

## **The Smart ATM Monitoring System using Raspi**

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### **Abstract**

Automated Teller Machines (ATMs) security is the field of study that aims at solutions that provide multiple points of protection against physical and electronic theft from ATMs and protecting their installations. From anti-skimming defend systems to silent indicate systems, integrated ATM video surveillance cameras and ATM monitoring options, security specialists are ready to help the people get more out of the ATM security and ATM loss prevention systems. The implementation is achieved with the use of Machine-to-machine (M2M) communications technology. M2M communications is a topic that has recently attracted much attention It provides real-time monitoring and control without the need for human intervention. The idea of M2M platform suggests new system architecture for positioning and monitoring applications with wider coverage and higher communication efficiency. The aim of the proposed work is to implement a low cost standalone Embedded Web Server (EWS) based on ARM11 processor and Linux operating system using Raspberry Pi. It offers a robust networking solution with wide range of application areas over internet. The Web server can be run on an embedded system having limited resources to serve embedded web page to a web browser. The setup is proposed for ATM security, comprising of the modules namely, authentication of shutter lock, web enabled control, sensors and camera control.

**Keywords:**ARM11, Arduino, GSM, ZIGBEE, Vibration Sensor, DC Motor, Buzzer, Spray.

### **1. Introduction**

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 robberies overcome the drawback found in existing technology in our society. Whenever robbery occurs, Vibration sensor is used here which

senses vibration produced from ATM machine. This system uses Arduino controller based embedded system to process real time data collected using the vibration sensor. Once the vibration is sensed, information is passed to ARM11 based master device over zigbee channel where alarm sound starts from the buzzer. DC Motor is used for closing the door of ATM. A relay will be triggered 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. This will prevent the robbery and the person involving in robbery can be easily carried.

### **1.1 LITERATURE REVIEW**

There are various existing system are developed such as Security in e-banking via card less biometric ATMs [1] provides high security in authentication which also protects user from unauthorized access. In this model user required to authenticate himself with biometric identification (thumb/ fingerprint/iris etc.), personal identity number (pin) and selection of bank branch from displayed list if necessary. This model is designed for the rural farmers, semi-literate peoples. Protected cash withdrawal in ATM using mobile phone [2] describes a method of implementing two way authentications. Role of biometric technology over advanced security and protection in auto teller machine transaction [3] describe, different biometric techniques related security topics regarding ATM has been discussed. Enhanced voice recognition to reduce fraudulence in ATM machine [4] introduced to reduce cases of fraud and theft due to its methods used in

identification of individuals, security based implementation of hidden markov model algorithm (hmm) to calculate speech rate, frequency and modulation pitch detection algorithm (PDA) for pitch calculation of voiceprints and accent classification (ac) for the accent analysis in voice. Anti-theft ATM machine using vibration detection sensor [5] provides security for the ATM machine itself. When the attacker try to damage the ATM machine vibration detection sensors gets activated. A message is passed to the nearby police stations with the help of GSM modem.

## **2. Related Work**

### **2.1 Existing Methodology:**

The existing system of two-factor authentication using mobile phones, are used to generate the one time password (OTP) [7]. By definition, authentication is the use of one or more mechanisms in order to prove that you are who you claim to be. Once your identity is validated, access is granted [6]. Three universally recognized authentication factors exists today: what you know (passwords), what you have (tokens, cards) and what you are (biometrics). Recent work has been done in trying alternative factors, for example somebody you know, a factor that can be applied in social networking. Two-factor authentication is a mechanism that implements two of the above mentioned factors and is considered stronger and more secure than the traditionally implemented one factor

authentication system. For example, withdrawing money from an ATM machine uses two factor authentication: the ATM card (what you have) and the personal identification number (what you know). Passwords are known to be one of the easiest targets of hackers. Therefore, most companies are searching more ways to protect their customers and employees. Biometrics is known to be very securing [7], but is used only in special organizations (such as military organizations) given the expensive hardware needed and their high maintenance costs. As an alternative, banks and companies are using tokens as a way of two-factor authentication. A token is a physical device that generates passwords needed in an authentication process. Tokens can either be software or hardware. Hardware tokens are small devices that can be easily carried. Some of these tokens store cryptographic keys or biometric data. Anytime a user wants to authenticate in a service, he uses the onetime password displayed on the token in addition to his normal account password. Software tokens are programs that run on computers and provide a onetime password that it is changed after a short amount of time (usually 30 seconds). OTP algorithm's security is very important because no one should be able to guess the next password in sequence. The sequence should be random to the maximum possible extent, unpredictable and irreversible. Factors that can be used in OTP

generation include names, time, seeds, etc. Several commercial two-factor authentication systems exist today such as RSA Secure ID [7]. Multifactor authentication uses more than two form of authentication and it provides higher security [8].

