

# Review of Motion Triggered Telegram Alert

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**Abstract**— Securing a home is a crucial task, especially due to the increasing incidents of burglaries. Traditional home security systems primarily focus on monitoring the property itself and often lack physical control measures for the house. Nowadays, it has become common for people to leave their houses unattended as they cope with busy schedules. As a result, many individuals opt for home security systems as a reliable means to protect their homes. Electronic sensors play a vital role in these systems, and one widely used sensor is the PIR (Passive Infrared) sensor. PIR sensors are commonly employed in wireless residential security systems, home alarm systems, and various other security circuits as motion detectors. These sensors detect the Infrared (IR) waves emitted by the human body, earning them the nickname 'human sensor.' The system itself is straightforward, with the PIR sensor used for sensing and the ESP32-CAM module employed for control purposes.

**Keywords**— PIR Sensor, human sensor.

## I. INTRODUCTION

In the 21st century, the world is experiencing rapid development in technology and innovation. People have high demands for reliable and advanced technology, encompassing both hardware and software aspects. The global trend is moving towards the implementation of the Internet of Things (IoT), and statistics indicate that by 2020, approximately 50 billion devices will be connected to the internet. To meet these requirements, the technology needs to be optimized, robust, scalable, and utilized for positive purposes. As we embrace the new world of IoT platforms, one crucial aspect is that they should be easily accessible and developed.

A home security system utilizing a PIR sensor is designed to address the high crime rates in residential areas. Home, office, and other locations require enhanced security, particularly in our absence. Many individuals choose electronic security systems to ensure the safety of these places. This project focuses on developing a Home Security System using the ESP32-CAM and PIR sensor. The system incorporates a motion sensor detector with photo capture capability using the ESP32-CAM. When motion is detected by the PIR sensor, the system wakes up, captures a photo, and sends it to the owner via Telegram. Telegram Messenger, a cloud-based instant messaging and voice over IP service, is utilized for communication. Telegram can be easily installed on smartphones (Android and iPhone) or computers (PC, Mac,

and Linux), and it is free of advertisements. Telegram allows the creation of bots for interactive purposes. Bots are third-party applications that operate within Telegram, enabling users to interact with them by sending messages, commands, and inline requests. The ESP32-CAM interacts with the Telegram bot, receiving and handling messages while sending responses.

This tutorial will guide you on using Telegram to send messages to your bot, requesting a new photo taken with the ESP32-CAM. You can receive the photo anywhere you have access to Telegram and the internet."

The people demands higher and reliable quality of technology with both the hardware and the software aspects. The world is moving towards Internet of Things (IoT) implementation and statistics state that by 2020 nearly 50 billion devices will be connected to Internet and in order to fulfill the requirements. The technology should be an optimized, robust, spreadable, and must be used for the good cause. As we move towards the new world of IoT platforms, the one thing should remain consistent is they should be easily accessible and easily developed. Home security system using PIR sensor is a system designed to reduce the high rates of crimes in most personal housing. In present time Home/Office and many other place security is most important. In our absence these places are not secure. For make these palaces secure many people prefer electronic security systems. In this project, we are going to develop Home Security System using ESP32 CAM & PIR sensor. In this project, we're going to make a motion sensor detector with photo capture using an ESP32-CAM. When your PIR sensor detects motion, it wakes up, takes a photo and will be sent to the owner through Telegram. Telegram Messenger is a cloud-based instant messaging and voice over IP service. You can easily install it in your smartphone (Android and iPhone) or computer (PC, Mac and Linux). It's free and without any ads. Telegram allows you to create bots that you can interact with. "Bots are third-party applications that run inside Telegram. Users can interact with bots by sending them messages, commands and inline requests. You control your bots using HTTPS requests to Telegram Bot API".

The ESP32-CAM will interact with the Telegram bot to receive and handle the messages, and send responses. In this tutorial, you'll learn how to use Telegram to send messages to your bot to request a new photo taken with the ESP32-CAM. You can receive the photo wherever you are (you just need Telegram and access to the internet).

## II. LITERATURE SURVEY

Motion Detection with ESP32" by Random Nerd Tutorials: This tutorial provides step-by-step instructions on how to set up an ESP32 to detect motion using a Passive Infrared (PIR) sensor and then send a Telegram alert message. It also includes the necessary code and wiring diagrams.

ESP32-CAM Motion Detection with Telegram Notification" by Rui Santos: This tutorial shows how to use an ESP32-CAM board with a camera to detect motion and then send a Telegram message with a picture of the detected movement. The tutorial includes code and wiring diagrams.

