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Design and Implementation of Anti-Theft ATM Machine Using Raspberry PI

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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.

Index-terms:

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

I. 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.

II. PROJECT IMPLIMENTATION:

2.1.BLOCK DIAGRAM:

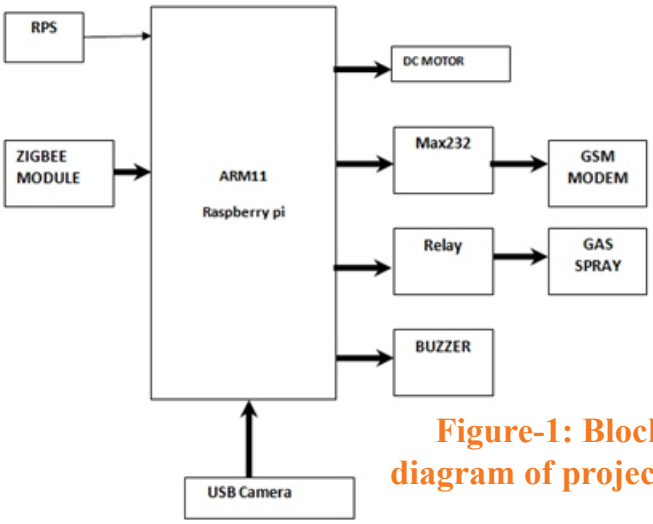

Figure-1: Block diagram of project

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2.2 SENSOR BOARD:

Figure-2: Sensor board diagram

2.3 RASPBERRY PI PROCESSOR:

Figure-3: Raspberry Pi processor

The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. The Raspberry Pi is manufactured in two board configurations through licensed manufacturing deals with Newark element14 (Premier Farnell), RS Components and Ego man.

These companies sell the Raspberry Pi online. Ego man produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacturers. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB.

It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and persistent storage. The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language, with support for BBC BASIC (via the RISC OS image or the Brandy Basic clone for Linux),C, Java and Perl.

2.4 ARDUINO:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed converter. The Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

III. HARDWARE COMPONENTS:

3.1 ETHERNET CABLE RJ45:

Since its commercial release, Ethernet has retained a good degree of compatibility. Features such as the 48-bit MAC address and Ethernet frame format have influenced other networking protocols. Ethernet initially competed with two largely proprietary systems, Token Ring and Token Bus. Because Ethernet was able to adapt to market realities and shift to inexpensive and ubiquitous twisted pair wiring, these proprietary protocols soon found themselves competing in a market inundated by Ethernet products and by the end of the 1980s, Ethernet was clearly the dominant network technology. In the process, 3Com became a major company. 3Com shipped its first 10 Mbit/s Ethernet 3C100 transceiver in March 1981, and that year started selling adapters for PDP-11s and VAXes, as well as Multi bus-based Intel and Sun Microsystems computers. This was followed quickly by DEC's Unibus to Ethernet adapter, which DEC sold and used internally to build its own corporate network, which reached over 10,000 nodes by 1986, making it one of the largest computer networks in the world at that time.

3.2 MEMS SENSOR:

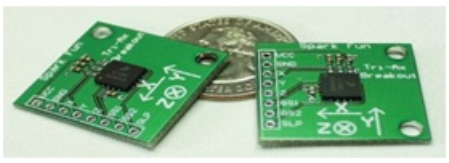

Figure-4:MEMS

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The MEMS is a 3-axis accelerometer .An accelerometer measures acceleration (change in speed) of anything that it's mounted on. Single axis accelerometers measure acceleration in only one direction. Dual-axis accelerometers are the most common measure acceleration in two directions, perpendicular to each other. Three-axis accelerometers measure acceleration in three directions. Accelerometers are very handy for measuring the orientation of an object relative to the earth, because gravity causes all objects to accelerate towards the earth. A two-axis accelerometer can be used to measure how level an object is. With a three-axis accelerometer, you can measure an object's acceleration in every direction.

3.3 D.C. MOTOR:

A dc motor uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic fields and current-carrying conductors. The reverse process, producing electrical energy from mechanical energy, is accomplished by an alternator, generator or dynamo. Many types of electric motors can be run as generators, and vice versa. The input of a DC motor is current/voltage and its output is torque (speed).

