Journal of **N**onlinear **A**nalysis and **O**ptimization
Vol. 10, No. 1 : 2019
ISSN : **1906-9685**

Journal of Nonlinear Analysis and Optimization : Theory & Applications

Editors-in-Chief :

A DESIGN OF ATM MONITORING AND SECURITY SYSTEM BASED ON SENSORS USING IOT

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ABSTRACT: The ubiquitous Automated Teller Machines (ATMs) provide a wide range of monetary transactions, both for individuals and businesses. In this project, sensors connected to the Internet of Things (IoT) were used to maintain ATMs. In this study, vibration and image sensors are used. To handle the data acquired in real-time from various sensors, this system employs an embedded system based on the ARM controller. This system uses image recognition to match the collected photographs with the user database stored in the cloud in the event that an unauthorised individual gains access to the user account, whether intentionally or unintentionally. The user receives the picture along with a message. In the event of a burglary, the buzzer will emit a beep as soon as it detects vibration. DC The door of the ATM is closed using a motor. The burglar is put into unconsciousness by releasing gas from within the ATM using a stepper motor. This allows the user to keep tabs on the ATM's status (temperature, smoke, etc.) and operate its loads (air conditioning, lights, doors, etc.) from afar. Compared to all the other systems that are already in use, this one is much simpler, more dependable, and has better security.

KEY WORDS: Automated Teller Machine (ATM), IOT, sensors, monitoring system, security.

I. INTRODUCTION

The "things" that make up the Internet of Things (IoT) are the physical items that have been equipped with electronics, software, sensors, and network properties. This allows these devices to collect and share data. The Internet of Things (IoT) opens up new possibilities for direct integration between the real and virtual worlds by allowing the detection and remote control of devices via preexisting network infrastructure. This, in turn, leads to

heightened effectiveness, precision, and financial gain. To begin with, "things," or ATMs, were unveiled in 1939. These days, almost three million devices are installed all over the globe. Hackers, fraudsters, robbers, and security breaches are becoming more common as the number of ATM units grows. Traditional automated teller machines' primary function was to disburse banknotes and debit associated checking accounts [1].

However, due to their multipurpose nature and increasing complexity, ATMs have become a prime target for cybercriminals. Modern automated teller machines are protected by stringent security protocols. In order to complete transactions, they operate under complex systems and networks. Although ATMs utilise encryption to protect customer data, hackers may still access their accounts and steal money using covert devices. Another option is that inexperienced thieves would use violence to intimidate bank customers into giving up their money or account information [3].

http://doi.org/10.36893/JNAO.2019.V10N01.045-051

Among the many sensors used by this system are an accelerometer, a pressure-sensitive resistor, and a passive infrared sensor. This system started with the well-known ATMEGA328 microcontroller. It continuously detects and displays changes in the temperature, pressure, and orientation of the ATM device. The concept involves use buzzers to notify the location of a bank and a police station. A camera captures images via the videos that play indefinitely. In this case, a DC motor closes the ATM door, while a stepper motor emits gas to put the thief to sleep.

II. LITERATURE SURVEY

With the beginning of operation of the shared CD network, which is regulated by the Korea Financial Telecommunications & Clearings Institute, civilians were able to use the ATMs of different banks following the 1975 installation of the first ATM by the Korea Exchange Bank and the 1982 installation by Shinhan Bank. With a sharp uptick in the first half of the 2000s and a more moderate uptick thereafter, the number of ATMs installed has been steadily rising over the last several years. The use of external ATMs in particular has been steadily on the rise.

In most cases, you may find the outside ATM machine at the kiosk booth's door or on a nearby wall. The external ATM security system safeguards the first stage using the machined's built-in signal light, while open and impact detecting sensors cover the others [4]. The ATM is safeguarded by the impact detecting sensor, which promptly transmits a signal to the security centre. In the event of an emergency signal and subsequent dispatch, the control centre has a policy stating that the agent must be at the scene of the crime within twenty-five minutes. However, in practice, agents often fail to meet this deadline due to a lack of accountability, as well as inadequate resources. Consequently, our research suggests that when GSM technology is integrated with other components mentioned before and implemented in ATMs, an enhanced security system may be built up. our system can execute a speedy response in real-time, even if a theft occurs [6].

The purpose of ATMs, or automated teller machines, is to make it simpler for people to withdraw money from their accounts. Nowadays, a large percentage of bank transactions take place via ATM terminals, which greatly strengthens the infrastructure's resilience. Several obstacles, such as an increase in server load and security concerns, prevented the study into providing a variety of non-financial services via ATMs from ever seeing the light of day [7]. Articles, journals, books, and antecedent works from the aforementioned subjects make up the bulk of the literatures. As before, these literatures are compiled for the purpose of providing guidance on how to carry out this project. Today, with the ever-increasing prevalence of automation and computerization, free systems are wildly popular. The proliferation of automated teller machines (ATMs) has made online banking and related activities more accessible, but at the same time, criminality targeting online financial institutions has increased during the last twelve years. It has been determined via analysis that the crimes are related. This task addresses the prevention of ATM theft and misuse by conducting a real-time audit of the ATM equipment.

