

Design and Implementation of Security Based ATM theft Monitoring system

Sivakumar T.¹, Gajjala Askok², k. Sai Venuprathap³

¹M. Tech (Embedded systems), Dept. of ECE, Kuppam Engineering College, Kuppam, Chittoor (dst), A.P, India

²M. Tech (Embedded systems), Dept. of ECE, KEC, Kuppam -AP

³Dept. of ECE, Asst. Professor, Kuppam Engineering College, Kuppam, Chittoor (dst), A.P, India

Abstract: *The Idea of Designing and Implementation 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. so overcome the drawback found in existing technology in our society. When ever robbery occurs, Vibration sensor is used here which senses vibration produced from ATM machine. This system uses ARM controller based embedded system to process real time data collected using the vibration sensor. Once the vibration is sensed the beep sound will occur from the buzzer. DC Motor is used for closing the door of ATM. Stepper motor is used to leak the gas inside the ATM to bring the thief into unconscious stage. Camera is always in processing and sending video continuous to the PC and it will be saved in computer. RTC used to capture the robber occur time and send the robbery occur time with the message to the nearby police station and corresponding bank through the GSM. Hear 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, Keil tools are used to implement the idea and results are obtained. keil tools is used for run the DC motor and stepper motor for automatic door lock and also leak the gas inside the ATM.

Keyword: *ARM controller-LPC2129, Vibration Sensor, GSM Technique, DC Motor, Stepper motor, Buzzer, LCD Display, Keil Tool ...*

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, Vibration sensor, DC Motor, Stepper Motor, unconscious gas theft of external ATM machine can be predicted. In this project we are using buzzer to give signal for corresponding bank and police station. Camera is used to take the continuous video clips. Here DC Motor is used to close the door of the ATM and stepper motor is used for emit gas and bring the theft to unconscious stage.

II. BLOCK DIAGRAM

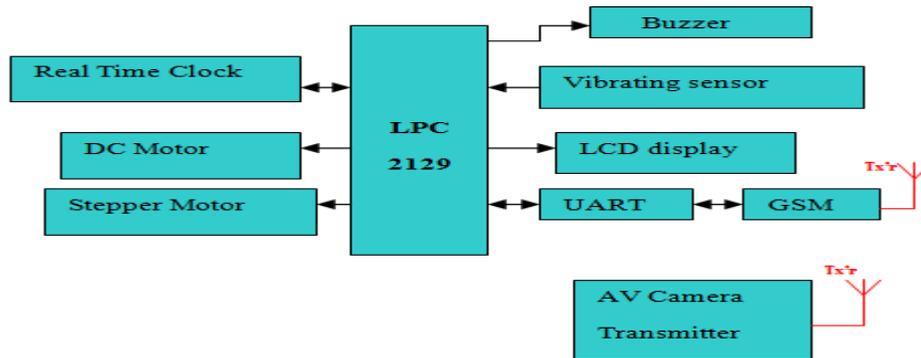
Functional Block diagram of the proposed system in which how the ARM7 (LPC2129) is interfaced with vibration sensor, stepper motor, GSM Modem, DC Motor, Stepper Motor, buzzer, RTC and LED display.

(i) ATM SECTION

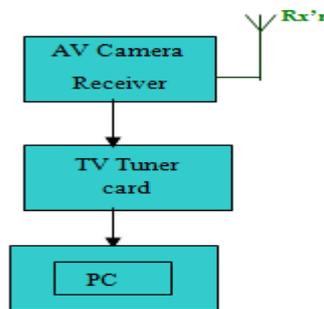
(ii) Receiver section (In side ATM Center)

iii) Via GSM

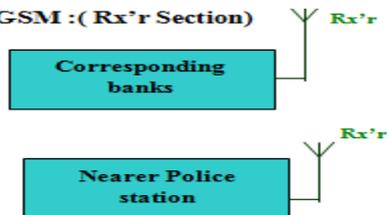
(i) ATM Section:



(ii) Receiver section :(In side ATM Center)



2. (iii) Via GSM :(Rx'r Section)



NOTE: Red Antena's --Transmitters
Green Antena's--receivers

III. Experimental (or) Practical Work

(i) Complete hardware development of this project for ATM Security system



(ii) Practical GSM Modem:



IV. RELATED STUDY

1. ATM (Automated Teller Machine):

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 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.

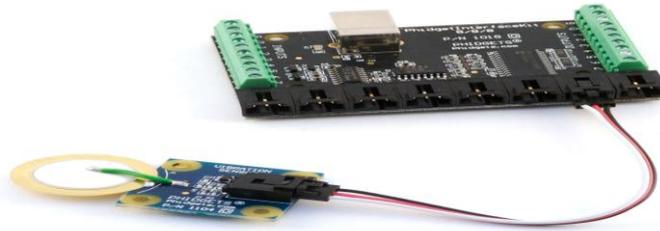
2(i) Technical details:

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. Vibration Sensor:



This sensor buffers a piezoelectric transducer. As the transducer is displaced from the mechanical neutral axis, bending creates strain within the piezoelectric element and generates voltages. If the assembly is supported by its mounting points and left to vibrate “in free space” the device will behave as a form of vibration sensor. The sensing element should not be treated as a flexible switch, and is not intended to be bent. Sensor Value 500 roughly corresponds to 0g acceleration. Acceleration will deflect the sensing element up or down, causing Sensor Value to swing either way. This sensor is not meant to measure precise acceleration and vibration - use it to detect an acceleration impulse, or the presence of vibration.

In the system we will be using a vibrating sensor (piezoelectric transducer) to find vibration from ATM machine when ever robbery occurs.

