Home Security System using ESP32-CAM and Telegram Application

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Abstract - *Security is the main issue that must be addressed in the present society. In terms of house security we represent a system that uses the internet networking to provide an easy path to our user to control the different appliances at home. Now a days the technology is increasing rapidly, that leads to an upgradation in home security system. Home security is a very useful application of IoT and we are using it to create an inexpensive security system for homes. The home security system using ESP-32 CAM and Telegram application is a project that aims to enhance the security of homes and other private premises. The system consists of an ESP-32 CAM module, which captures live video footage and sends it to a Telegram bot. The bot then sends notifications to the owner's Telegram account when motion is detected. The project is implemented using the Arduino IDE and various libraries, including the Telegram Bot Library and ESP32 CAM library. The system is designed to be low-cost, easy to install and use, and highly effective at preventing burglary and other security breaches. The project provides an innovative solution for enhancing home security using modern technologies and communication channels.*

Keywords—Home Security, Internet of Things, Arduino, ESP32-CAM, Telegram application.

1.INTRODUCTION

A home security system is an essential component of modern home automation. The system is designed to protect your home, family, and valuable assets from intruders, burglars, and other potential security threats. One effective way of implementing a home security system is by using an ESP32CAM module and the Telegram application.

The ESP32CAM module is a low-cost, low-power, and compact development board that combines Wi-Fi connectivity and image processing capabilities. It is equipped with a high-resolution camera that can capture clear images and videos of your home environment. By integrating this module with the Telegram application, you can receive real-time alerts and notifications whenever the system detects any suspicious activity or movement.

To set up this system, you will need to install and configure the ESP32CAM module and the Telegram application. Once the system is up and running, you can customize it to meet your specific needs by setting the sensitivity levels, adjusting the camera angles, and defining the detection zones. This way, you can ensure that your home security system is tailored to your unique security requirements.

Home security systems are becoming increasingly popular as people seek to protect their homes and families from theft, vandalism, and other security threats.

Overall, using an ESP32CAM module and the Telegram application is an effective way of implementing a home security system that can help you to protect your home, family, and valuable assets. With this system in place, you can have peace of mind knowing that your home is secure and well-protected against any potential security threats.

2. MOTIVATION

The main motive of this system is to control the home appliances and electronic devices with the help of a supervisory system. The supervisory system is designed in such a way that everyone can access it. Home security is the important concern for many people, as it helps ensures the safety of their property and loved ones. There are various ways to approach home security, but one effective method is to use a home security system that can monitor the premises and alert the homeowner of any unusual activity. The motivation for developing a home security system using ESP32-CAM and Telegram is to provide an affordable and accessible solution for homeowners to monitor their homes and enhance their security. With the use of automated technology and real-time communication, potential security threats can be quickly identified and addressed, ultimately contributing to a safer and more secure home environment.

3. LITERATURE SURVEY

1. The development of home security systems using the ESP32CAM and Telegram application has gained significant attention in recent years. A literature survey on this topic reveals various approaches and techniques proposed by researchers to enhance home security using these technologies.

2. In the paper "A Smart Home Security System based on ESP32-CAM and Telegram Bot," by Li et al. (2020), a smart home security system was proposed using the ESP32-CAM and Telegram Bot. The system included a camera module to capture images of the home environment, which were then transmitted to

the user's smartphone via Telegram. The system also included motion sensors and infrared sensors for detecting movement and intrusion.

3. In the paper "Design and implementation of a low-cost home security system based on ESP32CAM," by Liu et al. (2021), a low-cost home security system was proposed using the ESP32CAM. The system used Wi-Fi to transmit images and data to the user's smartphone, and also included motion sensors and door sensors for detecting intrusions.

4. In the paper "Home security system using ESP32-CAM and Telegram application," by Narkhede et al. (2021), a home security system was proposed using the ESP32-CAM and Telegram application. The system included a camera module for monitoring the home environment and transmitting images to the user's smartphone via Telegram. The system also included a PIR sensor for detecting movement.

5. In the paper "IoT based home security system using ESP32CAM and Telegram application," by Shinde et al. (2021), an IoT-based home security system was proposed using the ESP32CAM and Telegram application. The system used Wi-Fi to transmit images and data to the user's smartphone, and also included motion sensors, door sensors, and smoke sensors for detecting various threats.

6. In the paper "Smart home security system using ESP32CAM and Telegram application," by Zhao et al. (2021), a smart home security system was proposed using the ESP32CAM and Telegram application. The system used Wi-Fi to transmit images and data to the user's smartphone, and also included motion sensors, door sensors, and temperature sensors for monitoring the home environment.