The method that has been developed to provide clients with instantaneous cash is known as an automated teller machine. Current automated teller machines usually include instructions for interactive operations printed out on the screen. Once the user has read the instructions, they may use the keypad to operate the ATM. To use an ATM, customers must insert the card that their bank has issued them. The presence of a Personal Identification Number (PIN) alongside each ATM card number enables an authentication method.

After the customer's verification is finished, they are given the option to choose between two types of transactions: quick cash withdrawal and balance inquiry. These financial dealings now take place on the servers of the bank's private network. Users would be able to access a plethora of additional financial services via the expansion of ATM terminals, allowing for instantaneous cash withdrawals. Because of this, the accessibility and efficiency of the world's Automated Teller Machines are both enhanced. All of a sudden, the system's performance is rock solid. A security concern lies at the heart of the matter.

III. PROPOSED SYSTEM

Functional Block diagram of the proposed system is shown in figure (1) in which the ARM7 (LPC2129) is interfaced with image sensor, vibration sensor and smoke sensor along withGSM Modem, DC Motor, Stepper Motor and buzzer.

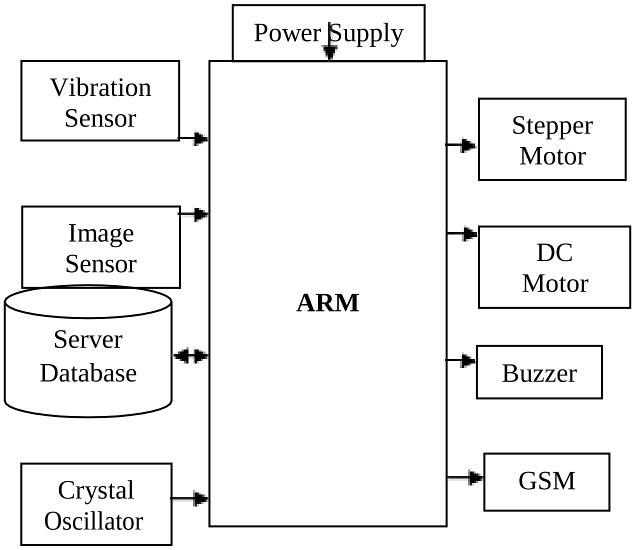


Fig. 1: FUNCTIONAL BLOCK DIAGRAM OF PROPOSED SYSTEM

3.1 ARM

A 16-bit or 32-bit ARM7TDMI-S CPU with constant imitating and inserted logic is at the heart of the LPC2148 microcontrollers. include a microcontroller with a high-speed flash memory ranging from 32 kb to 512 kb, and then follow the instructions. The most extreme clock rate for 32-bit code execution is made possible by a unique fastening agent construction architecture and a 128-bit wide memory interface. With the 16-bit Thumb mode, programmes that need to discriminate code size may reduce code by over

thirty percent with a very low penalty for death. The LPC2148 is an excellent choice for access control and purpose of offer applications because to its small size and low power consumption, which are critical requirements for scaling down.These devices are perfect for low-end imaging, voice distinguish, and communication gateways and convention converters thanks to their on-chip SRAM ranging from 8 kilobytes to 40 kilobytes, as well as their serial interchanges interfaces, which run from a USB 2.0 full-speed device, various UARTS, SPI, SSP to I2c-transport, and extensive cradle size. These microcontrollers are well-suited for use in mechanical control and restoration frameworks because to their 32-bit clocks, 10-bit analog-to-digital converters (ADCs), PWM channels, 45 fast GPIO lines, and nine edge-or level-sensitive external invasive pins.

3.2 Vibration Sensor

An electromechanical transducer is protected by this sensor. The transducer produces voltages when it is bent, which causes strain in the piezoelectric element and shifts it away from the mechanical neutral axis. Assembled and held "in free space" by its mounting points, the gadget may be used as a vibration sensor. Please do not bend the sensing element in any way; it is not meant to be used as a flexible switch. At 0 g acceleration, the sensor value is 500. When you accelerate, the sensing component, resulting in a yawing of the Sensor Value. Use this sensor to detect acceleration impulses or vibration, not for exact acceleration and vibration measurements. A piezoelectric transducer, a vibrating sensor, will be used in the system to detect vibrations emanating from ATMs in the event of a theft.

3.3 Image Sensor

A sensor that can detect and transmit the data that makes up an image is called an image sensor or imaging sensor. To do this, it takes use of the fact that light waves undergo varied attenuation as they travel through and reflect off of things, and then turns that information into signals, which are really brief bursts of current. Light or other forms of electromagnetic energy may manifest as waves. Digital cameras, camera modules, medical imaging equipment, night vision devices (including thermal imaging), and other analogue and digital electronic imaging tools all make use of image sensors. One kind of digital sensor is the flat panel detector. With this setup, the web camera doubles as an image sensor.

3.4 Buzzer

Mechanical, electromechanical, or piezoelectric buzzers or beepers are all examples of auditory signalling devices. Alarm clocks and timers are common applications for buzzers and beepers. An electromechanical mechanism similar to an electric bell but without the metal foundation was the basis of early gadgets.