## **2.2 Proposed Methodology:**

In this project we analyzed what is the problem people faced in the existing technology. Especially Multifactor Authentication (MFA) method provides more complexity to the user. This project helps to overcome the problem of complexity and provides easiest way to secure the ATM transaction. Whenever person enters account number onto the ATM machine, the system requires PIN to authenticate the user. If PIN gets verified, it makes a call to the user's mobile. If the user replied to make a transaction, then transaction process takes place. The proposed system uses GSM modem for call from ATM to the user and getting reply from user to ATM. If user correctly entered amount and secondary password from mobile then transaction takes place. There is no any problem of lost or damaged ATM card. Also if the robbers try to damage ATM machine then the vibrations are detected by vibration sensor and give an alert message to the nearest police station and switches on the alarm.

## **3. Implementation**

### **3.1 Hardware Description:-**

**Microcontroller-** Microcontroller can be termed as a single on chip computer which includes number of peripherals like RAM, EEPROM, Timers etc., required to perform some predefined task. AVR is an 8-bit microcontroller belonging to the family of Reduced Instruction Set Computer (RISC). In RISC architecture the instruction set of the computer are not only fewer in number but also simpler and faster in operation. AVR microcontroller executes most of the instructions in single execution cycle. AVRs are about 4 times faster than PICs; they consume less power and can be operated in different power saving modes. Let's do the comparison between the three most commonly used families of microcontrollers. AVR follows Harvard Architecture format in which the processor is equipped with separate memories and buses for Program and the Data information.

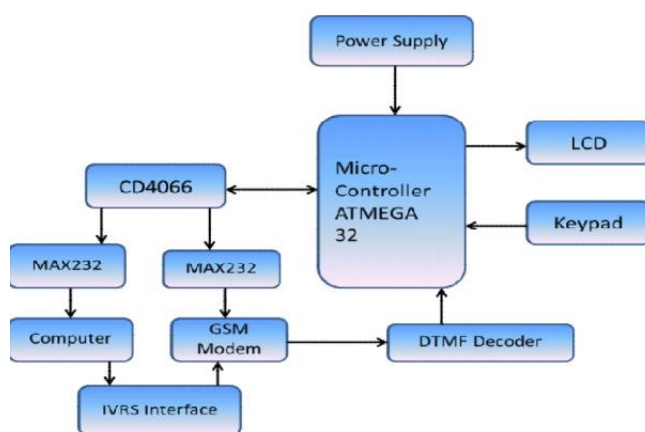


Fig 1: Block Diagram of Proposed System.

**LCD-** A liquid crystal display (LCD) is a flat panel display, electronic visual display, video display that uses the light modulating properties

of liquid crystals (LCs). LCs does not emit light directly. They are used in a wide range of applications, including computer monitors, television, instrument panels, aircraft cockpit displays, signage, etc. LCDs have displaced cathode ray tube (CRT) displays in most applications. They are usually more compact, lightweight, portable, less expensive, more reliable, and easier on the eyes. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they cannot suffer image burn-in.

**DTMF-** DTMF stands for Dual Tone Multi Frequency and it is the basis for your telephone system. DTMF is actually the generic term for Touch-Tone (touch-tone is a registered trademark of ATT). Your touch-tone phone is technically a DTMF generator that produces DTMF tones as you press the buttons. Dual-tone multi-frequency signaling (DTMF) is used for telecommunication signaling over analog telephone lines in the voice-frequency band between telephone handsets and other communications devices and the switching center. The version of DTMF that is used in push-button telephones for tone dialing is known as Touch-Tone.

**IVRS-** Interactive voice response (IVR) is a technology that allows a computer to interact with humans through the use of voice and DTMF keypad inputs. In telecommunications,

IVR allows customers to interact with a company's database via a telephone keypad or by speech recognition, after which they can service their own inquiries by following the IVR dialogue. IVR systems can respond with prerecorded or dynamically generated audio to further direct users on how to proceed. IVR applications can be used to control almost any function where the interface can be broken down into a series of simple interactions. IVR systems deployed in the network are sized to handle large call volumes. IVR technology is also being introduced into automobile systems for hands-free operation. Current deployment in automobiles revolves around satellite navigation, audio and mobile phone systems.

