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Research Article

ESP32 BASED SMART INFORMATION FOR THE ATM SYSTEM

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ABSTRACT

In today's global technology is strolling very fast. It is getting used anywhere in our everyday life to satisfy our requirements. We will increase the safety with right thoughts by way of using advanced era. This project objectives in designing a system which routinely detects the ATM cards and sends alerting message to the predefined quantity. Whilst a consumer lost his ATM card, he can notify the bank by using sending a message in order that he can notify the bank by using sending a message in order that he gets all of the facts where the card become operated formerly. Whilst any unauthorized person tries to perform the cardboard, an alert message can be sent to the pre-defined wide variety. That is executed by way of interfacing ATM machine with a GSM modem. GSM is used to tune the location wherein the cardboard is operated ultimate time so that the cardboard holder can get notified of the vicinity. We also can growth the safety with the aid of the usage of a vibration sensor that's attached to the ATM system. When an unauthorized man or woman attempts to thief cash at night time caution might be transmitted with the assist of vibration sensor and a message might be surpassed to the bank humans through GSM. The camera module ESP32 is used to capture the photos of the character during transactions and this picture could be uploaded to telegram routinely with this proposed device it is easy to get most security for this ATM card and also to ATM centres.

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INTRODUCTION

In these days superior world, autonomous structures are enhancing rapidly. With this increasing generation protection-primarily based structures are also gambling a essential function within the gift world. In the current international ATM device is very crucial a part of our existence [1]. Anyone is dependent on this ATM device to run into their banking needs. ATM related crimes also are increasing daily, so to overcome this case GSM and GPS generation has been delivered in ATM gadget. The GSM component gives communication, allowing the users to know approximately the popularity in their misplaced ATM playing cards and also to send commands via SMS [2]. It facilitates to make our transactions less difficult which had been very hard in early instances. A GSM and GPS-based clever records device for the lost ATM cards should help the customers to track and block their cards through at once sending the cardboard info to the person. GPS machine is used for tracking the region, via a mobile app or SMS, customers can set off the GPS monitoring to find their card. A good way to tighten more safety in ATM centres we brought an ESP32 camera module for securing ATMs and to improve the security measures [3]. The ESP32 digicam affords real-time video feed

which gives continuous surveillance of the ATM vicinity. It captures the pics every time a person enters into the ATM centre. We will access the digital camera feed via a cellular app or internet interface to reveal the surroundings, this stored photo could be uploaded to the server for future reference or for any research [4]. Here a vibration sensor is likewise added that is interfaced to the ATM to offer greater safety. at the side of GSM and GPS era we are combing ESP32 machine for non-stop monitoring to create a robust safety to the ATM gadget [5].

LITERATURE REVIEW

A complete literature overview became performed to explore the cutting-edge country of the ATM safety systems and pick out capability areas for improvement. The overview found out that most current structures depend upon proprietary software program and hardware additives, proscribing their scalability and compatibility with high protection. The evaluate revealed that most of the improvement has been accelerated for tracking the thefts and additionally for offering security to the ATM cards as well as ATM centers.

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The main reason of this scheme is to set up a consultation key between cell Station (MS) and traveler region sign up (VLR) authenticate. This scheme has much less bandwidth and storage. In this magazine there is a lot of observe about comparisons of different performances. The scheme is resilient to replay and man-in -the-center assaults. [1]

The primary cause of this observe is to reduce frauds that are occurred in ATM device. There are many new authentication mechanisms are advanced to overcome safety issues of private identification numbers (PIN). On this examine we came to comprehend about the real-international ATM use. For higher understanding of PIN-primarily based ATM authentication, and on how opportunity authentication methods can be as compared and evaluated. This result suggests that there may be a massive have an effect on of contextual elements on safety and overall performance in PIN-based totally ATM use. [3]

On this examine specific access manipulate strategies had been proposed to relaxed the ATM Transaction from unauthorized access. This paper describes a method of enforcing manner authentication. The primary one is regular PIN verification method and if the password is accurate then it goes to the second one step of authentication (i.e.,) way authentication method. In that if the legal person responded yes through their mobile, then corresponding transaction takes vicinity. in any other case, it switches on the buzzer, routinely near the door of ATM center and lcd will show the detail about ATM robbery to the higher government. the principle cause of this system is to increase the security to the ATM transactions. [7]

