



INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT

Volume 11, Issue 3, March 2024



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.580



+91 99405 72462



+9163819 07438



ijmrsetm@gmail.com



www.ijmrsetm.com

Home Security System with Telegram integration (IoT)

**Atharva Vishnu Maske, Peeyush Pravin Bagewadi, Sarang Pandurang Dalavi, Laxminarayan Raju
Amanchi, Aditya Basavraj Mhetre, Mr.Milind Madhukar Kulkarni**

Diploma Student, Dept. of Computer Engineering, A.G. Patil Polytechnic Institute, Solapur, India

Guide, Dept. of Computer Engineering, A.G. Patil Polytechnic Institute, Solapur, India

ABSTARCT: The integration of Internet of Things (IoT) technology with home security systems has become increasingly prevalent in recent years. In this project, we present a home security system incorporating Telegram integration, featuring a face recognition component alongside motion and fire detection functionalities. Upon detecting motion through the motion sensor, the system activates the camera to capture images. These images are then processed through a face recognition algorithm to determine if the detected individual is a registered person. If the individual is registered, no action is taken. However, if the individual is unrecognized, the system sends a photo notification to a designated Telegram bot. Additionally, the system includes a fire detection feature, which triggers an alarm upon detecting fire hazards. Simultaneously, it sends an alert message to the Telegram bot, notifying users of the potential danger. This project aims to enhance home security by leveraging IoT technology and Telegram communication, providing users with real-time alerts and facilitating remote monitoring and response.

I. INTRODUCTION

In an era where home security is paramount, the fusion of Internet of Things (IoT) technology with Telegram messaging offers a novel solution. This project aims to revolutionize home security through an innovative integration of IoT sensors and Telegram communication. Imagine a scenario where your home security system is not just a passive observer, but an active guardian. With the incorporation of a face recognition feature, triggered by motion sensors, the system can discern familiar faces from potential intruders. Upon detection of motion, the system springs into action, activating the camera to capture images. If the identified individual is registered, the system remains silent, ensuring no unnecessary alerts disturb the peace. However, if an unfamiliar face is detected, the system swiftly sends a photo notification to a designated Telegram bot, enabling homeowners to take immediate action. But the protection doesn't end there. In the face of another peril—fire—the system stands vigilant. Equipped with fire detection sensors, it swiftly detects any signs of combustion. Upon detection, the system initiates an alarm to alert occupants of the danger. Simultaneously, it sends a distress message to the Telegram bot, ensuring that help can be summoned promptly. This project represents a paradigm shift in home security, leveraging cutting-edge IoT technology and instant communication via Telegram to provide users with peace of mind and proactive protection. Through the seamless integration of sensors and messaging platforms, it heralds a new era of smart home security, where safety is never compromised.

This project aims to:

- Integrate IoT components into a comprehensive home security system, leveraging motion sensors and cameras to detect and capture potential intruders.
- Implement a facial recognition system to distinguish between registered individuals and potential intruders, ensuring that notifications are only sent when necessary.
- Utilize Telegram messaging platform to send real-time notifications and images to users, enabling them to monitor their home security remotely.
- Enhance the safety features of the system by incorporating fire detection sensors, which trigger alarms and send alerts via Telegram in the event of a fire hazard.
- Provide a user-friendly interface for configuring and monitoring the home security system, ensuring ease of use for homeowners.

OBJECTIVES :

Here are some objectives for our Home Security System with Telegram integration (IoT):

Primary Objective:

- Develop an IoT-based home security system integrated with Telegram, featuring a face recognition component triggered by motion sensors to enhance intrusion detection and minimize false alarms.



Secondary Objectives:

- Design a user-friendly interface for configuring and monitoring the home security system via Telegram, ensuring ease of use for homeowners.
- Implement robust facial recognition algorithms and image processing techniques to accurately identify registered individuals and trigger appropriate actions.
- Integrate fire detection sensors into the system to promptly detect and alert users about potential fire hazards via Telegram.
- Continuously evaluate and optimize the system's performance, including the accuracy of facial recognition and fire detection, through rigorous testing and refinement processes.

