



# MOTION DETECTION SYSTEM FOR SECURITY USING IOT

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*Abstract : Because of the frequency and pervasiveness of burglaries, an effective and dependable intrusion detection system with an alarm system has become an absolute must. Attacks against homes, workplaces, businesses, and banks are becoming more common. Motion may now be detected as a consequence of technological advancements by detecting a change in the speed or vector of an item in the field of view. To accomplish this, mechanical devices that interact with the field, as well as electrical components that measure and monitor changes in the provided environment, can be employed. The motion detector is used in a wide range of applications, such as home automation systems and energy efficiency systems. This project consists of an embedded microcontroller system capable of detecting mobility in a confined region and activating an alert system and motion detection system. A passive infrared sensor, but at the other hand, detected the person's motion by detecting body heat. In this project, the motion detector is a passive infrared (PIR) sensor connected to a microcontroller that triggers the alarm system and any other linked output device to warn the house owner. Early testing of the design confirmed that it performed as planned.*

## I. INTRODUCTION

It must consider the conduct of persons who are attempting to trespass or cause damage. Security refers to the degree of protection from risk, loss, and crime. Humans have fought to defend their lives, property, and professions throughout history. People's busy lifestyles need remote control of their home equipment, which increases the need for home monitoring. Now that we have everything, we can develop something that would offer us with perfect security. At the beginning, this was a fairly basic alarm system that featured low-cost warnings for questionable behaviors. An embedded microcontroller system capable of detecting intruder movement in a defined region and initiating an alert and motion detection system. Some common features of motion detection alarm and security systems include 24 hour monitoring, the ability to regulate doors, and the usage of a motion sensor. In this work, a pyro electric device was used to detect motion by measuring variations in infrared levels radiated by surrounding objects. The main goal of this project work is to build a system that detects human movement, buzzes an alert, and sends a message to the owner. This is a very well-organized and advanced intruder motion detector alarm and security system that can detect the presence of human bodies and alert the owners instantly. This system provides a low-cost safety system that can be deployed virtually any place in the home.

## II. OBJECTIVE

The objective of this project is to design a security system that includes a motion detector. The system's sensor allows it to monitor circumstances in the near vicinity. When motion is detected, the sensor activates and notifies the owners of a potential threat.

## III. RELATED WORK

[1] USING SENSOR NETWORK IN MOTION DETECTION BASED ON DEEP FULL CONVOLUTIONAL NETWORK MODEL by Qichang Xu

This study discusses the shortcomings of conventional moving target detection methods in complex backgrounds, such as low detection precision and high complexity, and proposes a sensor network-based moving-target detection method that does not take into account the overall structure information of the video frame image.. To start, a low-power motion detection wireless sensor network node is constructed to collect real-time motion detection data. Second, utilizing the time domain averaging approach, the video scene's backdrop is swiftly recovered, and the video sequence and background picture are channel-merged to construct a

deep complete convolutional network model. Finally, the network model is utilized to learn the deep features of the video image and output the pixel-level classification results in order to differentiate moving objects. This technology not only adjusts to complicated video settings of varying sizes, but it also offers a simple background exclusion strategy that significantly increases detection efficiency.

[2] MOTION DETECTION AND ANALYSIS WITH FOUR DIFFERENT DETECTORS by Ching Yee Yong, Rubita Sudirman and Kim Mey Chew

Motion, according to the authors, is defined as a change in the speed or vector measurement of an item or objects in the field of view. Motion detection can be achieved by utilizing electrical or mechanical devices that interact with or evaluate changes in the environment. This project creates a surveillance system by combining motion detection technology with modified well known algorithms written in C sharp and Matlab. This study's findings are intended to be instructive and useful in assisting users with motion detection and analysis. Four distinct motion detectors' performance is being compared. The Morph filter provides a more accurate and smooth detection in three trials at three different rates of motion. Finally, an effective motion evaluation and remote monitoring has been built to increase motion detecting capabilities.