In this gadget comprising of the modules namely, authentication of shutter lock, sensors and message alert. If an unauthorized character try to robbery the ATM by using destroying it, then the vibration sensor will activate and buzzer will deliver alert and the alert message was ship to the authorized man or woman. The cell number become saved within the system via sending the pattern message to the SIM card. If any individual locked within the ATM after lock of the ATM, then the PIR sensor spark off and send the alert message once more. For locking and unlocking cause a switch is used on this device. the main purpose of this system is to put in force a low-value stand-on my own Embedded server. [9]

In this machine comprising of Arduino mega R3 Board, RFID module, RF communication, Doppler radar. In nowadays technically superior world autonomous system are gaining fast popularity. In present environment social computerization and automation has been improved and the ATM and credit card has been established and spread out to simplify the financial and banking interest. However, the crime related with the economic organization has been increased. The principle goal of this system is going to suggest a method of minimization of loss by detecting ATM machine while it's been stolen. Right here with the aid of the use of GSM technology, Doppler radar, DC motor, advanced sensors robbery of ATM system may be anticipated. On this paper we supply the alert messages, sound through GSM and buzzer to the legal individual. [10]

The principle intention of this system is to design a security system for banks the usage of wireless era GSM. This undertaking is designed on a GSM module to ship the message about the lost card information to the financial institution. While this misplaced card if positioned within the ATM center the cardboard details could be right now send to the user and

bank. Consequently, one receives maximum security to their ATM card by way of tracking it continuously. [11]

On this ATMEGA328 Controller, GSM modem, GPS receiver, RFID, vibration sensor were used for the successful implementation of the device. The ATMEGA328 microcontroller become used to serve as the entire mind of the gadget that is having 32kbytes of flash memory and a GPS to inform the user of the misplaced card details and vicinity. The vibration sensor might be included as a further protection measure which is connected to ATMs for enhanced safety. Each time there may be an unauthorized individual tries to scouse borrow cash from the gadget a caution could be transmitted to the adjacent bank consequently, with this form of machine provided in this paper, the safety of misplaced ATM cards and ATM center may be more effective in order to at ease and guard our ATM cards and ATM machine from any intension and robbery in an digital based totally technique. [12]

METHODOLOGY

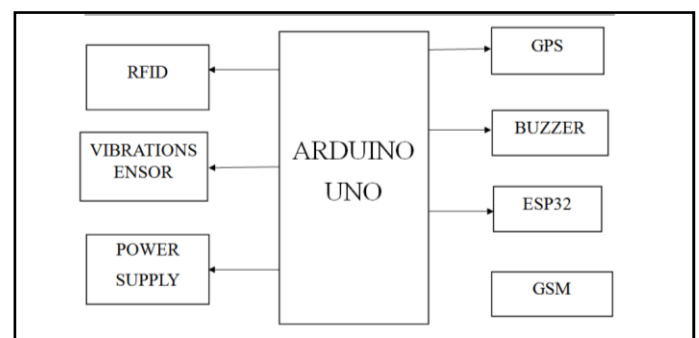


Fig 1.Block Diagram

The block diagram Fig 1 includes Arduino UNO, RFID module, GSM module, GPS receiver, vibration sensor, Buzzer,ESP32 digital camera module. The GSM module is attached to the microcontroller and then initialize the module by using sending AT instructions to installation communicate parameters, then the use of this AT commands we can send the configured textual content message [6]. The GPS receiver gets indicators from GPS satellites to decide the ideal place and accurate time of the misplaced card [7]. The ESP32 digicam is attached to the microcontroller. It captures the photo of someone getting into the ATM centre and send them to a Telegram bot via the Telegram Bot API. We will attain this by using programming the ESP32 camera the use of the microcontroller and integrating the digital camera library along with telegram library [8].

HARDWARE COMPONENTS

1. Arduino Uno: Arduino UNO is a low-fee, bendy, and easy-to-use programmable open-source microcontroller board that may be included into a ramification of digital tasks. This board may be interfaced with different Arduino boards, Arduino shields, Raspberry Pi boards and may control relays, LEDs, servos, and automobiles as an output [1,9].

2. Power supply: A power supply is an electrical tool that components electric strength to an electrical load. the principle purpose of a electricity deliver is to convert electric powered contemporary from a supply to an appropriate voltage, present day, and frequency to power the load. As a result, strength resources are once in a while referred to as electric power converters [1,6].

