

To Develop Anti-Theft Flooring Mat

Aditya Shinde¹ Sai Pingale² Disha Kadam³ Sanskruti More⁴ Prof. Snehal Rajole⁵

^{1,2,3,4,5}Department of Information Technology

^{1,2,3,4,5}MVP'S RSM Polytechnic, KBT Circle, Gangapur Road, Nashik, India

Abstract — In contemporary society, ensuring security has emerged as a formidable challenge, particularly amid the rapid urbanization and proliferation of crime in cities and towns. This paper presents an IoT-based anti-theft flooring mat system utilizing Node MCU technology integrated with motion sensors. IoT facilitates the remote sensing and control of objects, fostering direct integration between physical and digital realms, thereby enhancing efficiency, accuracy, and economic viability. The proposed system aims to safeguard areas during the absence of occupants through continuous monitoring. It tracks any movement within the monitored area, triggering alerts to users via IoT. The system employs secure flooring tiles connected to IoT, transmitting information to users upon activation. Upon an intrusion, the piezo sensor detects footsteps, signaling the Node MCU controller. The controller processes the signal, triggering the camera to capture images of the detected movement. These images are then transmitted over the internet, enabling owners to inspect them.

Keywords: IoT (Internet of Things), Node MCU, Piezo Sensor, Camera, Buzzer, Alarm

I. INTRODUCTION

Internet of Things (IoT) is the networking of physical items with electronics built into its design to enable communication and the detection of interactions between them or with the surrounding environment. IoT based technology will provide higher levels of services in the future years, effectively altering how individuals go about their everyday lives. Just a few categories where IoT is well established include improvements in medical, power, agriculture, smart cities, and smart homes. As of right present, there are more than 9 billion "Things" linked to the Internet. The Internet of Things (IoT) has revolutionized the world with its ability to connect devices and make them work together seamlessly. One such problem is theft and burglary, which is a growing concern for individuals and businesses. The purpose of this system to present an IoT- based anti-theft Floor Mat system that can help prevent theft and burglary. When a burglar enters a locked residence, the sensor quickly records their movement and sends a signal to the controller. IOT system that alerts the owner and SMS. A smart system called an anti-theft Floor mat system is employed to maintain security. The main goal of this project is to create a smart gadget that keeps an eye on a space to secure and guard our house office shop in our absence. Prevention is preferable to treatment. The person will not suffer any losses if the theft is stopped. IoT based anti-theft flooring mat system is an intelligent system which is an application developed from the security point of view. This project is develop a system that monitors the area in which it is implemented. Now a days most of the robbery occurs in jewelry shop, banks, home. Secondly in such areas, CCTV camera is used. But work of normal CCTV camera is continuous surveillance of that area under the human resource. As soon as sensors detect motion, captured images

are send to mobile through IoT. This device is installed in that area where no one is permissible to enter except the authorized persons. If an unauthorized person enters in that field, then the smart device will capture the face of that person and if that person is legal then it ok and if not then buzzer of this will get on and it sends alert message to the owner of that place.

II. LITERATURE SURVEY

Various researchers have proposed innovative solutions to address the challenges posed by theft and burglary in different environments.

M. Suresh et al. have proposed a research methodology at October 2019 aimed at designing a comprehensive framework for promptly notifying homeowners of ongoing thefts. Their system utilizes cameras to detect burglars entering through doors and alerts the homeowner via a smartphone app. Additionally, the technology integrates home security features. However, a key flaw in this paper is that it only alerts the owner via a pop-up warning when a burglar is passing through the door.

Chalamasetty Edward Pradeep Kumar et al. have introduced an innovative security technology to monitor individuals' movements at March 2020. In this project, IoT is combined with computer vision to determine personal traits. In the absence of the owner, sensors identify people entering the home. Upon detecting a burglar, the system notifies the homeowner through various means such as messages, phone calls, or capturing images. However, a fundamental flaw in this article is that it may miss fast-moving items and overlook corner areas.