[3] PIR SENSOR BASED SECURITY SYSTEM by Sanikommu Umamaheswari

This study describes a passive infrared sensor-based security system (PIRs). We can save power, have good management at a low cost, and only need a little amount of memory space by using this sensor. When an intruder or person passes through the system or location where the PIR sensor is mounted, it detects a change in infrared radiation levels. Changes in voltage are generated by variations in radiation levels, and as a result, the signal is amplified, resulting in the generation of sound. As a result, it has the potential to be employed in a wide range of applications and industries. This type of technology offers various advantages over the present system.

[4] EFFICIENT HUMAN MOTION DETECTION WITH ADAPTIVE BACKGROUND FOR VISION-BASED SECURITY SYSTEM by Fadhlan Hafizhelmi Kamaru Zaman, Md. Hazrat Ali, Amir Akramin Shafie, Zairi Ismael Rizman.

The authors of this paper stress the significance of motion detection in surveillance systems, particularly for video compression, person detection, and behaviour analysis. Various approaches have been used to detect motion in a continuous video stream, but for a real-time video surveillance system, we require motion detection that is accurate even in non-static backdrops and independent of the environment, object speed and size, and is resistant to camera noisy pixels or sudden changes in light intensity. This is required to ensure the safety of a monitored variable or location. We provide an approach for identifying human movement in real-time video streams that makes use of adaptive backdrop removal and camera noise reduction in this study.

#### IV. PROPOSED SYSTEM

##### PIR SENSOR



Figure 1: PIR Sensor

PIR sensors operate in a unique and complex manner when compared to other sensors. The complexity arises from the multiple elements that impact the sensor's input and output. PIR sensors detect changes in the amount of infrared light that strikes them. The intensity of the infrared radiation varies based on the surface features and temperature of the item in front of the sensor. When an object, such as a human, passes in front of the PIR sensor, the surrounding region's temperature changes from ambient to body temperature. When the item has moved forward, the temperature will return. The quantity of radiation released by the room, its walls, or its surroundings. When a warm body, such as a human or an animal, passes by the PIR sensor, it produces a differential positive pulse. The sensor creates a negative differential change as the hot body travels away from the detecting zone. When a body with a nonzero temperature, passes in front of the PIR sensor, the first half of the sensor detects it. This detection results in a positive differential change between the sensor's two halves. When the heated body departs the detecting region, the preceding procedure is reversed.

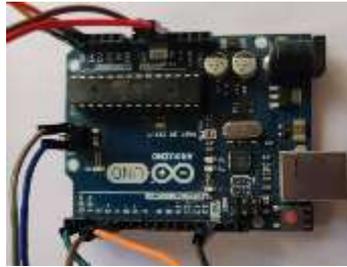


Figure 2: Arduino UNO

The Arduino Uno is an ATmega328P-based microcontroller board. It contains 14 digital I/O pins, six analogue inputs, a 16 MHz quartz crystal, a USB port, a power connector, an ICSP header, and a reset button. It comes with everything you need to get started with the microcontroller; simply plug it into a computer via USB or power it with an AC-to-DC converter or battery.

#### LCD



Figure 3: LCD

LCD (Liquid Crystal Display) screens are display modules that may be used for a variety of purposes. A 16x2 LCD display is a fundamental module found in a broad variety of devices and circuits. These modules outperform both seven-segment and other multi-segment LEDs. The following are the reasons behind this: LCDs are affordable, easily programmed, and have no constraints for displaying unique and even customized characters, animations, and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD includes two registers: Command and Data. The command register stores the LCD's command instructions. A command is an order delivered to an LCD that instructs it to perform a certain task, such as initialising it, cleaning its screen, repositioning the pointer, managing the display, and so on. The data register saves the information that will be shown on the LCD. The data is the ASCII value of the character to be shown on the LCD.

