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Real Time Monitoring and Security Based System for ATM Centre

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Abstract: **Automated Teller Machines are a part of our life as they allow easy access to get cash, pay bills, purchase or sell stocks or make credits twenty-four hours a day. The idea of Real Time Monitoring and Security Based System for ATM Centre arised with the incidents happening around us in day to day life. This project deals with prevention of ATM theft from robbery. A vibration sensor is used here which senses vibration produced from ATM machine, whenever robbery occurs. This system employs ARM controller based embedded system to process real time data collected using the vibration sensor. A buzzer is used to produce beep sound whenever vibration is sensed. The door of ATM centre is closed using DC motor. The thief is bought into unconscious stage using stepper motor which leaks the gas inside the ATM. Camera is employed in ATM centre to capture the activities, which is saved in computer. RTC is used to record the time of robbery and pass the recorded time as a message to nearby police station and corresponding bank through the GSM. This will avoid the robbery and the person involved in robbery can be easily caught. Here, Keil tools are used to run the DC motor and stepper motor which will automatically lock the door and also emit the gas inside the ATM.**

Keywords: **ARM Controller-LPC2129, Vibrating Sensor, GSM System, DC motor, Stepper motor, Buzzer, Keil Tool.**

I. INTRODUCTION

In today's technically advanced world, all the automatic systems are gaining more popularity. Due to advances in technology, the ATM and credit card has been installed that simplifies financial and banking activity, however the crime related with financial system has been increased equally in proportion to the ratio of automation and devices. Among the crime for financial systems, the cases of theft and robbery have very high proportion of over 90% and the crime related to ATM has been increased gradually during past 12 years because of the increased usage of ATM systems. Therefore, the study suggests the method of immediate reaction and minimization of loss by detecting the theft at real-time in ATM centre and also by sending the message through GSM technology. So by using the GSM system, vibration sensor, DC motor, Stepper motor, unconscious gas theft of external ATM machine can be predicted. In this design 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 to 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.

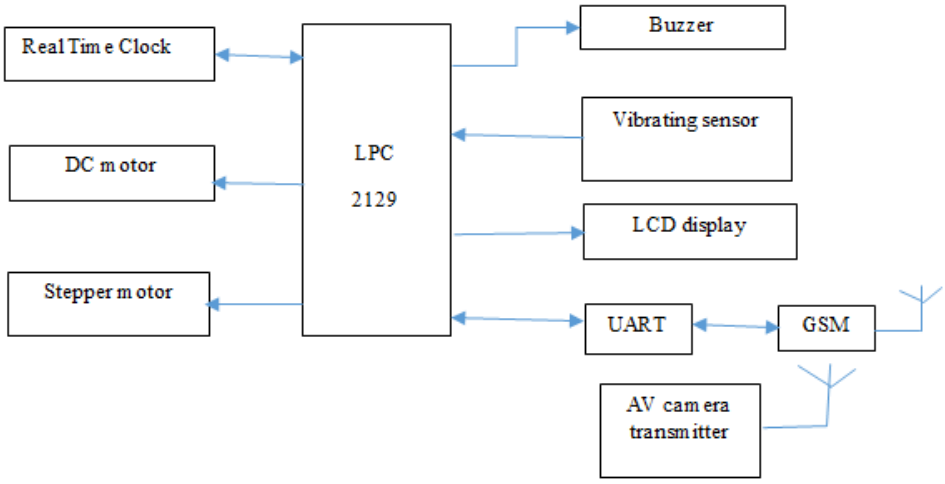

Fig. 1: ATM section

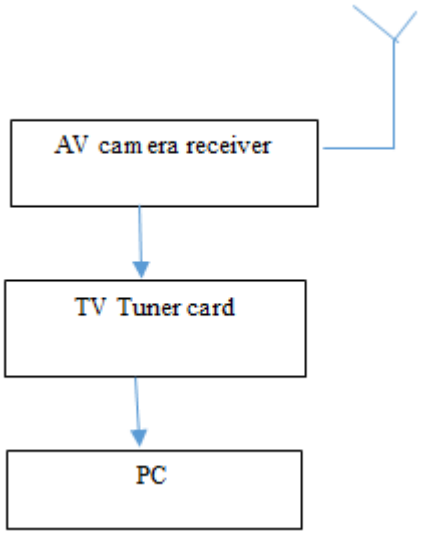

Fig. 2: Receiver section (inside ATM center)