**MAX232-** MAX232 from Maxim was the first IC which in one package contains the necessary drivers (two) and receivers (also two), to adapt the RS-232 signal voltage levels to TTL logic. It became popular, because it just needs one voltage (+5V) and generates the necessary RS-232 voltage levels (approx. -10V and +10V) internally. This greatly simplified the design of circuitry.

**CD4066BC Quad Bilateral Switch-** CD4066BC is a quad bilateral switch intended for the transmission or multiplexing of analog or digital signals. It is pin-for-pin compatible with CD4016BC, but has a much lower "ON" resistance, and "ON" resistance is relatively constant over the input-signal range. **KEYPAD-**

keypads are a set of buttons arranged in a block or "pad" which usually bear digits, symbols and usually a complete set of alphabetical letters. If it mostly contains numbers then it can also be called a numeric keypad. The keypad switches are connected in a matrix of rows and columns: The rows of the matrix are connected to four output port lines. The columns of the matrix are connected to four input port lines

**Software Description:** - The software part deals in programming the microcontroller. In the present work we have used the ORCAD design software for PCB layout design, the CODEVISIONAVR software development tool to write and compile the source code, which has been written in the C language. The uCFLASH serial device programmer has been used to write this compiled code into the microcontroller. The proteus software is used to simulate the project. The project also uses visual basic for interacting with the user.

#### 4. Experimental Work

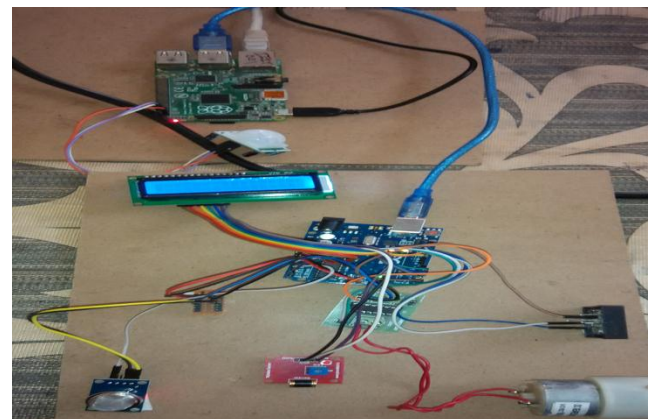


Fig 2: System Experimental Result-1.



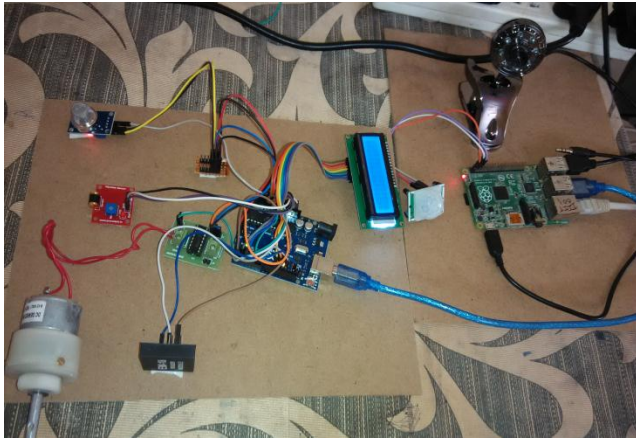


Fig 3: System Experimental Result-2.



Fig 4: System Web Home Page-1.

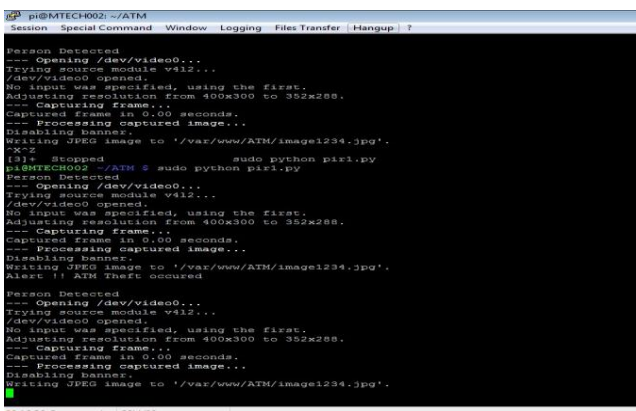


Fig 5: System Process displaying Console.

## 5. Conclusion

The project “DESIGN AND IMPLEMENTATION OF ANTI-THEFT ATM MACHINE USING RASPBERRY PI” has been successfully designed and tested. It has been

developed by integrating features of all the hardware components and software used and tested. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM Cortex A8 Processor board and with the help of growing technology the project has been successfully implemented.

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