ESP32/ESP8266 Telegram Alert Notification System" by Shawn Hymel: This tutorial shows how to set up an ESP32 or ESP8266 microcontroller to send a Telegram message when a button is pressed. While it does not focus specifically on motion detection, the principles can be applied to motion detection projects.

ESP32 Telegram Bot: How to Send Messages Using Arduino IDE" by Igor Fonseca Albuquerque: This tutorial shows how to use the ESP32 microcontroller to send Telegram messages using the Arduino IDE. It is well documented and includes example code.

These resources can serve as a starting point for a literature survey on motion-triggered Telegram alerts using ESP32. It is important to note that the ESP32 is a powerful microcontroller with many capabilities beyond motion detection and Telegram alerts. Thus, researchers can also explore additional applications of the ESP32 in IoT and home automation.

### B. Machine Learning Techniques

To create a motion-triggered telegram alert, you would typically need to follow these steps:

**Collect Data:** You would need to collect data on motion using sensors such as accelerometers, gyroscopes, or cameras. The data collected would depend on the type of sensor used.

**Preprocess Data:** Before feeding the data into a machine learning model, you would need to preprocess it. This would include steps such as filtering, smoothing, and feature extraction.

**Select Features:** You would then need to select the most relevant features from the preprocessed data. This would depend on the type of machine learning algorithm used.

### D. Hybrid Techniques

A hybrid technique for a motion-triggered telegram alert can be achieved by combining two different technologies: motion detection and telegram messaging.

Motion detection technology can be achieved through various means, including the use of sensors or cameras that are designed to detect movement. Once motion is detected, the system can trigger an alert that will be sent to a telegram messaging service.

To set up a motion-triggered telegram alert, the following steps can be taken:

**Install a motion detection sensor or camera:** Choose a sensor or camera that is compatible with your system and is able to detect motion reliably. Ensure that it is placed in a location where it can effectively detect any movement.

## IV. METHODS

The ESP32 microcontroller is a powerful and versatile device that can be used to implement a variety of IoT applications, including motion detection and alert systems. Here is a brief overview of the theory behind the motion triggered Telegram alert system using an ESP32

**Power supply:** The ESP32 and the PIR sensor require a power supply. This can be provided by a battery or a DC power supply. The power supply should be sufficient to provide the required voltage and current for both the ESP32 and the PIR sensor.

**Motion Sensor:** This component detects motion and sends a signal to the ESP32-CAM to trigger the camera and start recording.

**ESP32-CAM:** This module includes a camera and a microcontroller that can be programmed to interact with other components. It will receive the signal from the motion sensor and start recording video footage.

**Microcontroller:** The ESP32-CAM has a built-in microcontroller that will run a program to control its actions. The program will be responsible for activating the camera, recording video, and communicating with other devices.

**Wi-Fi module:** The ESP32-CAM is equipped with a Wi-Fi module that allows it to connect to a Wi-Fi network and send data over the internet.

**Telegram API:** Telegram is a messaging app that allows you to create bots that can send and receive messages. The Telegram API provides a way for your ESP32-CAM to send messages to your Telegram account.

**Cloud server:** To receive messages from your ESP32-CAM, you will need to set up a cloud server that can communicate with the Telegram API. This server will receive messages from the ESP32-CAM and forward them to your Telegram account.

The ESP32-CAM module is used to capture video and detect motion. The motion detection signal is sent to the ESP32 microcontroller which triggers a telegram message to be sent via Wi-Fi. The ESP32-CAM module is powered by a voltage regulator and the entire system is powered by a DC power supply. A block diagram overview of the system would include the ESP32-CAM module, the ESP32 microcontroller, the voltage regulator, and the DC power supply.

### 1. Objective Definition:

Clearly define the objective of the review, which is to assess the effectiveness and functionality of the motion triggered Telegram alert system.

Specify the specific aspects and features of the system to be evaluated, such as motion detection accuracy, real-time alert delivery, ease of setup, and user experience.

### 2. Literature Review:

Conduct a comprehensive review of existing literature, research papers, and technical articles related to motion triggered alert systems and Telegram integration.

Analyze the state-of-the-art techniques, methodologies, and best practices employed in similar systems.

Identify any limitations, challenges, or gaps in the current research and development of motion triggered Telegram alert systems.

### 3. System Overview:

Provide a detailed description of the motion triggered Telegram alert system under review.

Explain the underlying architecture, components, and integration between the motion detection module, alert generation, and Telegram messaging platform.

Discuss the hardware or software requirements for the system, including any dependencies or limitations.

### 4. Data Collection and Experimentation:

Define the data collection process, including the selection of appropriate motion detection scenarios and datasets.