3.5 Stepper Motor

To accomplish discrete mechanical motions, an electromechanical device known as a stepper motor is used. When electrical command pulses are supplied to a stepper motor in the correct order, the shaft or spindle revolves in discrete step increments. The order in which the

The direction of rotation of the motor shaft is directly correlated with the applied pulses. The length of rotation is proportional to the number of input pulses supplied, and the speed of rotation is proportional to the frequency of the input pulses. In order to put the burglar to sleep, we will use this stepper motor to release gas into the ATM.

3.6 DC Motors

Using DC motors, we are closing the ATM door. It runs on a 12VDC power source. Basic electromagnetism is the basis of any electric motor's functioning. Depending on the presence and intensity of an external magnetic field, a conductor carrying current may produce its own magnetic field. Here we have installed a DC motor to close the ATM door in the event that the machine is smashed by thieves.

3.7 GSM

Global System for Mobile Communications (GSM) modems are specialized types of modems that operate over subscription based wireless networks, similar to a mobile phone. A GSM modem accepts a Subscriber Identity Module (SIM) card, and basically acts like a mobile phone for a computer.Such a modem can even be a dedicated mobile phone that the computer uses for GSM network capabilities.

3.8 Working

The system's sensors are constantly being monitored in order to identify any intrusion attempt. Alerting the controller that the safety measures are due since the sensors have been activated. The controller then instructs the driver to trigger the alarm system, which will deter the would-be intruder by sounding a buzzer. The burglar is trapped inside the ATM when the controller triggers the motor to shut the doors. All of the data entered is processed by the ARM

http://doi.org/10.36893/JNAO.2019.V10N01.045-051

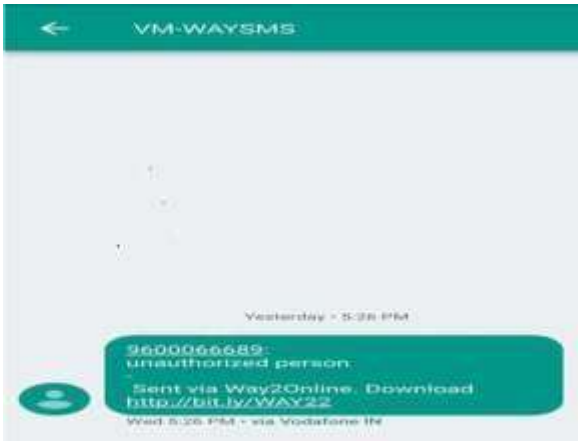
microcontroller.

processes the incoming data and then turns on the appropriate output devices. With the aid of IoT, all the values are sent to the homepage.

Also prevented in this publication from being used by unauthorised individuals without our knowledge. After detecting a picture, the image sensor compares it to the original, stored in a database on the server. In order to initiate this session, the user must recognise the third party as a known person. The user may skip the steps of entering the PIN for withdrawal and go straight to the user choice if he is the one who has arrived to withdraw. If the user in question is an unauthorised third party, their picture will be taken using the webcam. The next step is to check the picture against the user's database. After that, the user's account is notified and the picture is sent by email. After the user confirms that the sender is someone they know, a window will popup allowing them to input their PIN and withdraw the funds.

RESULTS

The complete hardware development of proposed ATM monitoring and security system is shown in Figure (2). Figure (3) shows the output of using the trusted third party application and the message received by the account user in case of an unauthorized access.



Yesterday • 5:26 PM

9600066689:
unauthorized person

Sent via Way2Online. Download http://bit.ly/WAY22

Wed 5:26 PM • via Vodafone IN

Fig 3: MESSAGE RECEIVED BY THE ACCOUNT USER

IV. CONCLUSION

In order for the ATM to handle all of the upcoming transactions, its infrastructure has to be very strong. Because an assault may bring down all of the transactions, it has to be resilient. The suggested system verifies the encryption of the transactions. By supplying the session key, which enhances encryption, this boosts security. Several difficulties are addressed by the system's robustness, security, and ease of implementation. The end customers will find it more convenient and easy to utilise. Making the existing infrastructure more useful and easy for end users is the goal of the suggested solution.

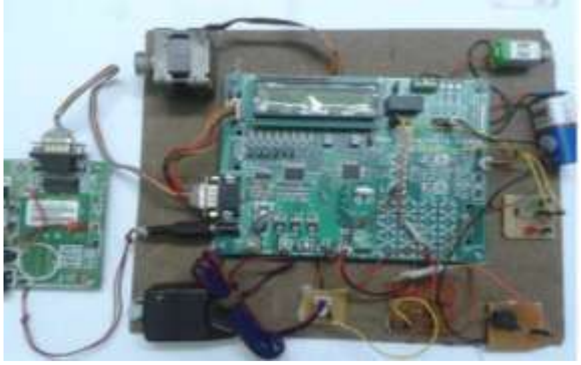


Fig 2: EXPERIMENTAL KIT OF PROPOSEDSYSTEM

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