

IOT Enabled E-ATM Surveillance and Security System Using BLYNK Server

Vijayakumar M

Department of ECE
Government College of Engineering
Dharmapuri, Tamilnadu, India
mvk.get@gmail.com

Ramamoorthi R

Department of EEE
Government College of Engineering
Dharmapuri, Tamilnadu, India
ram_moorthi2007@yahoo.com

Nirmalkumar S

Department of EEE
Government College of Engineering
Dharmapuri, Tamilnadu, India,
nirmal.5303@gmail.com

Abstract— ATM theft and robbery have been the main issues at ATM facilities over the past few years. The main goal of ATM applications is to prevent theft and maintain security. Today's security system ensures that the alarm system and surveillance camera aren't too protected. This project's main objective is to strengthen the security system by utilising the ESP32 platform and Blynk IoT. In this project, when the ATM vibrates, a message is sent via the BLYNK IoT app, the door closes automatically, and then the machine sends, notifying the surrounding area with an auditory signal while loading the entire data. In the custom Android the app that uses the Blink app decodes the commands and then sends them to the microcontroller, routinely activating the buzzer and chloroforms. Esp32 is NodeMCU, and Wi-Fi is used for communication between the microcontroller and the application (Internet). With regard to several of the security elements described above, the digitised intelligent security system is a special amalgamation that offers an unmistakable answer to the security issue. Once the system was successfully applied, the objective was reached without any deviations. Due of its protection capabilities, this project has a lot of future potential. It can be utilised in a variety of real-time applications, including financial, domestic, and commercial ones.

Keywords— Internet of things, e-ATM, Blynk server, Security, NodeMCU, Surveillance System.

I. INTRODUCTION

ATMs have emerged as one of the most important devices in our modern lives. We are able to withdraw money from authorised accounts whenever we want thanks to this capability. Some ATM locations are found outside of the region. The main problems in the ATM Center are theft and robberies. For ATM applications, a number of security alert and surveillance camera systems were created. Consequently, a computerised security system serves a crucial purpose in preventing theft. [1]. The reduction in the number of bank employees due to increased computerization, social automation, and the installation and expansion of ATMs and credit cards to facilitate economic activity is offset by an increase in robberies, which is inversely correlated with the relationship between automation and entity proliferation. Theft and robbery cases make up a disproportionately high

percentage of financial institution crimes—more than 90%—and ATM crimes have increased as a result of the expansion and constant exposure of external ATMs to criminality [2]. As a result, this study will suggest a method for prompt action and loss minimization that involves identifying the ATM in real time when it has been stolen using GSM technology. In order to protect the ATM system, we must therefore strengthen the security and surveillance systems. We use internet of things technology to alert the appropriate security personnel, the closest police station, and the banking industry. The CCTV camera is always being utilized to record videos. In this study, we suggested an Internet of Things (IoT) based ATM security and surveillance system as a cutting-edge solution for ATM centre protection. It is used to prevent theft and keep an eye on the ATM centre around-the-clock[3].

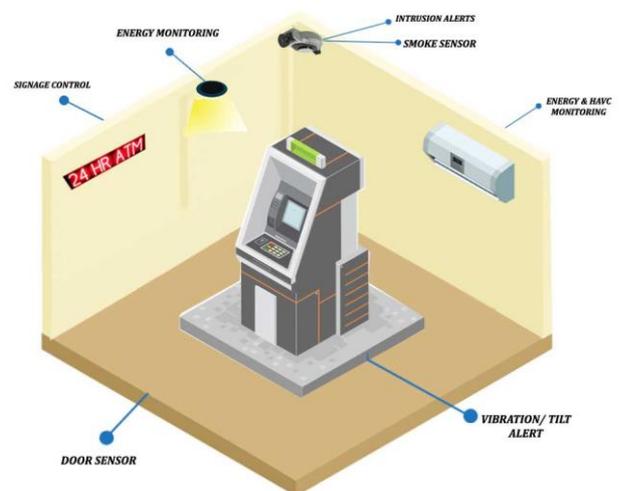


Fig.1 ATM security system

1.1 ATM Monitoring System

Today, an ATM centre is essential to fostering positive interactions between customers and the financial system. ATMs in rural locations and on highways are vulnerable to theft. Despite the fact that banks do not disclose their losses from cybercrime. The main issue in society with regard to the ATM Center is the increase of nighttime robberies. To increase security and continuously keep track of robberies in the relevant ATM centre, a surveillance and security system was created; the suggested online ATM monitoring system is seen in fig. 2. The ATM centre has the integrated sensor-based security device installed. It continuously monitors and protects the ATM system. The security system consists of sensor unit, controller unit, communication unit and Monitoring unit [4].