TECHNOLOGIES USED:

1. Operating System:- Microsoft Windows 11
2. Processor:- Intel Core i5(12th gen)
3. Hard disk:- 512 GB .
4. RAM:- 8 GB
5. Development Tool:- Arduino IDE
6. Languages Used:- C

APPLICATIONS:

Building an Home Security System with Telegram integration (IoT) with these functionalities will create a truly engaging user experience:

• Multi-Faceted User Input:

- Intruder Identification: Enable users to register faces of authorized individuals, allowing the system to distinguish between registered individuals and potential intruders.
- Venue Selection: Provide options for users to specify the location within their home where the security system will be installed (e.g., front door, back door, living room).
- Alarm Customization: Incorporate settings for users to customize the alarm preferences, such as selecting different alarm tones or adjusting the sensitivity of the fire detection sensors.
- Notification Preferences: Allow users to specify their preferred method of receiving notifications, such as via Telegram messages, email, or SMS.

• Real-Time Monitoring:

- Live Feed: Implement a feature that allows users to view live video feeds from the security cameras through the Telegram app, enabling real-time monitoring of their home.
- Activity Log: Provide a log of recent activities detected by the motion sensors and fire detection sensors, including timestamps and descriptions of the events.

Enhanced Security Measures:

- Two-Factor Authentication: Integrate an additional layer of security by requiring users to authenticate themselves through a second method, such as entering a unique code sent to their mobile device, before accessing the security system's settings.
- Emergency Response Integration: Establish protocols for automatically contacting emergency services, such as the police or fire department, in the event of a security breach or fire detection.

• Continuous Improvement:

- Feedback Mechanism: Implement a feedback system where users can provide input on the performance and usability of the security system, allowing for continuous refinement and optimization.
- Software Updates: Regularly release software updates to address any security vulnerabilities or improve the functionality of the security system based on user feedback and technological advancements.

II. WORKING

Motion Detection: The system consists of motion sensors strategically placed around the premises. When a motion sensor detects movement, it triggers the activation of the camera.

Face Recognition: Upon camera activation, the system initiates the face recognition module. If the detected face matches with a registered individual in the database, blur photo is taken, and sent it via telegram.

Unauthorized Intrusion: If the detected face is not recognized as registered, the system captures a photo of the intruder. This photo is then sent to a designated Telegram bot as a notification.

Fire Detection: In addition to motion sensors and cameras, the system incorporates fire detection sensors. When these sensors detect signs of fire or smoke, they trigger the alarm system and simultaneously send a message to the Telegram bot alerting users of the potential hazard.

Telegram Integration: The system is integrated with Telegram, a messaging platform. Users receive real-time notifications on their Telegram app regarding any detected motion, unauthorized intrusions, or fire hazards.

User Interaction: Users can interact with the system via the Telegram app, receiving notifications and taking appropriate actions in response to security alerts. They can also configure settings and monitor the system remotely through Telegram commands.

PROJECT FLOW:

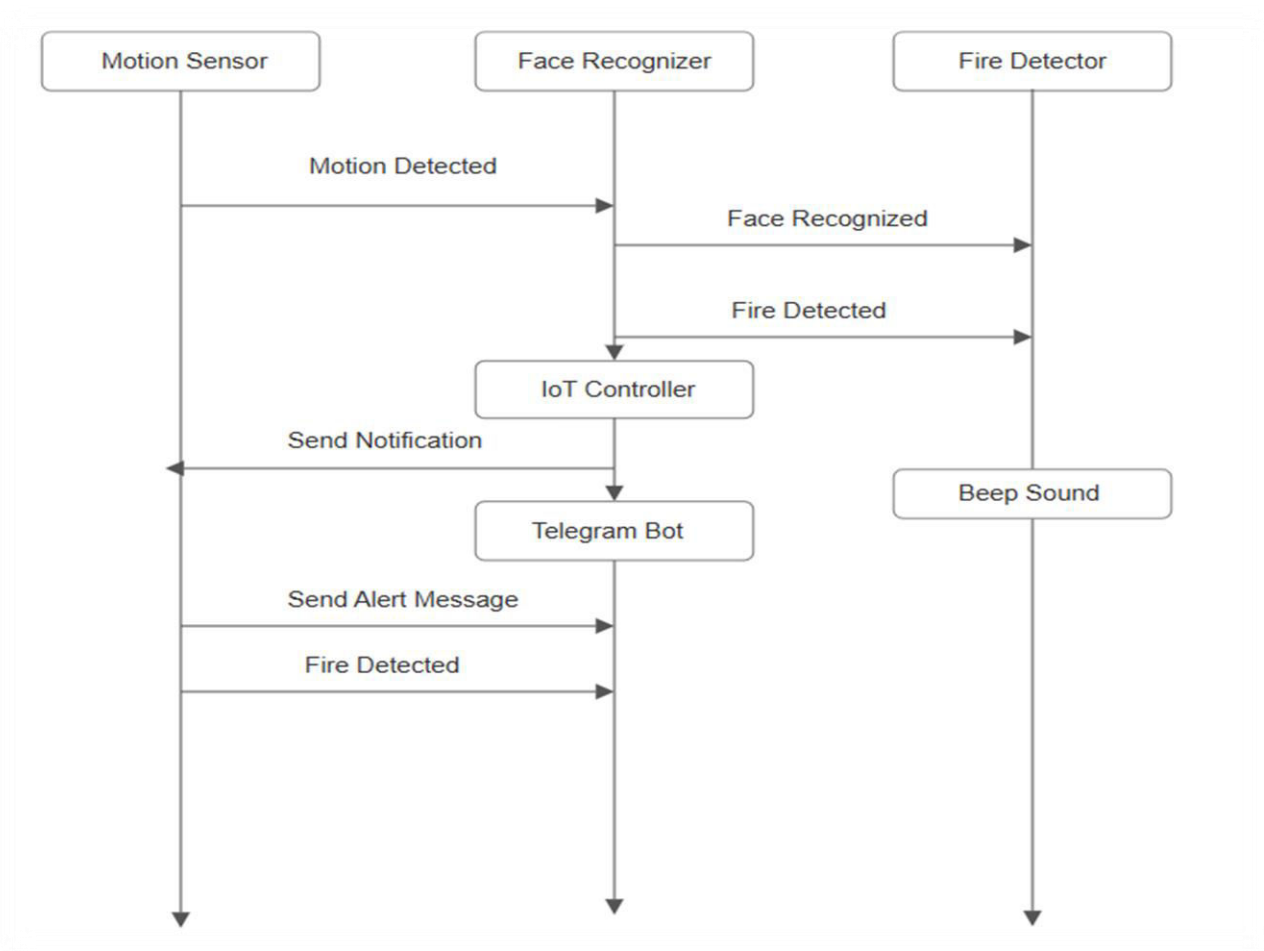


Fig. Flowchart of Project

PROJECT FLOW:



Advantages:

- 1. Enhanced Security:** The integration of IoT technology with facial recognition and motion sensors enhances the security of the home, providing proactive detection and deterrence against intruders.
- 2. Real-time Alerts:** Using Telegram as a communication platform allows users to receive instant notifications and photos of any detected motion or unauthorized intrusion, enabling quick response to potential security threats.
- 3. Remote Monitoring:** Users can remotely monitor their home security system through the Telegram app, providing peace of mind and ensuring that they can keep an eye on their property even when away from home.
- 4. Customization:** The system allows for customization of settings such as registered faces, notification preferences, and alarm configurations, allowing users to tailor the system to their specific needs and preferences.
- 5. Integration with Fire Detection:** The inclusion of fire detection sensors enhances the safety features of the system, providing early detection of fire hazards and timely alerts to users via Telegram.
- 6. User-friendly Interface:** The use of Telegram as a platform for interaction provides a familiar and user-friendly interface for users to configure settings, receive alerts, and interact with the security system.

Disadvantages:

- 1. Dependence on Internet Connectivity:** The system relies on internet connectivity for communication via Telegram, which may be prone to disruptions or outages, potentially affecting the reliability of the security alerts.
- 2. Privacy Concerns:** The use of facial recognition technology raises privacy concerns, as it involves capturing and processing images of individuals. Users may have concerns about the storage and use of their personal data.

3. False Alarms: The system may trigger false alarms due to factors such as misidentification of faces or motion detection triggered by non-threatening stimuli, leading to unnecessary notifications and potential user frustration.