Siddalingesha et al. have proposed a burglar-detection smart house anti-theft system at Oct 2021. Additionally, the system incorporates real-time video data handling for home security. Even when the owner is away, the user can monitor the house from a distance. It reduces the need for extensive memory storage and guards against cutting-edge smart home prevention techniques. The system successfully identifies non-human invaders and prevents false alerts by immediately reporting intrusions in real-time. However, a significant flaw in this paper is that the sensor only records live video when the burglar passes over it.

Sonali das et al. have proposed a new methodology to discover ongoing thefts and notify the homeowner at May 2019. Their device tracks the entire floor and captures images of the thief.

A. Project Proposal:

Internet of Things (IoT) is the networking of physical items with electronics built into its design to enable communication and the detection of interactions between them or with the surrounding environment. IoT based technology will provide higher levels of services in the future years, effectively altering how individuals go about their everyday lives. Just a few categories where IoT is well established include

improvements in medical, power, agriculture, smart cities, and smart homes. As of right present, there are more than 9 billion "Things" linked to the Internet. The Internet of Things (IoT) has revolutionized the world with its ability to connect devices and make them work together seamlessly. One such problem is theft and burglary, which is a growing concern for individuals and businesses. The purpose of this system to present an IoT-based antitheft Floor Mat system that can help prevent theft and burglary. When a burglar enters a locked residence, the sensor quickly records their movement and sends a signal to the controller. IOT system that alerts the owner and SMS. A smart system called an anti theft Floor mat system is employed to maintain security. The main goal of this project is to create a smart gadget that keeps an eye on a space to secure and guard our house office shop in our absence. Prevention is preferable to treatment. The person will not suffer any losses if the theft is stopped.

- Step 1: Initially the camera will be recording the movements in the area.
- Step 2: Pizo sensor is used to detect the motion of the intruder.
- Step 3: If the motion is detected in Pizo sensor, it will capture the image of the intruder and this image will be send to the user.
- Step 4: Simultaneously the sms message will be send to the user.
- Step 5: A buzzer will be alarmed to alert everyone in the surrounding area and notification will be send to the authorized users with the immediately capture of image.

B. Hardware Requirements

- 1) Node MCU: NodeMCU is a firmware designed for open-source prototyping boards, with readily available designs. The term "NodeMCU" derives from the combination of "node" and "MCU" (microcontroller unit). It's important to note that "Node MCU" primarily refers to the firmware itself rather than specific development kits.



Fig. 1: Node MCU

- 2) Piezo Sensor: A piezoelectric sensor is a type of device designed to measure changes in pressure, acceleration, temperature, strain, or force by harnessing the piezoelectric effect. The prefix "piezo-" originates from the Greek word meaning 'press' or 'squeeze'. These sensors are capable of converting mechanical energy into electrical signals, making them useful for a wide range of applications where precise measurements of physical phenomena are required. It's important to note that

piezoelectric sensors are widely used in industries such as automotive, aerospace, healthcare, and consumer electronics due to their sensitivity and reliability.

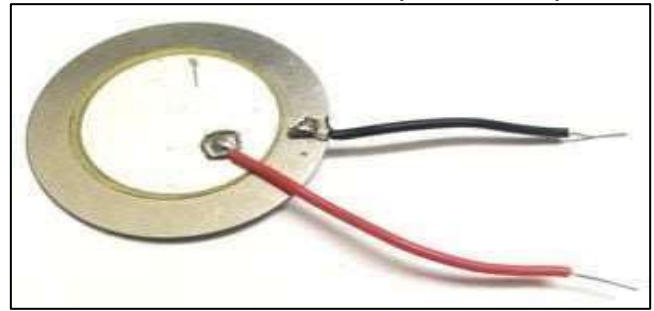


Fig. 2: Piezo Sensor

- 3) ESP 32 CAM: The ESP32-CAM is a versatile development board featuring the ESP32-S module and a camera module. It is designed for projects requiring both wireless connectivity and image capturing capabilities. The ESP32-S module integrates the ESP32 chip, which is a powerful microcontroller with built-in Wi-Fi and Bluetooth connectivity. Additionally, the camera module allows the ESP32-CAM to capture images and video streams, making it suitable for applications such as surveillance, remote monitoring, and machine vision.

