OBJECT DETECTION AND MOTION SENSING USING IOT

Mr Rajkumar Pogaku[1], Dr. Murugesan Vanitha[2]

[1]Assistant Professor, Department of IT ,Malla Reddy Engineering College For Women, (Autonomous Institution), Maisammaguda,Dhulapally,Secunderabad,Telangana-500100

[2] Professor, Department of IT ,Malla Reddy Engineering College For Women,(Autonomous Institution), Maisammaguda,Dhulapally,Secunderabad,Telangana-500100

Abstract

The Internet of Things, or IoT, is a transformational technology that allows the creation of applications connecting physical objects to the internet, thereby making everyday tasks easier and more efficient. IoT allows devices to communicate and exchange vital data with other systems, for example, in home automation, to reduce human effort and improve convenience. This technology usually employs Wi-Fi or Bluetooth for data transmission. For instance, IoT can ensure that parents have peace of mind because their young children are not left alone at home. With IoT, parents are able to monitor what is happening inside and outside their homes, as well as who comes to the door, remotely. This is parental control and home security application using a product with motion detection, photo recognition of abnormal behavior, and easy monitoring without needing to open the door.The ESP32-CAM captures and stores images of the visitor and sends it via TCP/IP to the Telegram alerts. The system ensures only authorized people enter the house. When motion is detected at the door, the camera captures photos, which are then sent to the owner through Telegram. This system eliminates the need to watch long CCTV footage and enables the owner to quickly identify unusual activities. This complete control system is developed and tested using the ESP32-CAM microcontroller.

Keywords: Internet of Things (IoT), Alert system, Internet of Things (IoT), ESP32-CAM microcontroller,Telegram app, Child, home security.

1. Introduction

Everything moves at the supersonic speeds in the modern world and digital media enables for the transmission of data at light speed. Internet conventionstherefore require a steady stream of information. The Internet of Things is predicted to result in Thirty Five Billion connected things by the year 2025. In order to provide remote permission and door control based on observing the motion at the forward entrance,a safe home automation system is being developed as portion of this project. The object of this idea is to use an Android-powered smartphone to regulate door accessibility, voice warnings, and forward Telegramnotifications with an image of a visitor. Internet of Things (IoT) is a theory that assists create things, wireless network between various accessing gadgets through the internet and different IP Protocols, InternetOf Things practice and create an environment between the gadgets you create. It can be accessed remotely andobjects in Internet of Things are gadgets such as sensors,microcontrollers and mobile phones.
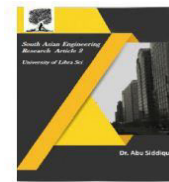
You are linked to a wireless network, the result is network commonly mentioned to as Internet of Things (IoT). Progression of Internet of Things has resolved many problems in real time. Upgraded compliance ofseveral old systems. Technological advances have constantly uplifted their use. Wi-Fi that does not requirea cable connection this reduces the cost and complexity of the system. Here Wi-Fi module, MCU node (esp8266) plays a role gateway for connecting devices to Telegramservers. It can be activated remotely fromthat device. The Telegram mobile app. In addition, it is an internet based house. The automation system iscombined with Passive Infrared (PIR) Sensor ensures that the operationof the mechanism. With all this in consideration, the system is developed to detect any motion in the surroundings.

Today, home automation systems (HAS) are gaining popularity all over the world. This ensures usersafety, surveillance and comfort, making life easier for users. Many homes in developed countries have smart home automation systems that sense their surroundingsand turn on appliances like fans and air conditioners based on data. of their price. Also, almost all of these systems are hard-coded, so they just make certain decisions based on iteration conditions. There are no user-defined or conditional checks in the system. A voice-activated home automation system (VCHAS) is required. A ZigBee-based home automation system anda proposed Wi-Fi network are connected by a common home gateway. Combiner offers network compatibility,a simple and flexible user interface, and remote system access.

2. Methodology

Our Project aims to implement a smart home automation and security system with telegram based remote access and door control on the movement of visitors to the door. The camera module detects motionand sends a notification to the system via TCP/IP as a Telegram notification.

The ESP32-CAM AI-BASED Thinker module board is built into this compact hardware-based implementationwith the necessary PIR sensor and a few extra visible pins. The ESP32-CAM already had the code loaded using FTDI and was also used to load it during deployment. PIR sensors are used for motion detection because they only detect human movement. Using the ESP32-CAM, We developed a Telegram bot that allowsyou to request photos and control the flash by controlling the bulletin board anytime, anywhere. You can even get notified with a new photo when real motionis detected. A voice warning system was introduced to notify residents of intruders. This technology can be employed in commercial buildings as well as residences.

