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# Smart Integrated Surveillance and Security System for Intruder Alert/Trapping Using Node MCU

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**ABSTRACT**: In today's world, every field like industrial, medical, corporate, and other smart environments prefer low-power security and surveillance system. Conventional surveillance system faces the problem of unnecessary power and memory wastage. To overcome this problem, a system in which a surveillance and security system that uses a small IR sensor set up with a wi-fi camera and node MCU. IR sensor detects the presence of the human and notifications are sent using the Blynk app. This setup can be installed at the primary door of our home or office and you can monitor itfrom everywhere.

**KEYWORDS**: Security, Surveillance, Node MCU, Wi-fi camera, IR sensor

## I. INTRODUCTION

As we can see that a predominant integral of the Internet of Things (IoT) nowadays, security provides users effectively and efficiently by both communicating and interfacing with a copious number of digital devices based on IoT.
Security and safety are the major issues being faced in almost every field like industrial applications, offices, and in general, smart environments.
Developing Home security has been a worry for all individuals residing in every community around the world. Home security frameworks are for computerizing, further developing security, wellbeing, correspondence, solace, and energy saving. A smart home framework is worked with various kinds of sensors to give hints and exact checking. These days, home security has turned into a significant issue because of the high pace of wrongdoings. First and foremost, the security framework was very fundamental and offered easier offices. Be that as it may, in the current days' a severaldifferent offices are incorporated into the framework to make the city homes more agreeable and secure.

 To detect whether there is an intruder or not conventional (or) traditional surveillance systems cannot do it. It only records the footage or streams it regularly. The conventional (or) traditional surveillance systems use a lot of power and memory. The traditional solution for any security system is a Closed-Circuit Television (CCTV). CCTV is generally a device for monitoring the situation around a working area, house, and building. CCTV is additionally helpful form on it ,the situation around a house. (Both when the residents are at home and when they are not at home). Placing aside the benefits, there are also problems related to the use of CCTV. Firstly, CCTV does not produce any notification and warning when it captures anything suspicious. Secondly, CCTV streams continuously to capture events even when there is nothing suspicious. So, streaming requires large storage media due to the continuous video streaming and storing.
        A door is the first security and safeguarding aspect to maintain and sustain the physical security and safety of the house. A thief or an intruder can easily break into a house if
 the door is breakable. Initially, a door included a physical key for both locking and unlocking the door, but after, with the evolution and growth of the technology, a modern door has invented to increase the security of a house without the use of a physical key. However, these doors can be breakable if the house is empty. IoT describes a network integrated with sensors and software to communicate or exchange information through the internet. With the usage of IoT, there could be a great addition to the security of a door by using various devices such as magnetic sensors – to detect if the door is opened or closed.

## II. LITERATURE SURVEY

Rupali R. Ragade proposed a study entitled "Embedded Home Surveillance system with PIR sensor using GSM" (2017). The proposed system runs on sensor technology. The sensor triggers an alarm system when they detect a human presence. It cannot identify if the person is an intruder or not. There is no proper security system. [1]

Tanwaretal. carried out a study entitled "An Advanced Internet of Thing primarily based Security Alert System for Smart Home" (2017). It describes less expensive domestic protection structures and the usage of Infrared (PIR) and Raspberry Pi modules to reduce delays all through electronic mail alerts. Therefore, there are PIR sensors as movement detectors and Raspberry Pi as its processing module. [2]

Chuimurkar and Bagdi proposed a study entitled "Smart Surveillance Security and Monitoring System Using Raspberry PI and PIR Sensor" (2016). It focused on the planning and implementation of monitoring systems using RaspberryPI and PIR Sensors for a mobile device. The system has the flexibility to detect smoke and human movement, providing precautions against potential crime and potential fire. [3]

Gupta RK, Balamurugan S, Aroul K, and Marimuthu R. proposed a study entitled "IoT Based Door Entry System using Raspberry PI" (2016). Its design consisted of the speaker, camera, solenoid actuator, and switch. This system is used to detect any unauthorized entry. [4]

Bangali and Shaligram proposed a study entitled "Design and Implementation of Security Systems for Smart Home based totally on GSM technology" (2013). It proposed strategies for domestic protection structures that are allotted into one application. The primary device used is an online digital cam used for taking pictures movements and objects, generating caution sounds, and sending feedback to the user. The 2nd approach shows us the utilization of the GSM-GPS Module(sim548c) and Atmega644p microcontroller ,sensor, relay, and buzzer. [5]

Nurul Husna, A. Khalil proposed a study entitled "Wireless Home Security System" (2013). The proposed system consists of one main circuit and one remote control and the Zigbee technology was used in the communication of both circuits to the remote control or vice versa. The main drawback of this system is the Zigbee technology itself. Zigbee technology is not secure, has a high replacement cost, the transmission rate is less, less coverage limit, highly risky for official private information. [6]

Huiping Huang, Shide Xiao, Xiangyin Meng, and Ying Xiong proposed a study entitled "Remote Home security system based on WSN and GSM technology" (2010).The proposed is a low-power consumption remote home security alarm system. It can detect theft, leaking of raw gas, and fire, and send alarm messages remotely. The main drawback of this system is that it cannot identify the person as an intruder or an insider. [7]

## III. PROPOSED SYSTEM

In this proposed system, the design is detecting human presence with help of an IR sensor. If there is a presence of a human, the system starts working which saves both power and memory. This is a portable model which can be installed in any location. The main aim of the project is to detect human and object presence using an IR sensor to alert the user via Blynk alerts.