4. PROBLEM STSTEMENT

The issue of Owners not being able to know what is going on in their house when they are not at home besides that problems such as theft and fires in the home while the user is at home can be overcome by this system.
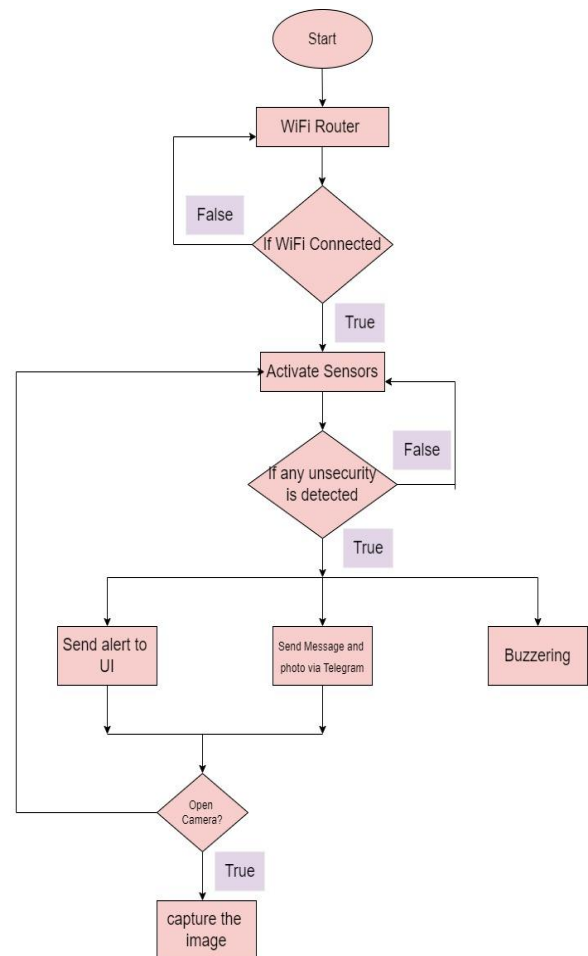
5. FLOWCHART
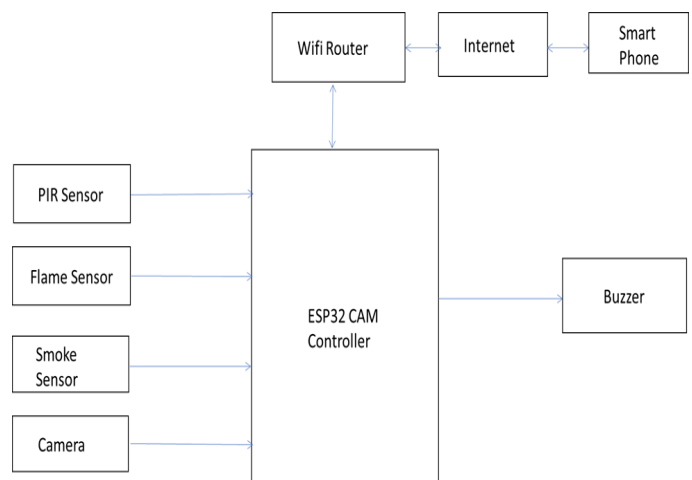

Fig.5.1 Flowchart

6. BLOCK DIAGRAM
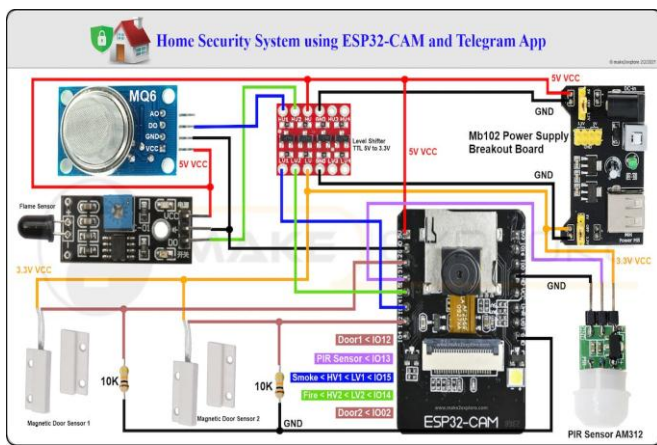

Fig.6.1 Block Diagram

7. CIRCUIT DIAGRAM

Fig.7.1 Circuit Diagram

8. ALGORITHM

Step 1:- Install and set up the ESP32-CAM module and connect it to the home Wi-Fi network.

Step 2:- Install the Telegram application on a mobile device and create a new bot using the BotFather service. Note the bot token and chat ID.

Step 3:- Connect the ESP32-CAM to the Telegram bot using the bot token and chat ID.

Step4:- Define the trigger conditions for the security system, such as motion detection or door/window opening.

Step 5:- Write the code for the ESP32-CAM to detect the trigger conditions and take appropriate actions, such as capturing a photo or recording a video.

Step 6:- Use the Telegram API to send the captured media to the Telegram chat associated with the bot.

Step 7:- Define the action to be taken when the security system is triggered, such as sounding an alarm or notifying the homeowner.

Step 8:- Write the code for the ESP32-CAM to execute the defined action when the security system is triggered.