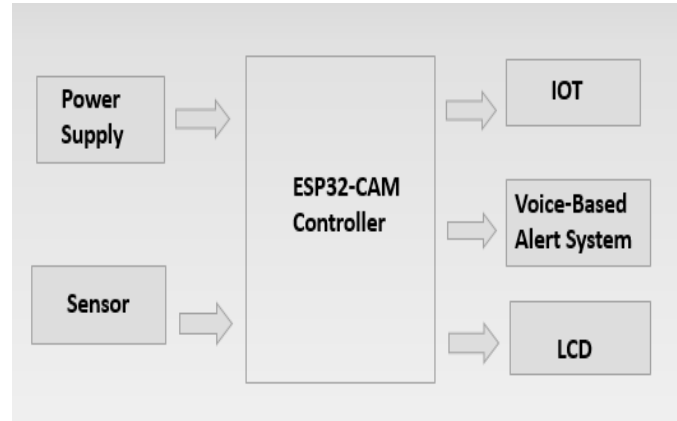## 2.1 Block Diagram Of The System

Figure 1: Block diagram

2.2 Hardware Tools

A. ESP32-CAM

The camera module for the ES32-S chip is the ES32-M. It has a V2640 camera, many GIS to attach peripherals and the micro-SD card space. It includes 3.3 volt and 5-volt power pins. 5v pin is typically utilised.

B. Sensor

PIR sensors enable motion detection, which is always used to detect whether a person has moved within or outside of the sensor's range. This sensor produces a pulse when motion is detected.

C. A DuPont Wire

Jumper wires/DuPont wire are electrical lines made primarily of copper and equipped with connectors ateach end, used to connect many small components.

D. FTDI Programmer

FTDI programmers help you upload programmingcode to the CAM 32-ESP.

E. Voice Detector

Voice detector is the recorded voice which is placed inresident to aware about the intruder.

2.3 Software Tools

A. Arduino IDE

The Arduino Integrated Development Environment (IDE) consists of a code editor, a message board, a text terminal, a toolbar with frequently used buttons, and many menus. Join in with your Arduino device to run the software and play around with it.
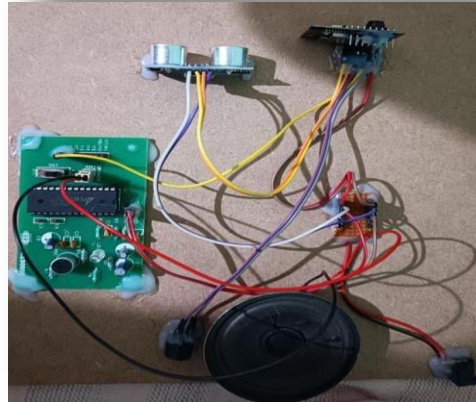
2.4 Experiment Setup

Figure 2: Experimental Setup using ESP32.

To safeguard the safety of children who are home alone, the motion detection system is managed by a Telegram bot, as seen in the figures. The system includes a PIR sensor, an ESP32-CAM, and an audible alert. Connecting the RX and TX pins on an FTDI programmer allows for programming. And connect thePIR sensor to ESP32-CAM GPIO 13 and connect it to ground and 5V pins. ESP32 CAM production sendsimages to Telegram bot. PIR sensors detect everything in the house. First, the flashlight is turned off and the front door is locked. We can also know the distance of an object up to a range of 3m-7m.

Its compact size makes it easy to install in any electronic device. It absorbs infrared rays and generates electricity. It continuously detects movement in the room and darkness during the day.Comparedto other sensors, it consumes less powerand is cheaper. It does not emit radiation.
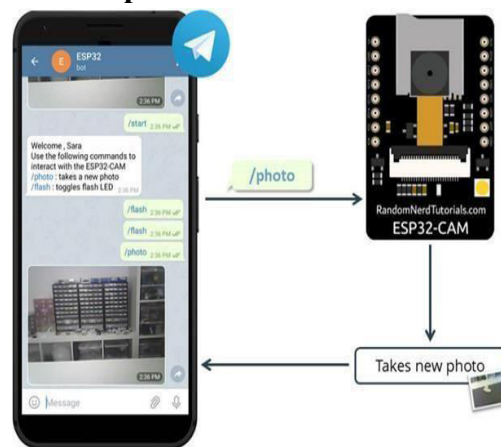
2.5 Overview of Experimental set up:

Figure 3: Overview of experiment setup.