A system is proposed that supports both security and surveillance within the single circuit. The circuit operates in two modes namely surveillance mode and security mode. The surveillance mode will be active in pre-defined time, the security mode will be active in post-defined time and the defined time will be given by the authorized person or the user. In surveillance mode, the IR sensor senses the presence of human activities and sends the signal to a wi-fi camera which can be used for both live-streaming or recording the activities. This helps us to save power and memory. In the security mode, if there is a presence of an intruder, the IR sensor senses the presence and sends an alert notification to the registered Blynk user.

The user can switch to the streaming section and can view who is present. If, the authorized person confirms the presence of the intruder he/she can activate the security system (automatic door locking and alarm) with the help of the Blynk app. This project works on the Node MCU. Node MCU stands for Node Microcontroller Unit. It is an open-source Lua-based firmware that is designed for IoT (Internet of Things) applications. The Node MCU module runsESP-12E firmware and it is based on 32-bit ESP8266 MCU which supports the wifi module. It has 2.4 GHz Wi-Fi that supports WPA/WP2. You do not need any external programmer to program this board, and you can easily run this board directly on 5V from USB. An infrared (IR) sensor measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of the light (separated by a prism), he noticed that the temperature just beyond the red light was the highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum).

## IV. BLOCK DIAGRAM

The Block Diagram of this System consists of:
- Power supply
- Node MCU
- IR Sensor1
- IR Sensor2
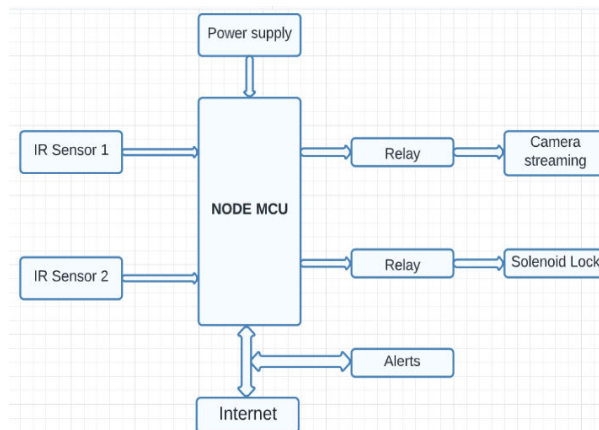- Wi-fi Camera
- Solenoid Lock
- Relay



Figure 1: Block diagram of Smart Integrated Surveillance and Security System for Intruder Alert/Trapping using Node MCU

## V. FLOWCHART

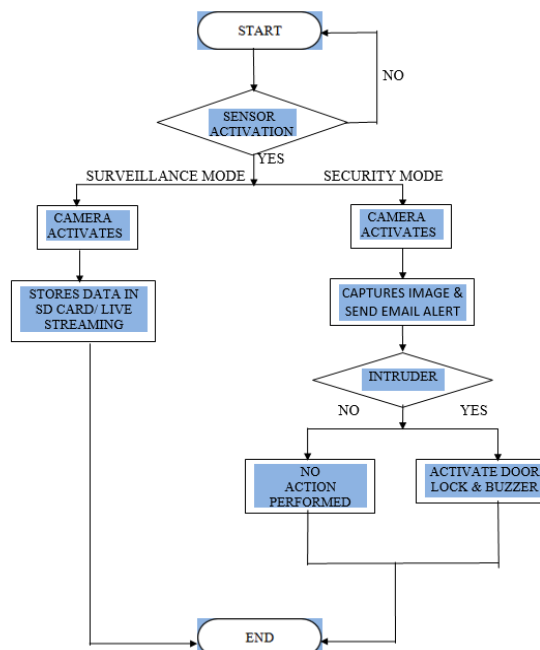This flowchart shows a short idea of how this project works



Figure 2: Flowchart of Smart Integrated Surveillance and Security System for Intruder Alert/Trapping using Node MCU