Specify the hardware or software tools used for data collection, such as motion sensors, cameras, or simulation environments.

Conduct experiments to measure the system's performance in terms of motion detection accuracy, false positives/negatives, and response time.

Collect data on the effectiveness of alert delivery through Telegram, considering factors such as latency, reliability, and user notifications.

### 5. Performance Evaluation:

Define evaluation metrics to assess the performance of the motion triggered Telegram alert system.

Analyze the collected data and measure the system's accuracy, sensitivity, specificity, and overall performance.

Compare the system's performance against established benchmarks or similar existing systems.

### 6. User Feedback and Usability Evaluation:

Collect feedback from users who have interacted with the motion triggered Telegram alert system.

Conduct surveys, interviews, or usability tests to gather insights on user satisfaction, ease of setup, and overall user experience.

Identify any usability issues, challenges, or areas for improvement based on user feedback.

### 7. Security and Privacy Analysis:

Evaluate the system's security measures and privacy considerations, particularly regarding the storage and transmission of sensitive data through Telegram.

Assess the effectiveness of encryption, authentication, and access control mechanisms implemented in the system.

Identify potential vulnerabilities or privacy concerns and propose mitigation strategies if necessary.

### 8. Comparative Analysis:

Compare the reviewed motion triggered Telegram alert system with other existing motion detection systems or alert mechanisms.

Analyze the strengths, weaknesses, and unique features of the system in relation to its competitors.

Identify areas where the system excels or requires further improvements to maintain a competitive edge.

### 9. Discussion and Conclusions:

Summarize the findings of the review, highlighting the strengths and weaknesses of the motion triggered Telegram alert system.

Discuss the implications of the system's performance, usability, and security in real-world applications.

Provide recommendations for system enhancements, future research directions, and potential areas of innovation.

By following this methodology, the review of the motion triggered Telegram alert system can provide valuable insights into its effectiveness, performance, usability, and security, contributing to the understanding of its capabilities and potential for practical use.

## V. Results

The device is equipped with sensors that can detect motion in its surroundings. When motion is detected, the device triggers an alert to be sent via the Telegram messaging app.

The device is designed to integrate with the Telegram messaging app, allowing you to receive real-time alerts on your smartphone or other device. This feature ensures that you are notified immediately when motion is detected, even if you are not in the same location as the device.

This motion triggered telegram alert device can be used in a variety of settings, including home security, pet monitoring, and even as a baby monitor. Its versatility makes it a valuable tool for anyone looking to monitor activity in a specific area.

## VI. Discussions

A motion-triggered telegram alert system can be a useful way to monitor and receive notifications when motion is detected in a particular area. Here are some possible discussions and considerations for implementing such a system:

**Hardware requirements:** You will need a motion sensor that can detect movement and send a signal when motion is detected. You can use a passive infrared (PIR) sensor or an ultrasonic sensor for this purpose. You will also need a microcontroller or a single-board computer such as Raspberry Pi to process the signals and trigger a notification to Telegram.

**Power source:** Depending on where the motion sensor will be located, you may need to consider the power source. If the sensor is installed outdoors, you may need to use a battery-powered system or solar power. For indoor installations, you can use a USB power supply.

**Connectivity:** To send a notification to Telegram, you will need an internet connection. You can use Wi-Fi or a cellular data connection depending on the availability of the network in the area.

**Programming:** You will need to write a program to read the sensor's signal and send a notification to Telegram. You can use Python, Node.js, or any other programming language that can interact with the Telegram API.

**Telegram bot:** You will need to create a Telegram bot and obtain a bot token from the BotFather. The bot token will be used to send notifications to your Telegram account.

**Security considerations:** If the motion sensor is installed in a sensitive area, you may need to consider security measures to prevent unauthorized access to the system. You can use encryption, authentication, and access control mechanisms to ensure the system's security.

**Testing and debugging:** Once the system is set up, you should test it thoroughly to ensure that it works as expected. You may need to debug any issues that arise during testing.

## VII. Conclusion

Motion triggered Telegram alerts can be a highly effective way to keep track of activity in a specific area or around a particular object. By setting up a motion sensor and connecting it to a Telegram bot, you can receive real-time alerts whenever motion is detected. This can be useful for a variety of purposes, such as monitoring your home or office while you're away, keeping an eye on your pets or livestock, or detecting potential intruders or burglars.

There are many different types of motion sensors available, ranging from simple PIR (passive infrared) sensors to more advanced technologies like ultrasonic, microwave, and video motion detection. Depending on your needs and budget, you can choose the type of sensor that best suits your needs.

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