Figure-5: DC Motor

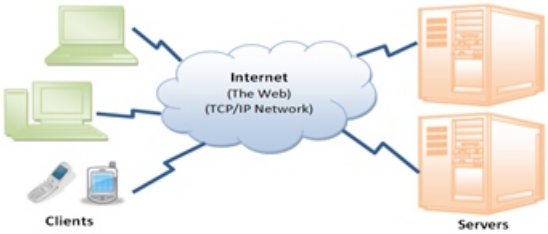
The DC motor has two basic parts: the rotating part that is called the armature and the stationary part that includes coils of wire called the field coils. The stationary part is also called the stator. Figure shows a picture of a typical DC motor, Figure shows a picture of a DC armature, and Fig shows a picture of a typical stator. From the picture you can see the armature is made of coils of wire wrapped around the core, and the core has an extended shaft that rotates on bearings. You should also notice that the ends of each coil of wire on the armature are terminated at one end of the armature. The termination points are called the commutator, and this is where the brushes make electrical contact to bring electrical current from the stationary part to the rotating part of the machine.

3.4 GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION):

GSM (Global System for Mobile Communication) 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. This ubiquity means that subscribers can use their phones throughout the world, enabled by international roaming arrangements between mobile network operators. GSM differs from its predecessor technologies in that both signaling and speech channels are digital, and thus GSM is considered a second generation (2G) mobile phone system. This also facilitates the wide-spread implementation of data communication applications into the system.

IV. PROTOCOLS:
4.1 WEB:

Internet (or The Web) is a massive distributed client/server information system as depicted in the following diagram.
Figure-6: TCP/IP protocol
Many applications are running concurrently over the Web, such as web browsing/surfing, e-mail, file transfer, audio & video streaming, and so on. In order for proper communication to take place between the client and the server, these applications must agree on a specific application-level protocol such as HTTP, FTP, SMTP, POP, and etc.



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4.2.HYPER TEXT TRANSFER PROTOCOL (HTTP):

HTTP (Hypertext Transfer Protocol) is perhaps the most popular application protocol used in the Internet (or The WEB). HTTP is an asymmetric request-response client-server protocol as illustrated. An HTTP client sends a request message to an HTTP server. The server, in turn, returns a response message. In other words, HTTP is a pull protocol; the client pulls information from the server (instead of server pushes information down to the client). HTTP is a stateless protocol. In other words, the current request does not know what has been done in the previous requests. HTTP permits negotiating of data type and representation, so as to allow systems to be built independently of the data being transferred.

V. RESULTS:

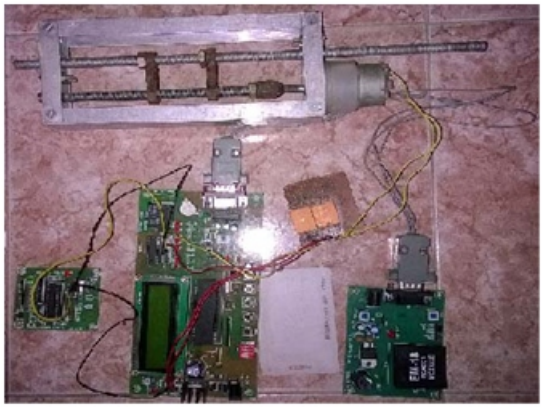

Figure-7: Hardware implementation

VI. FUTURE SCOPE:

» The cost of ARM11 is more that's why in future we can implement this system using ARM CORTEX A8, Beagle bone etc as well as updated processors with high frequencies will work fine.
» As the storage space is also less in future we can also record these live streaming data by connecting external memory storage.
» We can complete our project using wireless technology.
» In future we can provide more security to data by using encryption, decryption techniques

VII. 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.

VIII. REFERENCES:

[1] Wireless Medical Technologies: A Strategic Analysis of Global Markets [online]. International Telecoms Intelligence.

[2] G. Y. Jeong, K. H. Yu, and Kim. N. G. Continuous blood pressure monitoring using pulse wave transit time. In International Conference on Control, Automation and Systems (ICCAS), 2005.

[3] K. Hung, Y. T. Zhang, and B. Tai. Wearable medical devices for telehome healthcare. In Procs. 26th Annual International Conference on the IEEE EMBS, 2004.

[4] Fang, Xiang et al: An extensible embedded terminal platform for wireless telemonitoring, Information and Automation (ICIA), 2012 International Conference on Digital Object Identifier: 10.1109/ICInfA.2012.6246761 Publication Year: 2012 , Page(s): 668 - 673.

[5] Majer, L., Stopjaková, V., Vavrinský, E.: Sensitive and Accurate Measurement Environment for Continuous Biomedical Monitoring using Microelectrodes. In: Measurement Science Review. - ISSN 1335- 8871. - Vol. 7, Section 2, No. 2 (2007), s. 20-24.

[6] Majer, L., Stopjaková, V., Vavrinský, E.: Wireless Measurement System for Non-Invasive Biomedical Monitoring of Psycho Physiological Processes. In: Journal of Electrical Engineering. - ISSN 1335-3632. - Vol. 60, No. 2 (2009), s. 57-68.