1: The first step is to make an ESP32 CAM Telegram bot.

2: The ESP32- CAM robot can have a conversation with you.

3:Third, the ESP32-CAM board on the robot gets your message and photo, and then it takes a fresh picture andsends it back to you.

4: Sending the /flash command to the ESP32-CAM will cause its LED to flash. 5: You can get a welcome message as a board control command by sending /start.

6: Telegram account IDs are the only ones that will get a reply from the ESP32-CAM.

7: In addition to taking a picture, the Voice Alert system may also sound an alarm, alerting the resident to thepresence of an intruder at the same time.

8: The Owner/User also has access to information about the detection range.

2.6 Applications:

Our projects include lighting controls, HVAC systems, thermostats, digital signage, smart home and IoT, surveillance systems, IP cameras, automatic doors, security alarm systems and more.it includes. It is also used in robotics based on human perception, stepper motor controllers and video.

3. Results

The results of a security system based on the Telegram application shows screen snips of Telegram. Therefore,I have noted it here, keeping various limitations in mind. In this approach, we used a PIR sensorto detectmotion and an ESP32-CAM to take pictures. And whenthe movement is detected the voice basedalert system make aware about the intruder in the residents. The below three figures shows the notificationin telegram bot when the movement is detected.

Figure 4: Shows the captured images of movement detection where every time the PIR sensor detects motion, asseen in and the user is notified.
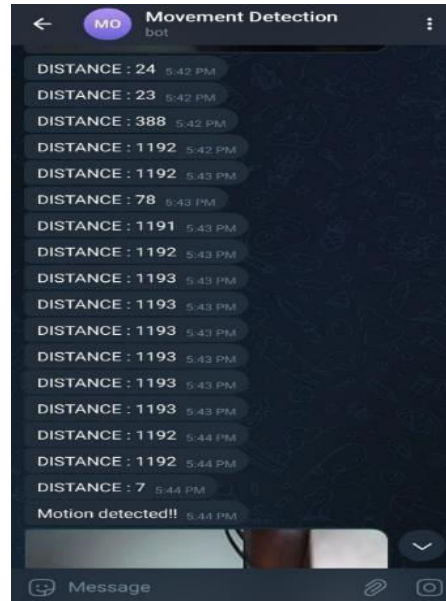
Figure 5: Shows the distance of the moving object and the detection   distance range from 25m-20m forindoorpassive infrared, indoor curtain type. The detection distance ranges from 10m-150m for outdoor passive

infrared.

Figure 6: Displays a screenshot of the created Telegram bot and offers the user a menu to activate the flash atnight and take a photo of the current circumstances.
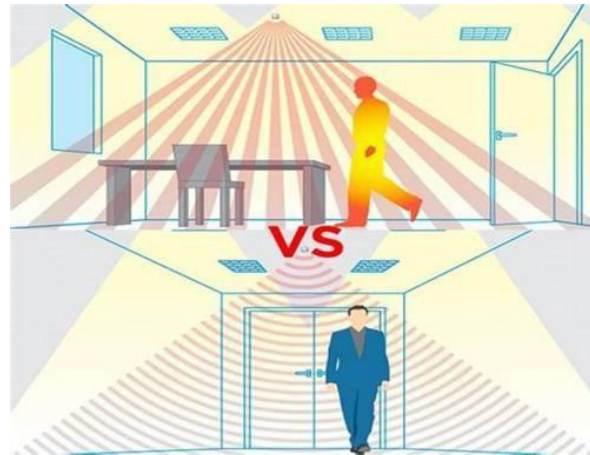
Figure 7: The above figure displays the overview of ourproject. Where it detects the human movement,when they are near the sensing area.

4. Discussion

IoT refers to appliances or objects that are linked to the internet so that one or more appliances cantrack or communicate with other devices on the internet.With the quick development of the Internet of Things (IoT), home automation and security systems are growing in popularity. In this article, we will implementan Internet of Things (IoT) smart home system using the introduced technique provides home protection through a passive infrared (PIR) sensor that detects intrusion when no one is home. When the system detectsan attack, it sends an email alert to the user. Our project is based on security and we can alsosave power, and effective management at a low cost and requires small memory space. It is responsible fordetecting the change in infrared radiation levels when an intruder or human is passed through the system where it is arranged.