by using ESP32, Vibration sensor and blynk internet of things. When robbery and theft occur, the vibration sensor is used to detect the vibration level of ATM. This sensor sends the real time detection of vibration data to ESP32. This microcontroller sends the data to Blynk server. For the eATM security application, a dedicated BLYNK IoT Android app was created. The vibration sensor detects the intensity of vibration and sends it to the microcontroller while the thief attempts to harm the ATM machine.

The device immediately closes the ATM when the vibration level reaches an extreme level and sends out an alert signal to nearby locations. Stepper motor-powered door. The thief becomes unconscious when the relay circuit sprinkler sprays chloroform gas on them. The notification is sent via the Internet by the control unit to the appropriate parties. Only until the bank personnel has input the password can the door be opened. The task is completed successfully. This stops stealing and makes it simple to catch the perpetrator.

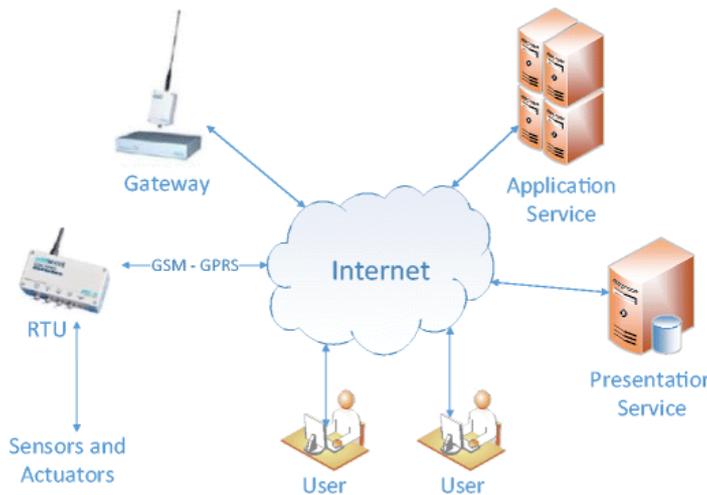


Fig.2 ATM Monitoring system using IoT

II. RELATED WORK

We have used locks and keys for 2000 years. We have modified our safety system for security purposes. With the rise of the Internet, technology has recently advanced, and we've also moved on to wireless communication for locking systems. The keyboard's digital locking mechanism is crucial. We utilize passwords and PINs to lock systems instead of keys in this system. But it carries a number of concerns, including the possibility of password hacking and forgetfulness, and it cannot unlock the door in the event of a power outage. The security system that uses information about a person to identify them is called a biometric system. Biometric systems, such as facial recognition, fingerprint verification, iris/retinal verification, etc., have been utilized for safety purposes. [5]. Electronic locking systems are currently used to increase security and authentication. The GSM and Bluetooth connections are supported by the encrypted and secured smart lock system. The smart phone is now superior for many uses other than making and receiving phone calls and text messages. We are able to remotely monitor voice blocking off structures for banks and many other purposes in real time thanks to mobile operating systems and internal apps. [6].

Every day, we work to better ourselves and the world around us so that we can claim development. When technology initially emerged, i.e., when the first computer was created many years ago, no one even considered controlling the equipment with voice instructions. This was only a science fiction idea, but we use the voice interface because we want things to be better. Since speech communication is the most effective means to communicate while requiring the least amount of effort, ideas can be easily articulated and put into action. Our suggested system has been evolved to the point where voice commands may control it from a distance. Our machine becomes incredibly useful and efficient on a tight budget by integrating this capability. This may be the best way to save energy and save energy. Many strategies have been introduced to acquire the above objectives [7].