3. ESP32: ESP32-CAM is a low-price ESP32-primarily based development board with onboard digicam, small in size. it is an excellent solution for IoT application, prototypes buildings and DIY projects. The board integrates Wi-Fi, traditional Bluetooth and occasional energy BLE,with 2 excessive- overall performance 32-bit LX6 CPUs [10,12].

4. RFID: RFID is a machine used to tune gadgets, people, or animals using tags that respond to radio waves. RFID tags are included circuits that consist of a small antenna. The are typically small sufficient that they may be not without problems important and therefore can be positioned on many styles of items [1,3,10].

5. GPS:The main function of GPS is to discover the places at the globe precisely by way of figuring out the space from the satellites. This device helps you to create in any other case record genuine locations at the globe & allow you to navigate from the one's locations. Essentially, this gadget became particularly designed for military applications however in the 12 months 1980, it became made handy for civilian use. This article discusses a top level view of the GPS system and its running & uses.

6. GSM: GSM telephone machine transmits mobile facts and voice services. The network transmits voice calls and user information at 850MHz, 900MHz, 1800MHz, and 1900MHz frequency bands. GSM uses the department a couple of get right of entry to (TDMA) approach in voice calls and different communications. GSM digitizes and compresses statistics and sends it down a channel together with two different data streams where each has its precise time slot [2,11].

7. Vibration Sensor: The vibration sensor is likewise referred to as a piezoelectric sensor. These sensors are flexible devices which might be used for measuring numerous strategies. This sensor uses the piezoelectric outcomes whilst measuring the adjustments inside acceleration, stress, temperature, force in any other case stress by way of converting to an electrical rate. This sensor is also used for figuring out fragrances in the air by using at once measuring capacitance as well as quality [4,11].

RESULTS

To implementation of an ESP32-based clever information device for ATM yields several advantageous outcomes, which include:

- Stronger User Experience:Consumer gain from actual-time transaction updates, personalized services, and a extra interactive and person-friendly interface, improving their normal revel in at ATMs.
- Accelerated Operational Efficiency: Realtime tracking of ATM fame, cash ranges, and far off diagnostics contribute to reduced downtime, quicker issue decision and green resource.
- Improved protection: ESP32 enables superior protection capabilities which include biometric authentication, safety alerts, and farflung tracking, enhancing the overall safety of ATM transactions and decreasing the hazard of fraudulent activities.
- Adaptability and Scalability: ESP32's modular design lets in for easy customization and scalability, making sure that the clever data machine can adapt to evolving generation developments and accommodate future improvements.

- Statistics Analytics: ESP32 allows the collection of data associated with ATM utilization styles, transaction volumes, and consumer behaviour, presenting precious insights for banks to optimize offerings and make knowledgeable selections