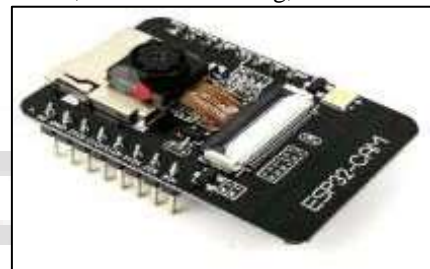


Fig. 3: ESP 32 CAM

C. System Architecture

This system is designed to monitor the floor for any movement, detecting even a single step on the mat and alerting the user via IoT. It consists of secure mat tiles connected to IoT, which are activated when the occupants leave the house. Upon detecting any movement inside the house, the system sends notifications over IoT to the user. Powered by NodeMCU, the system includes two demonstration tiles, a piezo sensor, and a buzzer. When an intruder enters the house and steps on the mat, the piezo sensor detects the movement and sends a signal to the NodeMCU controller. The controller processes the signal, triggering the buzzer to sound an alarm. Simultaneously, a photo is captured, and both the photo and a notification are immediately sent to the user's phone. This integrated approach ensures swift detection and response to any unauthorized entry, enhancing the security of the premises.

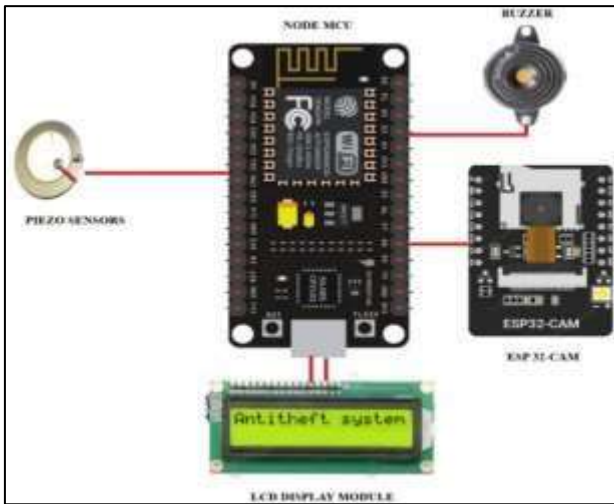


Fig. 4: Architecture

III. CONCLUSION

The primary objective of this project is to enhance security and prevent theft by developing an efficient and user-friendly motion detection surveillance system, serving as an anti-theft device. This system is specifically tailored for small-scale surveillance applications, such as personal office cabins, bank locker rooms, and parking entrances. It aims to detect motion and promptly alert users to potential security. An essential advantage of this project is its simplicity of implementation, coupled with its cost-effectiveness and high performance. The smart IoT-based surveillance system is designed to meet the specific requirements of users or organizations for monitoring particular areas. The effectiveness of the system is evaluated based on the accuracy of the sensors used for motion detection and the accuracy of face detection or recognition. Furthermore, the proposed model can be enhanced with additional features, such as electronic device control and home automation integration, by incorporating supplementary sensors and actuators. These enhancements contribute to the system's versatility and expand its capabilities beyond basic surveillance, providing users with a comprehensive security solution tailored to their needs.

Future scope: The project is usefull for security purpose. Future Scope The aim of this project is to identify theft by his photo. Buzzer is also used for the alarm to nearest peoples. When theft will arrive the photo and notification will be send immediately to the user.

REFERENCES

- [1] Dr. M.Suresh, A.Amulya, M.Hari Chandana, P.Amani, T.Lakshmi Prasanna. "Anti-Theft Flooring System Using Raspberry PI Using IOT System". Compliance Engineering Journal 2021 [1].
- [2] Chalamalasetty Edward Pradeep Kumar, Goutham Prashanth V G, Manoharan E, Kesavamurthy K. "IOT [2].
- [3] Sonali Das, Dr. Neelanarayan V. "IOT based Anti-Theft Flooring System". International Journal of Engineering Science and Computing (IJESC) 2020[3].