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ATM CRIME PREVENTION USING WIRELESS SENSORS

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Abstract-

Security and safety are a necessity for automated teller machines (ATM). The ATM security system is implemented using the Internet of things (IoT) and GPS (global positioning system). The main idea of this project is to develop an ATM surveillance and security system. In this project, when any physical attack against the ATM takes place, then information about the attack is sent using IoT and also alerts the surrounding area using a buzzer, at the same time the entire data from the sensors is sent to the developed mobile application and puts alert message to the bank officials. The officials who have control over the mobile application can control the Door through their mobile to lock from their location remotely. To prevent the escape of the thief chloroform connected to the controller through relay can also be sprayed inside the ATM by the officials remotely from their place using the mobile app. The Camera (ESP32) is used for live video coverage and to monitor the activity inside the ATM. The Camera will not only record the activity but also, transmit will live video taken inside the ATM and the ATM location as latitude and longitude are tracked using GPS. The system is connected to the Blynk mobile application. The sensor and GPS data are read by the microcontroller and these data are sent to the Blynk application. With the help of the Blynk application, the official who has access to it can control the relays and the respective devices connected to the relay to turn it ON or OFF.

I. INTRODUCTION

Introducing ATM Crime Prevention using wireless sensors, a project aimed at transforming bank security. With cutting-edge IoT and GPS technologies, we detect and deter ATM physical attacks effectively. Real-time alerts and audible signals ensure swift responses to security breaches. Our system enables remote ATM control via a mobile app, including door locking and anti-theft measures. Integrated ESP32 cameras offer live video coverage and GPS tracking for comprehensive surveillance. Through innovation, we prioritize the safety and security of banking operations, safeguarding assets and providing peace of mind for financial institutions and customers.

II. PROBLEM STATEMENT

The security of automated teller machines (ATMs) is paramount in safeguarding banking operations and protecting assets. However, conventional security measures often fall short in effectively preventing physical attacks and thefts targeting ATMs. Existing systems lack real-time monitoring capabilities and fail to provide immediate alerts in the event of security breaches. Moreover, the challenge of remotely controlling ATM functions and deploying anti-theft measures further exacerbates the vulnerability of these systems. There is an urgent need for an innovative solution that leverages wireless sensors to enhance ATM security, enabling proactive monitoring, swift response to security threats, and remote control of ATM functions. This solution must address the shortcomings of existing security systems to ensure comprehensive protection of ATM facilities and assets against potential threats.

III. METHODOLOGY

The methodology for the ATM Crime Prevention project involves a comprehensive approach to developing and implementing a sophisticated surveillance and security system for automated teller machines (ATMs). It begins with an analysis of ATM security requirements, followed by the selection of suitable hardware components such as IoT devices, GPS modules, and ultrasonic sensors. A detailed system architecture is then designed to seamlessly integrate these components, defining communication protocols and software interfaces. Custom software is developed to control hardware operation, including alert triggers and remote control functionalities. The system undergoes thorough testing and validation, including simulated attack scenarios and real-world testing. Upon successful validation, the system is deployed to ATM locations and integrated with existing infrastructure. Training sessions are conducted for bank officials and maintenance staff, and ongoing maintenance activities ensure system reliability and effectiveness.

IV. COMPONENTS USED

1.ARDUINO NANO

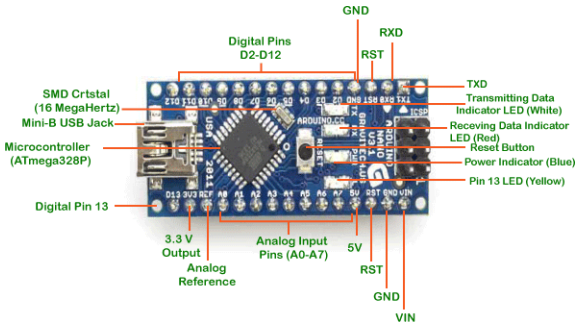

Fig 1: Arduino NANO

Arduino Nano is a compact and versatile microcontroller board based on the ATmega328P chip, offering a wide range of functionalities in a small form factor. It features 14 digital input/output pins, 8 analog inputs, and 6 PWM outputs, making it suitable for various projects. With USB connectivity for programming and power supply, Arduino Nano is ideal for prototyping and embedded systems development. Its low cost and ease of use make it popular among hobbyists and professionals alike. Arduino Nano's compatibility with the Arduino IDE and extensive library support further enhances its versatility and accessibility for users.

2. IR SENSOR:

Fig 2: IR SENSOR

IR (Infrared) Sensors: These sensors are used to detect the presence of objects or people in close proximity to the ATM machine, helping to prevent potential theft or vandalism. An infrared (IR) sensor is a device that detects infrared radiation, a type of electromagnetic radiation with longer wavelengths than visible light. IR sensors are widely used in various applications for detecting the presence or absence of objects, measuring temperature, and sensing motion.

3. Regulated Power Supply:

Fig 3: REGULATED POWER SUPPLY

A regulated power supply is an essential component in various electronic systems, providing a stable and consistent voltage output regardless of fluctuations in input voltage or load conditions. Its primary function is to ensure that electronic devices receive the required voltage within specified tolerances, there by enabling reliable operation and preventing damage due to overvoltage or voltage fluctuations. Regulated power supplies typically consist of several key components, including a transformer, rectifier, voltage regulator, and filtering capacitors. The transformer converts the input

voltage to the desired level, while the rectifier converts AC voltage to DC voltage. The voltage regulator then ensures that the output voltage remains constant by adjusting the voltage as necessary, while the filtering capacitors smooth out any ripples or fluctuations in the output voltage.