Fig. 3: GSM (receiver section)

III. RELATED STUDY

A. ATM(Automated Teller Machine):

The first ATM in Korea was installed by Korea exchange bank in 1975, and after installation of ATM by Shinban bank in1982, the civilian can use the ATM of various banks with starting of operation of common CD network which is controlled by Korea financial telecommunication and clearing 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 2000's, 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 both and sidewall generally. The security signal lamp is installed inside the machine itself, and covers the others with the impact and open designing 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 the agent, the agent shall be in location within 25 minutes 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 in proper and rapid reaction for the ATM theft. Therefore, GSM technology with addition of some more components already mentioned above which is suggested in this study is installed in the ATM, the advanced security system can be setup with the rapid reaction implementing in real-time when the theft is happening.

B. GSM (Global System for Mobile Communications):

The GSM which is one of the representative wireless networks that has low power, low cost and convenient to use. Global System for Mobile Communications originally from Group Special Mobile is the most popular standard for mobile telephony systems in the world. The GSM association, its promoting trade organization of mobile phone carriers and manufacturers estimated that 80% of the global market uses the standard. GSM is used by 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 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 not 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.

Technical details:

Most GSM networks operate in the 900MHz or 1800MHz bands. Some countries in the America (including United States and Canada) use the 850MHz and 1900MHzbands because the 900MHz and 1800MHz frequency bands were already allocated. The rarer 400MHz and 450MHz frequency bands are assigned in some countries, notably Scandinavia where these frequencies are in the 900MHz band the uplink frequency band is 890-915MHz, and the downlink frequency band is 935-960MHz. This 25MHz bandwidth is subdivided into 24 carrier frequency channels, each spaced 200 KHz apart.

Using GSM modem in the ATM system:

In ATM system we will be using the GSM modem to send and receive SMS. When the robbery occurs, it will send the message to corresponding banks and nearby police station according to the controller.

C. Vibration Sensor:

This sensor buffers a piezoelectric transducer. As the transducer is dispatched 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 the free space the device will behave as a form of vibration sensor. The sensing element should not be treated as 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, it is used to detect an acceleration impulse or the presence of vibration. In the system we will be using a vibration sensor (piezoelectric transducer) to find vibration from ATM machine whenever robbery occurs. Device specifications: Current consumption-400uA, output impedance- 1Kohm

D. Hardware Resources:

Power supply unit:

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

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 motor's rotation has several direct relationships to these applied input pulses. The sequence of

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 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 center to bring the thief into unconscious stage.

DC motor:

For closing the ATM door, we are using DC motor. It is operated by 12V DC power supply. In any electric motor, operation is based on simple electromagnetism. A current carrying conductor generates a magnetic field; and to the strength of the external magnetic field here we are placing DC motor for closing the ATM door while thieves are trying to break the ATM machine.

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 next room (up to 15m away) and hook it up to a TV or DVR to watch the action or record the footage for security records.

IV. SOFTWARE IMPLEMENTATION

For the software implementation, we deploy two software packages. First one is the Keil uvision 3.0. Second one is the Flash magic simulator. The Keil uvision debugger accurately simulates on-chip peripherals (I2C, CAN, UART, and SPI, Interrupts, I/O ports, A/D converter, D /A converter and PWM module) of ARM7 device. Simulation helps to understand hardware configuration 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 microcontroller. Build custom applications for Philips microcontroller on the flash magic platform, use it to create custom end-user firmware programming application, 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 computer Keil to be sent to target microcontroller. It detects the hardware connected to the serial port.

V. CONCLUSION

As we all know, these days most of the ATM's have been attacked by robbery which is leading to gradual increase in the theft of the ATM year by year. This paper suggest how an automation of ATM theft prevention from robbery or thief can be implemented using GSM technology, vibration sensor, DC motor, Stepper motor, LED display, buzzer with keil uvision can be implemented in ATM machine centres. By implementing this design we can avoid theft in ATM centres also we can save our precious time.

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