III. PROPOSED SYSTEM

This project aims to prevent the theft of ATM theft by overcoming the disadvantages of the technology that exists in our society. The proposed security system was developed

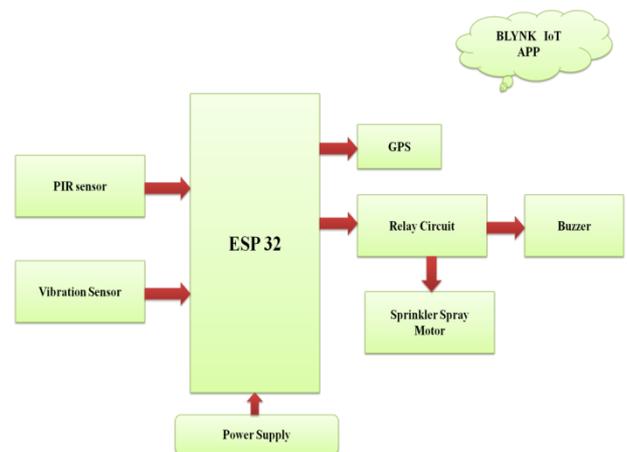


Fig.3 Proposed block diagram

The main goal of the current study is to promptly warn the environment if something strange occurs in a particular zone in order to increase security and prevent problems. PIR sensors are frequently utilized in autonomous energy lighting and security systems. PIR sensors can identify human motions. Fig. 3 illustrates how this study aims to combine the capabilities of components such a PIR sensor, webcam, esp32, alarm system, and Wi-Fi connection. When a human passes within a range of 10 to 12 meters from the PIR sensor's webcam, the microcontroller triggers the webcam to start taking continuous pictures. A unique function in the current development is IoT-based Warning notice using the serial protocol. The suggested online-based security system includes a vibrating sensor that warns authorized security personnel and the bank's security wing when suspicious activity is detected, ensuring the quick defense of victims. This IoT device is an autonomous, continuous and safe surveillance system

3.1 SYSTEM architecture

Automation is an essential factor for the protection system. Our aim in the project is to design and implement a safety system. System that provides control functions by a handheld mobile Smartphone through IoT. As we know, for the previous three decades, consumers have relied heavily on and depend on ATMs to effectively meet banking needs. The

concept to design and implement the ATM-based safety alert project is primarily based on observation of real events occurring around us. The proposed intelligent security system helps to catch thieves when they attempt to steal ATMs.

The architecture of the IoT-based ATM security system is shown in Fig. 4. The security and monitoring system powered by the internet of things ensures the safety of ATM. Software and hardware components were used to create the intelligent system. Vibration sensor, PIR sensor, GPS, ESP32 with built-in Wi-Fi, and power supply circuit make up the hardware unit.

When someone tries to force open or harm the ATM system, the vibration sensor generates the analogue signal. When the vibration sensor analogue value exceeds the threshold limit, the ATM door immediately closes and an emergency warning is sent to the nearest police station and security personnel. The thief is locked inside ATM cabin.

The BLYNK android application was developed for security purposes. The Blynk application can view the ATM location that was sent by the GPS. The esp32 surveillance camera is used to continuously send the video to authorized person via BLYNK App. using the security app that was installed in mobile phones Specific devices such as alert system and chloroform gas can also be turned on / off.

An Android device's BLYNK app talks with the microcontroller and transmits the desired signal via the Internet. After entering the password using the BLYNK application, the bank sector or security personnel once again unlocked or opened the ATM door.