4. Initial Setup Complexity: Setting up and configuring the system, including registering faces and adjusting settings, may require technical expertise and time investment, potentially posing challenges for less tech-savvy users.

5. Cost of Implementation: Implementing a comprehensive IoT-based home security system with features such as facial recognition and fire detection may involve significant upfront costs for hardware and software components, as well as ongoing maintenance expenses.

6. Potential Security Risks: Like any IoT device, the home security system may be vulnerable to cybersecurity threats such as hacking or unauthorized access, posing risks to the security and privacy of the user's home.

III. MAINTAINABILITY

Modular Design:

- For our IoT home security project using Telegram, we've adopted a modular approach to our codebase. Each module is dedicated to a specific functionality such as motion detection, face recognition, fire detection, and message sending via Telegram. This modularity ensures that each component is well-defined and can be easily understood, modified, and tested independently, without causing disruptions to the entire system.

MAINTAINABILITY:

Clear Documentation:

- Throughout the development of our IoT home security system using Telegram, we have emphasized the importance of clear and concise documentation. This includes detailed comments within the code explaining specific functions and decisions, as well as external documentation outlining the overall system architecture and data flow. Such documentation will be invaluable for future modifications and onboarding of new team members.

Version Control System:

- To track changes made to the codebase effectively, we have implemented a version control system like Git. This enables us to revert to previous versions if needed, collaborate efficiently on code updates, and maintain a transparent history of the project's development.

Automated Testing:

- We have integrated automated testing frameworks to ensure the reliability of our home security system following any code changes. These tests will automatically execute various scenarios and verify the expected outcomes, thereby saving time and effort during maintenance phases.

Data Pipeline Standardization:

- To maintain consistency in data handling processes, we have established standardized procedures for acquiring, cleaning, and preprocessing data within our system. This standardization will simplify the integration of new data sources and updates to existing ones in the future.

Regular Model Retraining:

- We plan to periodically retrain our face recognition and fire detection models with new data to ensure optimal performance. This approach will enable our system to adapt to changing environmental conditions and enhance its accuracy over time.

IV. FUTURE SCOPE

Enhanced User Experience:

- We envision implementing features such as user profiles and leaderboards to track prediction history and accuracy, fostering a sense of competition among users.
- Additionally, we aim to introduce match simulation capabilities, allowing users to predict scores for cricket matches and explore different scenarios.

In-Depth Analysis:

- We aspire to provide users with visualizations or breakdowns of factors influencing the detection of motion and fire, offering insights into the reasoning behind our system's decisions.



Advanced Machine Learning Techniques:

- As part of our future roadmap, we aim to integrate additional data sources such as weather conditions and player information to enhance the accuracy of our models.
- We also plan to explore more advanced machine learning techniques like recurrent neural networks (RNNs) to capture the sequential nature of events in our home security system.
- Furthermore, we aim to develop a system capable of adjusting predictions based on real-time sensor data, thereby enhancing the responsiveness and effectiveness of our system.

V. CONCLUSION

Our IoT Home Security System project marks a significant stride in leveraging modern technology to enhance safety and security. By integrating features such as face recognition and fire detection with Telegram notifications, we've created a robust system capable of responding to potential threats effectively.

The project's emphasis on modular design and maintainability ensures its resilience and adaptability for future iterations. Potential enhancements, including real-time updates, user customization, and integration with smart home ecosystems, hold promise for further enriching the user experience and bolstering the system's effectiveness.

In conclusion, this project represents not only a technological achievement but also a commitment to safeguarding homes and communities. As we continue to refine and expand our IoT Home Security System, we aim to contribute positively to the realm of home automation and security, making a tangible difference in people's lives.

REFERENCES

1. Telegram Bot API Documentation: <https://core.telegram.org/bots/api>
2. Python Telegram Bot Library: <https://github.com/python-telegram-bot/python-telegram-bot>
3. How to Create a Telegram Bot Using Python: <https://www.freecodecamp.org/news/create-a-telegram-bot-using-python/>
4. Twilio API for Sending SMS Messages: <https://www.twilio.com/docs/sms>
5. Firebase Realtime Database for Storing Emergency Numbers: <https://firebase.google.com/docs/database>



INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT



+91 99405 72462



+91 63819 07438



ijmrsetm@gmail.com

www.ijmrsetm.com