Step 9:- Test the system thoroughly and make necessary adjustment

WORKING

The ESP-32 CAM AI THINKER Module is a microcontroller which is an ESP-32 development board with an Ov2640 Camera, Micro SD card support, On board flash lamp and several GPIOs to connect peripherals . In our project, there is a mini PIR motion sensor (AM312) which is used to detect whether a human has moved in or out of door with sensors range. The Magnetic(Reed/Switch) Door sensor is used to sense whether the door is open or closed. The MQ6 Gas/Smoke sensor which is used in gas leakage detection in home. The Flame sensor Module is used to detect whether any fire occurance in the home. The Router is a device that

provides Wi-Fi and is connected to modem which send information from internet to telegram application. If any problem is noticed in the home by the sensor it gives notification to the telegram application by capturing and sending the photo with a message and we can reply using the command specified to enable and disable the sensors.

COMPONENTS

ESP32-CAM:- The ESP32-CAM is a small size, low power consumption camera module based on ESP32. It comes with an OV2640 camera and provides onboard TF card slot. The ESP32-CAM can be widely used in intelligent IoT applications such as wireless video monitoring, Wi-Fi image upload, QR identification, and so on.

Fig.8.3.1 ESP32-CAM

PIR Sensor:- PIR (passive infrared) sensors utilise the detection of infrared that is radiated from all objects that emit heat. This type of emission is not visible to the human eye, but sensors that operate using infrared wavelengths can detect such activity.

Fig.8.3.2 PIR Sensor

Flame Sensor:- The flame sensor of a furnace is a safety device that detects whether the equipment is producing a flame and burning gas. A sensor which is most sensitive to a normal light is known as a flame sensor. That's why this sensor module is used in flame alarms

Fig.8.3.3 Flame Sensor

Smoke Sensor:- Smoke alarms detect fires by sensing small particles in the air using a couple of different kinds of technologies. Once they detect those particles above a certain threshold, they signal the alarm to sound so that you and your family can get to safety and call 911. Smoke alarms save lives

Fig.8.3.4 Smoke Sensor

Magnetic Door Sensor:- A door contact sensor works using a sensor and a magnet. The sensor has an internal reed switch that is closed when it is in direct proximity with a magnet. When the door is opened, the magnet is separated from the sensor. This releases the reed switch, and the sensor alerts the panel.

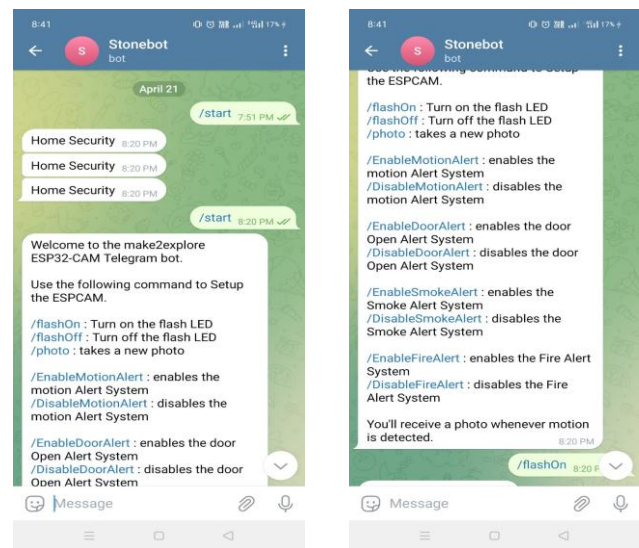Fig.8.3.5 Magnetic Door Sensor

RESULTS

Fig.8.4.1 Results

3. CONCLUSIONS

In conclusion, a home security system using ESP32CAM and Telegram application can be an effective and cost-efficient solution to safeguard your home. ESP32CAM is a powerful microcontroller that can handle image and video processing, and its integration with Telegram allows for real-time monitoring and alerts. With this setup, the ESP32CAM can capture images or videos of any potential intrusion and send them to your Telegram account for immediate action. Additionally, you can remotely control the ESP32CAM, such as turning it on and off or adjusting its sensitivity, using Telegram commands. Overall, this DIY home security system provides a simple yet effective way to secure your home, and

with its open-source nature, you can customize and expand it to fit your specific needs

REFERENCES

[1] "ESP32-CAM Security Camera with Telegram Notifications" tutorial by Rui Santos on Random Nerd Tutorials website: https://randomnerdtutorials.com/esp32-cam-security-camera-with-telegram-notifications/

[2] "DIY Smart Home Security System with ESP32CAM and Telegram" tutorial by Saravanan on Medium: https://saravanan-annamalai.medium.com/diy-smart-home-security-system-with-esp32cam-and-telegram-8f3b3b16da7b

[3] "ESP32-CAM Home Security System with Telegram Notifications" tutorial by IoT Design Pro: https://iotdesignpro.com/projects/esp32-cam-home-security-system-with-telegram-notifications

[4] "ESP32-CAM Security Camera with Motion Detection and Telegram Notifications" tutorial by Rui Santos on Random Nerd Tutorials Website: https://randomnerdtutorials.com/esp32-cam-security-camera-motion-detection-telegram/