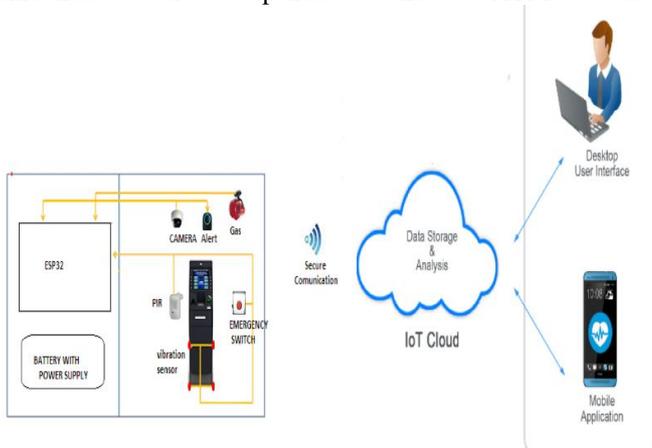


Fig.4 Architecture of proposed system

3.2 PIR SENSOR

PIR is a passive infrared sensor. It detects the motion of human movements in ATM centers. This sensor operating voltage is 3.3V and send the digital signal to ESP32. This sensor is connected in pin D1. If any movement is occur, it send the notification to authorized persons. This sensor is located at backside of ATM machine.



Fig.5 PIR sensor

3.3 Vibration Sensor

Vibration sensor is used to monitor the vibration level of ATM. The Vibration module based on the vibration sensor SW-420 and Comparator LM393 to detect if there is any vibration that beyond the threshold. The threshold can be adjusted by the on-board potentiometer. When this no vibration, this module output logic LOW the signal indicate LED light and vice versa. In the system we will be using a vibrating sensor (piezoelectric transducer) to find vibration from ATM machine whenever robbery occurs.



Fig.6 Vibration Sensor

3.4 Relay circuit

Relay circuit is used to trigger the Sprinkler spray and alert system of ATM. The two relay circuits is connected in D5 and D6 of ESP32. When any event or vibration occurs, the microcontroller automatically trigger the buzzer and sprinkler motor. The relay and sprinkler and buzzer operating voltage are 12v.

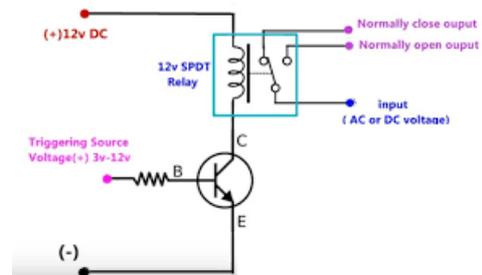


Fig.7 Relay circuit

3.5 ESP32 camera

The camera is interfaced with ESp32. It continuously monitors the image and video to authorized person via and Web server. The detected IP address is programmed by

embedded C language. This IP address and URL link is used to view the image and video of ATM system.



Fig.8 ESP32 camera

IV. BLYNK IoT PLATFORM

The IoT based android Application was developed for ATM security application. The proposed hardware component connects to the Internet of Things using WiFi gadgets. The BLYNK IoT Application server continuously monitored the operation of the hardware output. The vibration level exceeds and theft is detected then a notification is sent to the authorized personals.

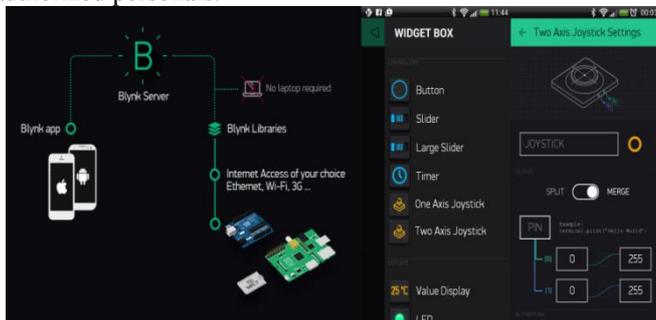


Fig.9 BLYNK IoT platform

V. RESULTS AND DISCUSSION

The microcontroller, which is housed in the CPU unit, is responsible for gathering detected data, sending it over the network, carrying out operations, processing data, and evaluating the operation of various components in the sensor node. Sensors and an ADC in the detecting unit convert the detected analogue signal into a digital signal. The suggested technology uses very little energy, is intelligent and software programmable, low costs to acquire and install, and need less maintenance. Choosing best sensors for Wi-Fi communication requires knowledge of the application and the problem definition. Fig.10 shows the result of implementation hardware unit.