The results of a security system based on the Telegram application shows the captured images of movement detection where every time the PIR sensor detects motion, as seen in and the user is notified andthe distance of the moving object and the detection distance range from 25m-20m for indoor passive infrared, indoor curtain type. The detection distance ranges from 10m-150m for outdoor passive infrared and Its compact size makes it easy to install in any electronic device. It absorbs infrared rays and generateselectricity. It continuously detects movement in the room and darkness during the day.Compared to other sensors, it consumes less powerand is cheaper. It does not emit radiation.

5. Conclusion

This white paper provides details on the implementationand design of a practical and inexpensive interactive security system. A voice alarm system can be installed to notify residents of intruders. It can bevery affordableand practical. It is a product of a hardware-based designcourse. The
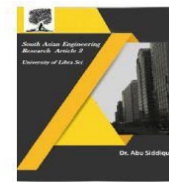
ESP32-CAM BASED Thinker module board is built into this compact hardware-basedimplementation with the necessary PIR sensor and a fewextra visible pins. PIR sensors are used for motion detection because they only detect human movement. We developed a Telegram bot that can control the boardanytime to request photos andhelp control the flash.

References:

[1] Shaik Rabban; G. Rama Krishna," Home Security and Automation with Telegram CommunicationApplication using Raspberry Pi" on, vol. 8, July 2020.

[2] Dhiraj Sunehra, G. Venkat Ramana, "Webpage And Telegram Bot Controlled Home AutomationSystem Using Raspberry Pi3", vol. 9, February 2020.

[3]Rui Santos, Sara Santos "Home Automation Using ESP8266", vol. IV, 2016.

[4]https://www.instructables.com/Automation-With-Telegram-andESP32/.

[5]https://randomnerdtutorials.com/esp32-cam-shield-pcb-telegram/

[6] Ishan Krishna, K. Lavanya,"Intelligent Home Automation System using BitVoicer", 11th InternationalConference on Intelligent Systems and Control, 2017.

[7] Ramón Alcarria, Diego Martín de Andrés, "A Service-Oriented Monitoring System Based on RuleEvaluation for Home Automation", IEEE 2016.

[8]Hattie Clougherty, Alec Brown, Margaret Stonerock, "Home Automation and Personalization throughIndividual Location Determination", IEEE 978-1-5386-1848-6/17/$31.00 2017

[9]Sukhen Das, souvikghosh, RishirajSarker, "A Bluetooth Based Sophisticated Home Automation systemUsing Smartphone", international conference on intelligent power and instrumentation, 2016.

[10]Juan Carlos de Oliveira, Danilo Henrique Santos," Chatting with Arduino Platform through TelegramBot", IEEE International Symposium on Consumer Electronics, 2016.

[11] Vedan rattan vasta , Gopal singh, "Raspberry Pi based Implementation of Internet of Things using Mobile Messaging Application - „Telegram‟", International Journal of Computer Applications (0975 – 8887), Volume 145 – No.14, July 2016.

[12] Ankush B.powar, shasikanthgumhre, "A SURVEY ON IoT APPLICATIONS, SECURITY CHALLENGES AND COUNTER MEASURES", international conference on computing, dec 19-21, 2016.

[13] Jinsoo Han; Chang-Sic Choi; Ilwoo Lee, "More efficient home energy management system based onZigBee communication. and infrared remote controls," Consumer Electronics, IEEE Transactions on , vol.57, no.1, pp.85,89, February 2011 [2] Erdem, H.; Uner, A., "A multi-channel remote controller for home and office appliances," Consumer Electronics, IEEE Transactions on , vol.55, no.4, pp.2184,2189, November 2009.

[14] G. Soni, "Experimental analysis and investigation of WCDMA link in terms of EVM using vector signal transceiver (VST) 5644R & LabVIEW 2012," 2016 International Conference on Control, Instrumentation, Communication and Computational Technologies (ICCICCT),2016, pp. 797-800, doi: 10.1109/ICCICCT.2016.7988061.

[15] Soni, Gaurav, Anshdeep Kaur and A. Seth. "Implementation of temperature sensor based on Arduino Unoand LabVIEW 2012." (2016)