Firstly, upon the start of the system, The IR sensor is initialized. The IR sensor checks for the presence of a human. In surveillance mode (pre-defined time), if the IR sensor senses the human presence, it activates the camera and starts recording. In the security mode (post-defined time), if the IR sensor senses the human presence that person is

considered an intruder. The microcontroller (in this case it is Node MCU) activates the camera for live-streaming or recording of the intruder and sends the alert notification through Blynk to the authorized person. The authorized person confirms whether the person present is an intruder or an insider. If the person is an intruder, the authorized person activates the door locking system with the help of the Blynk app. If the person is an insider no action is taken by the authorized person.
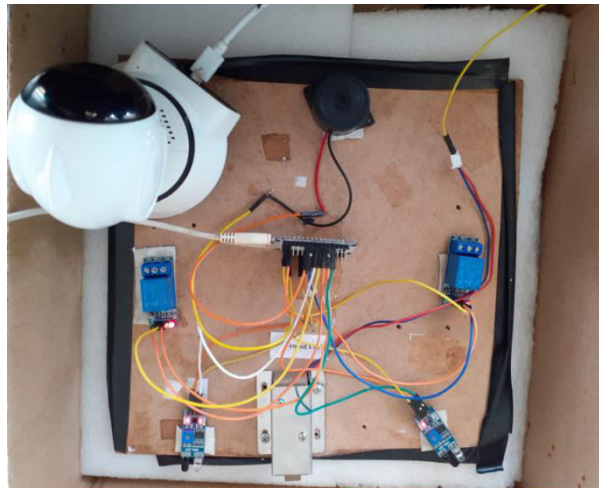
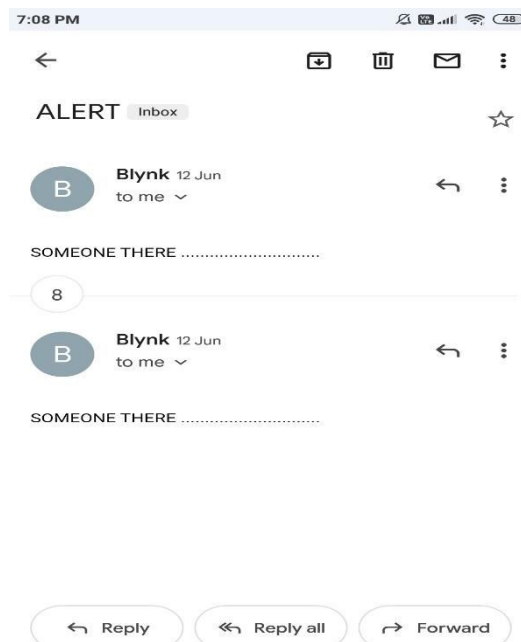## VI. RESULTS



Figure 3: Prototype of the design



Figure 4: Alert notification through the Blynk app

## VII. CONCLUSION AND FUTURE SCOPE

A system is developed with a node MCU module loaded with the code to detect any intrusion and installed in the house. It can be used for various applications like small scale-industries, Hospitals, etc. This system will be connected to a Wi-Fi network. The building complex has an extended entrance panel at the main entrance.Node MCU, whose function is to forward the communication to all other elements in the assembly. We can extend the project by

interfacing this device with Raspberry Pi, and we can use AI face recognition for detecting authorized and unauthorized access.

## REFERENCES

[1] S.Sujatha, M.Mohamed Irfan, B.Rhaagul "Gsm based home security system using PLC" International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Volume 5, Special Issue 1, March 2016.

[2] Hasan R, Khan MM, Ashek A, Rumpa IJ. Microcontroller based home security system with gsm technology. Open Journal of Safety Science and Technology. 2015;5(02): 55.

[3] Shawki F, Dessouki ME, Elbasiouny AI, Almazroui AN, Albeladi FM. Microcontroller based smart 70 design and development of a versatile and intelligent home security system home with security using GSM technology. IJRET: International Journal of Research in Engineering and Technology. 2015 Jun;4(06).

[4] Eseosa O, Promise E. GSM based intelligent home security system for intrusion detection. International Journal of Engineering and Technology. 2014 Oct;4(10):595-605.

[5] Budijono S, Andrianto J, Noor MA. Design and implementation of modular home security system with short messaging system. InEPJ Web of Conferences 2014 (Vol. 68, p. 00025). EDP Sciences.

[6] Bangali J, Shaligram A. Design and implementation of security systems for smart home based on gsm technology. International Journal of Smart Home. 2013;7(6):201-8.

[7] S. Sivagamasundari, S. Janani, "Home surveillance system based on MCU and GSM", International journal of communications and engineering, 2012, volume 06– no.6.

[8] Ying-Wen Bai, Zi-LI Xie and Zong-Han Li, "Design and implementation of an embedded home surveillance system with ultra-low alert power", International conference on consumer electronics,2011, pp 299-300.

[9] Azid SI, Kumar S. Analysis and performance of a low cost sms based home security system. International Journal of Smart Home. 2011 Jul;5(3):15-24.

[10] Das CK, Sanaullah M, Sarower HM, Hassan MM. Development of a cell phone based remote control system: an effective switching system for controlling home and office appliances. International Journal of Electrical & Computer Sciences IJECS. 2009 Dec;9(10):37-43.

[11] Cheng-Hung Tsai, Ying-Wen Bai, Wang Hao-Yuan and Ming-Bo Lin, "Design and implementation of a socket with low standby power", IEEE Transactions on Consumer Electronics, Vol. 55, No. 3, pp. 1558- 1565, August 2009.

[12] Wong EM. A phone-based remote controller for home and office automation. IEEE Transactions on Consumer Electronics. 1994 Feb;40(1):28-34.

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