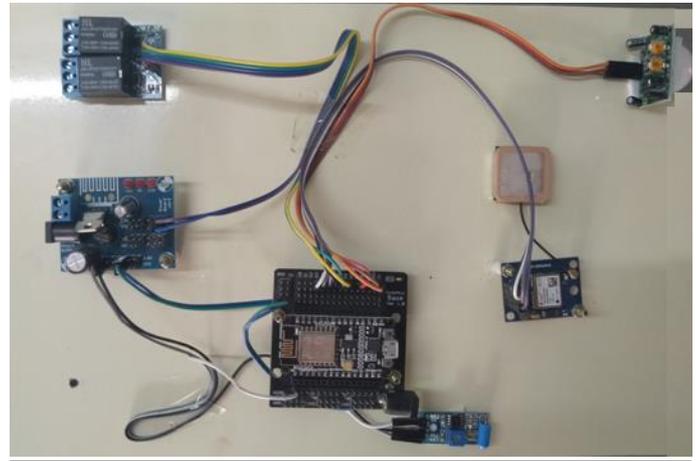


Fig.10 Hardware Implementation

Fig.11-13 shows the result of online based eATM security system using Internet of things. A specialized BLYNK Android Application was developed for ATM security application. This application is used for monitoring the ATM centre 24hrs/per day.

Application

- Home security application
- In banks, industries, etc
- In laptops to keep information confidential.

Advantage

- Easy to implement
- Anywhere to monitor and control
- High speed
- High security

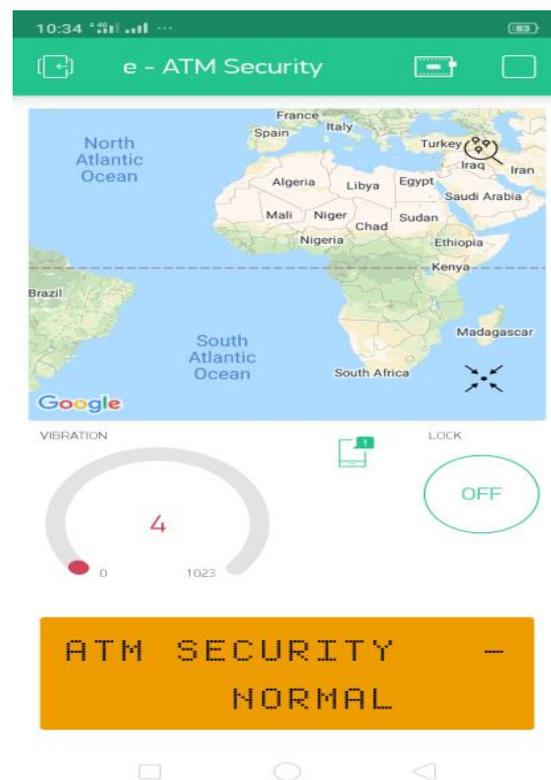


Fig. 11 BLYNK Android App Result

VI. CONCLUSION

The proposed e ATM security system is put into use for ATM security applications. We can monitor and identify the theft in the ATM itself using this project. GPS, a vibration sensor, and esp32-developed hardware are the suggested components. In the event of a theft, it instantly locks the door and activates the sprinkler spray relay, rendering the burglar unconscious. The ATM door is automatically locked at the same time, and a bell sounds to warn those around. The precise position of the ATM centre is shared by the GPS module. The suggested IoT module instantly notifies one or more authorised individuals online, and the door should only be opened after entering the password through the IoT Android application. The proposed hardware system is low cost and it has reliability. It can be used for real time security based applications.