#### GSM MODULE



Figure 4: GSM

The GSM/GPRS Modem-RS232 is outfitted with a Dual Band GSM/GPRS engine- SIM900A, which runs at 900/ 1800 MHz frequencies. The modem features an RS232 interface via which you may connect a PC as well as a microcontroller with an RS232 chip (MAX232). The AT command can be used to set the baud rate between 9600 and 115200. The GSM/GPRS Modem has an integrated TCP/IP stack that allows you to connect to the internet through GPRS. It's perfect for SMS, phone, and data transmission in M2M interfaces. You may connect a broad range unregulated power supply to the onboard Regulated Power Source. By utilizing simple AT instructions, you may utilize this modem to make audio calls, send SMS, read SMS, answer incoming calls, and connect to the internet.

## V. WORKING

This project is designed with an Arduino microcontroller and an Embedded C compiler. This compiler includes an efficient C compiler as well as extra functionality for a number of microcontroller functions. The microcontroller unit is initialized when the programme begins. The microprocessor circles the detector on a regular basis, spiking the inputs for a brake in. When a movement or braking in the switch is recognized, an action is taken to trigger or activate the alarm system, and the owner receives a message on his phone through the GSM module, which is also shown on the desktop programme.

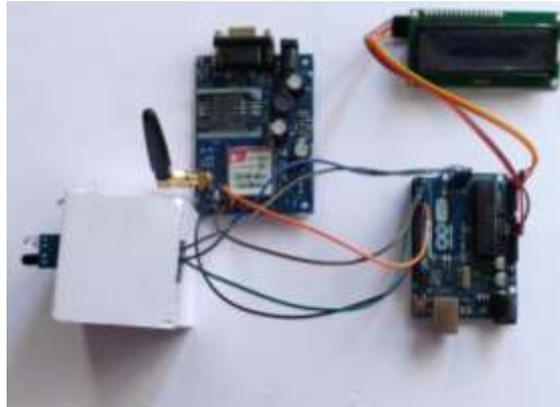


Figure 5: Motion Detection System

## VI. RESULTS

In its initial state, when there is no motion around the area, the LCD shows no motion detect.



Figure 6: No motion is detected

When there is movement around the device, the sensor detects the motion and the LCD shows a message motion detected.



Figure 7: Motion is detected

The GSM module connected allows the system to alert the owner when the motion is detected via SMS.

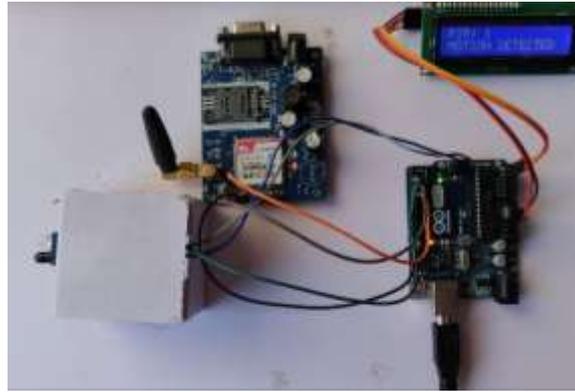


Figure 8: Motion Detection System

## VII. CONCLUSION

A home security system's feature will garner a lot of attention in the future. People are getting increasingly worried about defending their houses from burglars. When a possible breach occurs, a calling mechanism is used to warn consumers by mobile phone. Because almost everyone has a smartphone these days, customers will not need to carry an additional device to keep an eye on their house if they utilize this system. This system is developed with modularity in mind to be a flexible system that can add more sensors without having to replace the entire system; instead, only a few sensors can be added to extend the system's capabilities. In a nutshell, this system is a modular home security system that communicates with the user via a call function. The project model may be used in a number of situations, including banks and businesses. It is now feasible to handle theft strategies that differ depending on the location and kind of goods. Modern technology has entered all regions, making it simple to minimize theft potential in a number of ways without spending a lot of money. A microcontroller was used to build a home security and reliability system.

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