4. Relay:

Fig 4: RELAY

A relay is an electromechanical switch that operates using the principle of electromagnetism. It consists of a coil of wire wound around a core, known as the electromagnet, and a movable armature connected to one or more contacts. When an electric current passes through the coil, it generates a magnetic field, which attracts or repels the armature, thereby opening or closing the contacts. The operation of a relay is based on the interaction between the electromagnetic field created by the energized coil and the armature.

5. BUZZER:

Fig 5: BUZZER

A buzzer is a small electronic signaling device that produces an audible sound or tone when activated. It consists of a piezoelectric element or an electromagnetic coil and a diaphragm, which vibrates in response to an electrical signal, generating sound waves. Buzzer is commonly used in various applications, ranging from alarm systems and electronic devices to industrial machinery and automotive vehicles, to provide auditory alerts, warnings, or notifications.

6. VIBRATION SENSOR:

Fig 6: VIBRATION SENSOR

A vibration sensor, also known as a vibration detector or accelerometer, serves as a pivotal device utilized to detect and measure oscillations or vibrations within a given object or system. Operating on the fundamental principle of converting mechanical motion into electrical signals, these sensors play a crucial role in monitoring and analyzing vibrations across a multitude of applications. Typically comprising a sensitive element, such as a piezoelectric crystal or a MEMS accelerometer, coupled with associated electronics for signal conditioning and processing, vibration sensors generate electrical signals proportional to the magnitude and frequency of the vibrations they detect. In industrial settings, vibration sensors are extensively employed for condition monitoring purposes, particularly in machinery and equipment.

7. GPS:

Fig 7: GPS

The NEO-6M GPS engine on this board is a quite good one, with the high precision binary output. It has also high sensitivity for indoor applications. NEO-6M GPS Module has a battery for power backup and EEPROM for storing configuration settings. The antenna is connected to the module through a ufl cable which allows for flexibility in mounting the GPS such that the antenna will always see the sky for best performance. This makes it powerful to use with cars and other mobile applications.

8. GSM:

Fig 8: GSM

GSM (Global System for Mobile Communications) Module: This module is used to enable wireless communication between the ATM machine and the bank's servers, allowing for real-time monitoring of transactions and immediate detection of any suspicious activity.

9. MOTOR:

Fig 9: MOTOR

A motor is a mechanical device that converts electrical energy into mechanical energy, facilitating motion or rotation. Operating on the principle of electromagnetic induction, motors utilize the interaction between magnetic fields and electrical currents to generate force, propelling the motor to move or rotate. These devices find extensive application across various domains, from industrial machinery and transportation vehicles to household appliances and consumer electronics, serving to provide propulsion, drive systems, and mechanical power.

10. ESP32 CAMERA:

Fig 10:ESP32 CAMERA

The ESP32 camera is a compact and versatile module that integrates a camera sensor and a microcontroller, based on the ESP32 system-on-chip (SoC). This module enables developers to easily add camera functionality to their IoT (Internet of Things) projects, allowing for applications such as video streaming, image recognition, surveillance, and remote monitoring. The ESP32 camera module typically features a small form factor, making it suitable for integration into various devices and systems.

V. BLOCK DIAGRAM

In response to the limitations of the existing security systems, we propose an advanced ATM Prevention System (APS) designed to significantly enhance the security and protection of ATMs. Building upon the existing security infrastructure, the APS incorporates innovative technologies and additional features to create a comprehensive security framework. In addition to the previously mentioned components such as GSM, GPS, vibration sensors, IR sensors, relays, and an ESP32 cam, the proposal system introduces a novel security measure: the inclusion of a chloroform spray. This chloroform spray serves as an additional deterrent against potential intruders and enhances the system's ability to incapacitate unauthorized individuals attempting to tamper with or steal the ATM.

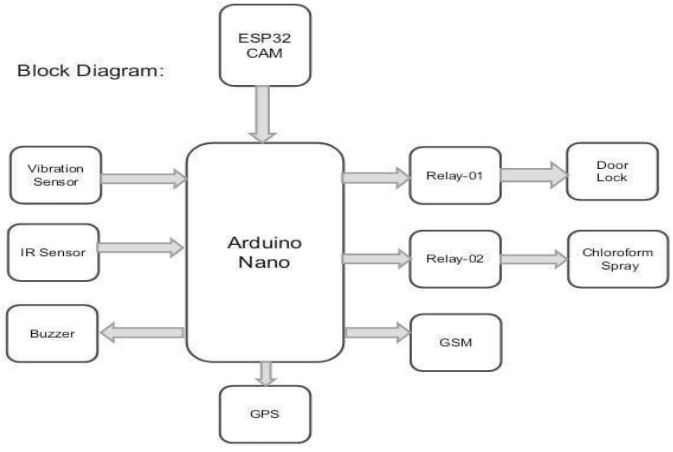

Fig 11:BLOCK DIAGRAM

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CONCLUSION

In conclusion, the proposed ATM Prevention System offers comprehensive security features utilizing advanced technology like GSM, ARDUINO microcontroller, and MEMS sensors to combat ATM crimes effectively. Despite potential challenges, the benefits of enhanced security outweigh drawbacks. Implementing a wireless sensor network (WSN) using IoT technology for ATM crime prevention offers a robust and proactive approach. It enables real-time monitoring, automated alert generation, and seamless communication with law enforcement agencies, ensuring the safety of customers and their financial transactions. Overall, deploying WSN using IoT represents a significant step towards safeguarding ATM assets and reducing criminal activities.

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