Device Specifications:

- i. Current Consumption --400uA
- ii. Output Impedance --1K ohm

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, RTC, GSM, +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. DC Motors

For the Closing the ATM door, we are using DC motors. It is operated by 12VDC power supply. In any electric motor, operation is based on simple electromagnetism. A current carrying conductor generates a magnetic field; when and to the strength of the external magnetic field Here we are placing DC Motor for closing the ATM door while thief's are trying to broken the ATM machine.

D. Motor Driver ULN2003D

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads and switching power transistors. To simplify use as two bridges each pair of channels is equipped with an enable input.

A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are included. This device is suitable for use in switching applications at frequencies up to 5 kHz. The L293D is assembled in a 16 lead plastic package which has 4 center pins connected together and used for heat sinking. The chip is designed to control 2 DC motors. There are 2 Input and 2 output pins for each motor.

FEATURES:

- 500mA rated collector current(Single output)
- High-voltage outputs: 50V
- Inputs compatible with various types of logic.
- Relay driver application.

E. BC 547:

The BC547 is a small signal transistor. It is used to control outputs that require a higher voltage and/or more current than an Arduino pin can provide. However, these kinds of transistors are not good for controlling outputs that require a large amount of current (like many motors and some higher-current light sources).

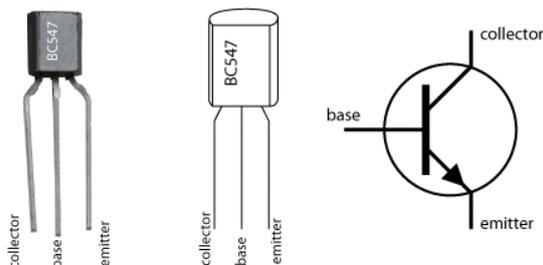
Here we are placing this BC 547 to control outputs between the vibrating sensor and controller.

F. RF Communication

Radio frequency (RF) is a rate of oscillation in the range of about 3 kHz to 300 GHz, which corresponds to the frequency of radio waves, and the alternating currents which carry radio signals. RF usually refers to electrical rather than mechanical oscillations. The energy in an RF current can radiate off a conductor into space as electromagnetic waves (radio waves) this is the basis of radio technology

G. JMK AV Receiver with Wireless Camera

It is mini wireless monitoring video camera and wireless receiver set for home and small business surveillance and is used here for demonstration purpose. Simply install the wireless camera in the room where we want to monitor and set the wireless receiver in the next room (up to 15 meters away) and hook it up to a TV or DVR to watch the action or record the footage for the security records.



Here we are placing this wireless camera in the ATM room. Depiction of AV Receiver wireless camera sends the continuous video footages to PC.

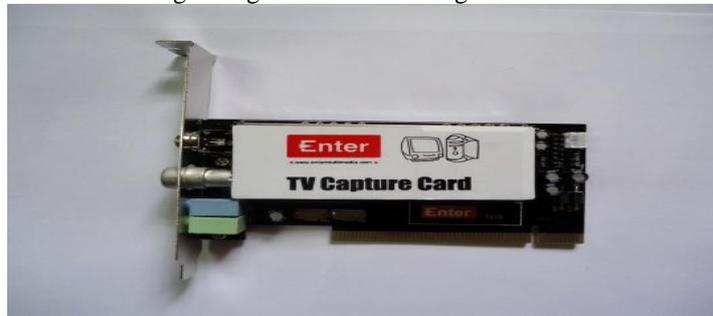
H. TV Capture card

A TV capture card is a computer component that allows television signals to be received by a computer. It is a kind of television tuner. Most TV tuners also function as video capture cards, allowing them to record television programs onto a hard disk. Digital TV tuner card is as shown in the Figure



AV Receiver and Wireless Camera

The card contains a tuner and an analog-to-digital converter along with demodulation and interface logic



VI. SOFTWARE IMPLEMENTATION

For the software implementation, we deploy two software packages. First one is the Keil μ Vision 3.0. Second one is the Flash magic simulator. The Keil μ Vision Debugger accurately simulates on-chip peripherals (I²C, CAN, UART, SPI, Interrupts, I/O Ports, A/D Converter, D/A Converter, and PWM Modules) 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.

Keil development tools for the Microcontroller Architecture support every level of software developer from the professional applications engineer to the student for learning about embedded software development. The industry-standard Keil C Compilers, Macro Assemblers, Debuggers, Real-time Kernels, Single-board Computers, and Emulators support all ARM7 derivatives. The Keil Development Tools are designed to solve the complex problems facing embedded software developers.

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. Build custom applications for Philips Microcontrollers on the Flash Magic platform! Use it to create custom end-user firmware programming applications, or generate an in-house production line programming tool.

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 Keil 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, vibrating sensor, dc motor, stepper motor, LED display, buzzer with keil micro vision 3.0 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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He completed B. E in ECE from "Sri Nandhanam College of Engineering and Technology", "ANNA University" from Tirupatur campus in the year 2010. He is pursuing M.Tech (EMBEDDED SYSTEM) from Kuppam Engineering College, "JNTU" from Kuppam campus. His Research interests in real time system, control system, networks and digital communication.



He completed B. Tech in EEE from "Srikalahasteeswara institute of technology"srikalahasti campus from JNTU in the year 2011. He is pursuing M.Tech in "EMBEDDED SYSTEM" in Kuppam Engineering College from JNTU.His Research interests in real time operating systems for handling complex operations, Experts Systems, Artificial neural networks ,graphine based computer chip design and EHVAC,HVDC.



He completed B. Tech in ECE from MITS Madarapalli in the year 2009. He completed M.Tech in VLSI from SRM Engineering College, Chennai in the year 2011. Currently working as Assistant Professor in Kuppam Engineering College in the Department of ECE. His area of research is VLSI, low power VLSI, Mixed mode level VLSI design and Data circuit design.