VII. REFERENCES

- [1]. P.K. Amurthy and M.S. Reddy(2012),“Implementation of ATM Security by Using Fingerprintrecognition and GSM”, International Journal ofElectronics Communication and ComputerEngineering vol.3, no. 1, pp. 83-86.
- [2]. B. M. Nelligani, N. V. U. Reddy and N. Awasti, "SmartATM security system using FPR, GSM, GPS," 2016 International Conference on Inventive ComputationTechnologies (ICICT), Coimbatore, 2016.
- [3]. Adrienne Heinrich, Dmitry Znamenskiy, Jelte Peter Vink, Robust and Sensitive Video Motion Detection for Sleep Analysis. Biomedical and Health Informatics, IEEE Journal of (Volume:18 , Issue: 3) , 2168-2194, 20 September 2013, pp. 790-798.
- [4]. B.Sivakumar, P.Gunasekaran, T.Selvaprabhu, P.Kumaran, D.Anandan, “The Application of Wireless Sensor Network in the Irrigation Area Automatic System”, IjctaJan-Feb2012.
- [5]. C. Bahlmann, Y. Zhu, Y. Ramesh, M. Pellkofer, T. Koehle, A system for traffic sign detection, tracking, and recognition using color, shape, and motion information. IEEE Intelligent Vehicles Symposium, Proceedings,2005, pp. 255-260.
- [6]. Joaquin Gutierrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, And Miguel NGEL PortaGndara, ”Automated Irrigation System Using A Wireless Sensor Network And Gprs Module”,IEEE Transactions On Instrumentation And Measurement, Vol. 63, No.1, January2014.
- [7]. K.Prathyusha, M. Chaitanya Suman,”Design of Embedded Systems for the Automation of Drip Irrigation,”International Journal of Application or Innovation in Engineering Management (Ijaiem) Volume 1, Issue 2, October 2012.
- [8]. Liai Gao, Meng Zhang, Geng Chen,”An Intelligent Irrigation System Based On Wireless Sensor Network and Fuzzy Control, “Journal of Networks, Vol. 8, No. 5, May2013.
- [9]. Orazio Mirabella, Senior Member, IEEE, and Michele Brischetto,”A Hybrid Wired/Wireless Networking Infrastructure for Greenhouse Management,” IEEE Transactions on Instrumentation and Measurement, Vol.60, No.2, February 2011.
- [10]. Sathiyabama P, Lakshmi Priya C, Ramesh Sm, PreethiB, Mohanaarasi M,”Embedded System Design For Irrigating Field With Different Crops Using Soil Moisture Sensor, “International

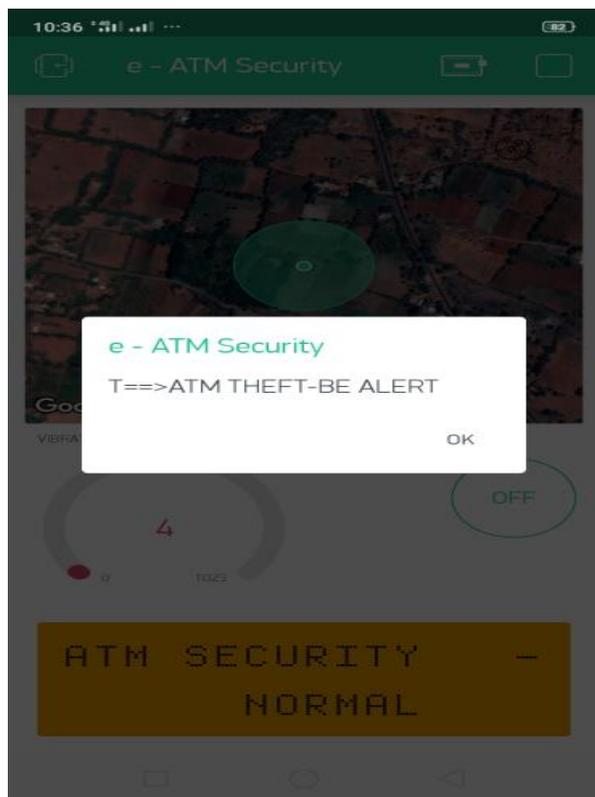


Fig.12 ATM theft Alert Monitoring



Fig.13 ATM Location Monitoring Using BLYNK IoT Application

Journal Of Innovative Research In Computer And Communication Engineering Vol. 2, Issue 8, August2014.

- [11]. Vimal.p, Priyanka.V, Rajyasree.M, Santhiya Devi.P.T, Jagadeeshraja. M, Suthanthira Vanitha.N, "A Novel Approach for Automatic Irrigation and Fustigation Using Embedded System," International Journal of VLSI and Embedded Systems-Ijves Vol05, Article 03257; March2014.