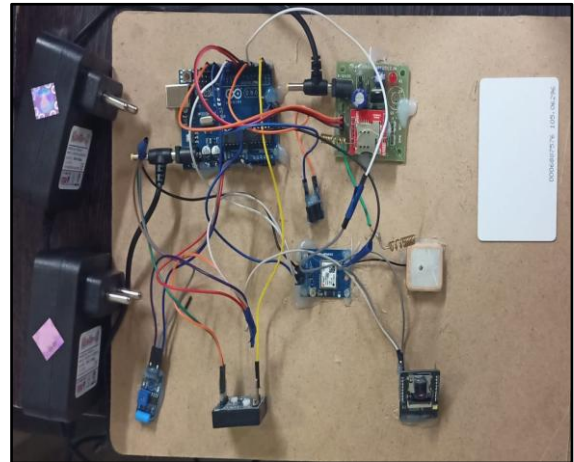


Fig 2 Final Circuit Prototype

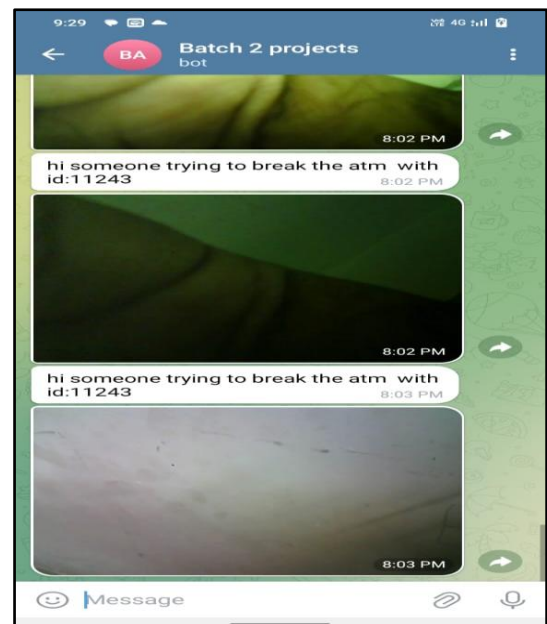


Fig 3 Storing images in telegram bot

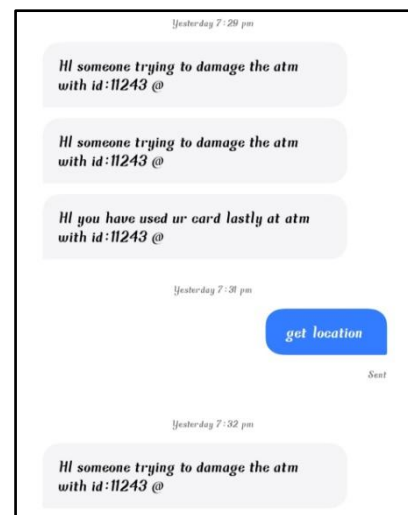


Fig. 4 Receiving and sending commands through GSM

ADVANTAGES

The use of an ESP32 primarily based clever statistics gadget for ATMs offers numerous benefits, together with:

•Price Efficiency

ESP32 modules are fee-powerful, offering a budget-pleasant solution for enforcing clever functions in ATM gadget.

•Wireless Connectivity

ESP32 supports c084d04ddacadd4b971ae3d98fecfb 2a and Bluetooth, allowing wi-fi verbal exchange for far flung tracking, updates, and management of ATM facts.

•Actual-time monitoring

ESP32 permits real time monitoring of ATM reputation, enabling short detection and response to troubles including cash shortages, technical malfunctions, or safety breaches.

•Records protection

Enforcing strong security protocols at the ESP32 guarantees the safety of touchy facts transmitted between the ATM and the server, improving basic system safety.

•Remote Updates

ESP32 allows far flung wireless updates, ensuring that ATMs can obtain the cutting-edge software program improvements and protection patches without bodily intervention.

APPLICATIONS

The implementation of an ESP32-based smart data gadget for ATMs yields numerous programs.

•Coins Availability tracking

Imposing sensors and connectivity with ESP32 lets in actual-time tracking of coins levels in ATMs, decreasing times of out-of-provider machines due to cash shortages.

•Safety indicators

ESP32 may be integrated with security systems to ship on the spot indicators in case of suspicious activities, including more than one failed PIN attempts or tampering with the ATM.

•Energy management

Smart capabilities powered through ESP32 can optimize electricity usage in ATMs, making sure efficient energy control and reducing usual operational expenses.

•Consumer Authentication

Stronger security capabilities, consisting of -factor authentication using cell devices related to ESP32, can add a further layer of safety for ATM transactions.

•Marketing and statistics display

ESP32 can aid interactive displays for advertising or providing critical statistics, growing a greater enticing person revelin.

Future Enhancements

There's a future integrated enhancement of completely make builtin it digitalized which offer their consumer with a fully digital revel built-integrated. It's far feasible to withdraw cash from ATMs without cards, acquire built integrated cards at once upon request, chat with bank employees via

7fd5144c552f19a3546408d3b9cfb251 video with built integrated ATM. A brand new authentication approach also can be built-introduced, perceive verification may be as simple as built-in a selfie from a cellphone with lot of era. This lets built integrated clients to integrated a person identity lets built integrated customers to built integrated a consumer identification without worry of records leakage fast.

CONCLUSION

This Proposed system "ESP32 based smart information for the lost ATM system" is designed with the assist of Arduino microcontroller. This system is extra dependable in presenting security to the ATM cards and ATM centres. It is carried out through ESP32 digital camera module which captures the photos of the individuals and send that facts data thru telegram. Through GSM and GPS we will music the area of the lost ATM card whilst and in which it's miles operated previously through SMS. To save you all viable ways to ATM robbery vibration sensor is used which gives extra safety. If any unauthorized man or woman tries to thief cash then they vibration sensor receives the vibration sign and ship SMS to bank. Therefore, this gadget offers maximum security to lost ATM cards and ATM centres.

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