepper motor, LED display, MAX 232, buzzer with Embedded C, Micro C pro can be implemented in ATM Machines center.

By implementing this project we can catch thief and robberie’s in ATM itself and also we can save our precious time.

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