A MAJOR PROJECT ON
MOTION DETCTION AND INTRUSION ALERT SYSTEM

Presented By

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PROBLEM STATEMENT

- Ensuring the security and surveillance of various environments, including residential homes, commercial establishments, and public spaces, is a critical concern in today's society.
- There is a need for a robust and efficient motion detection and intrusion alert system that can accurately identify and respond to abnormal activities

INTRODUCTION

- Introducing the Motion Detection and Intrusion Alert System, a powerful security solution designed to detect movement and unauthorized access, providing real-time alerts for enhanced safety and protection.

OBJECTIVE

➢The objective of a motion detection and intrusion alert system is to provide real-time detection and immediate alerts for unauthorized movement or intrusion, enhancing security and response capabilities.

TOOLS REQUIRED

HARDWARE TOOLS

1. Raspberry pi 4
2. Web camera
3. Buzzer
4. USB-C power supply

SOFTWARE TOOLS

1. Thonny IDE
2. Python
3. SMTP
4. OpenCV

BLOCK DIAGRAM

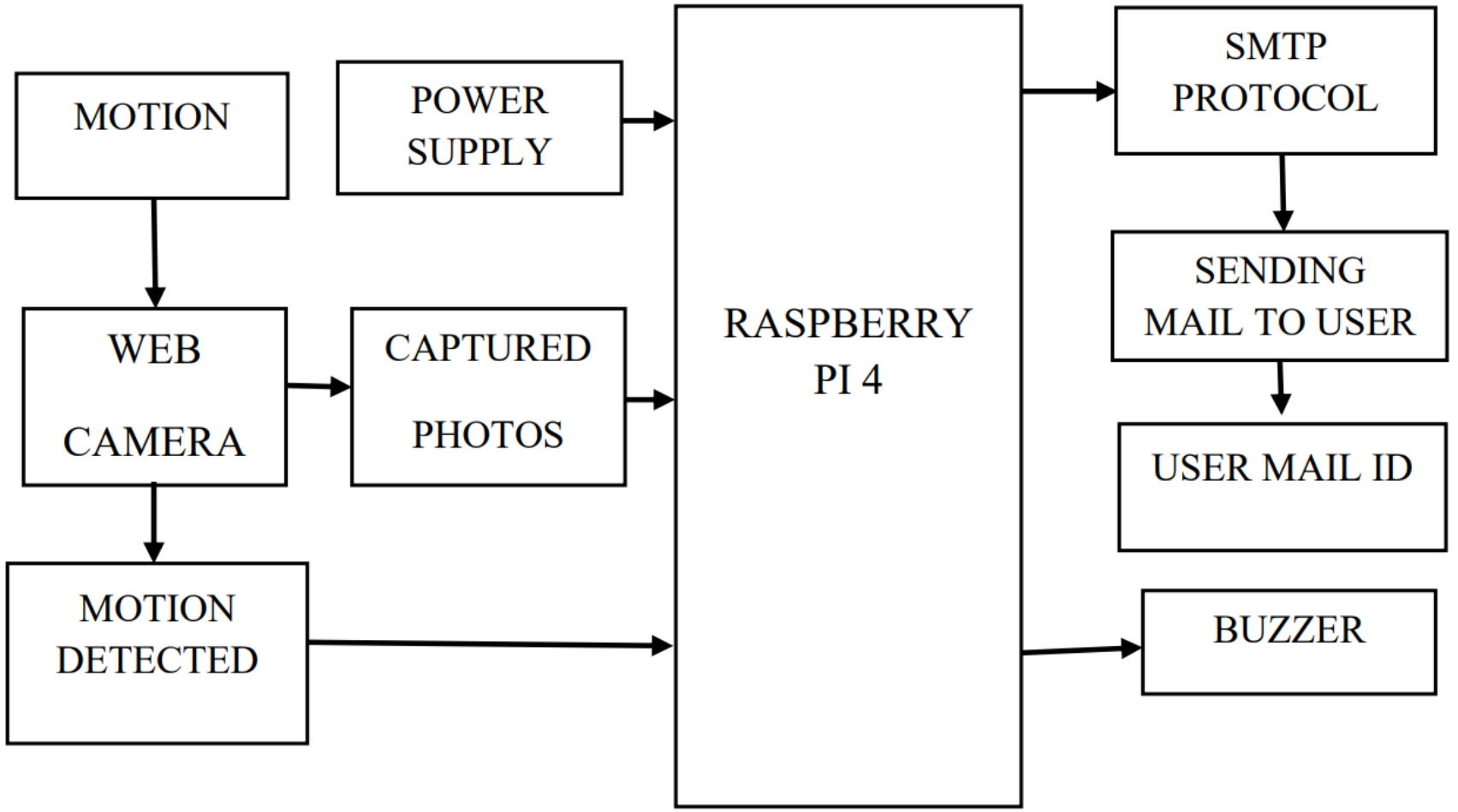

Figure 1: Block diagram of motion detection and intrusion alert system

WORKING

1.Webcam: The webcam captures video frames in real-time.

2.Motion Detection: The motion detection module analyzes the video frames from the webcam to identify any motion. It detects changes between consecutive frames and determines if motion is present.

3.Image Capture: When motion is detected, the system captures an image from the webcam to document the intrusion event. This image can later be used as evidence or for further analysis.

4.Buzzer: If motion is detected, the system activates a buzzer or an audible alarm to alert nearby individuals about the intrusion.

5.Email: Upon motion detection, the system sends an email to the user to notify them about the intrusion event. The email can include the captured image as an attachment or a link.

6.User Alert: The user receives the email notification and can take appropriate action, such as checking the image, contacting authorities, or remotely monitoring the situation

RASPBERRY PI 4

- The Raspberry Pi 4 has the world of single-board computers, offering enhanced performance, connectivity, and versatility.
- The Raspberry Pi 4 with a quad-core ARM Cortex-A72 CPU clocked at 1.5GHz,
- Dual 4K Display Support With dual micro HDMI ports, the Raspberry Pi 4 can simultaneously support two 4K displays
- The inclusion of two USB 3.0 ports and Gigabit Ethernet ensures faster data transfer speeds, and high-bandwidth applications.
- the Raspberry Pi 4 retains its 40-pin GPIO, allowing users to connect a wide range of sensors, actuators, and other external components.

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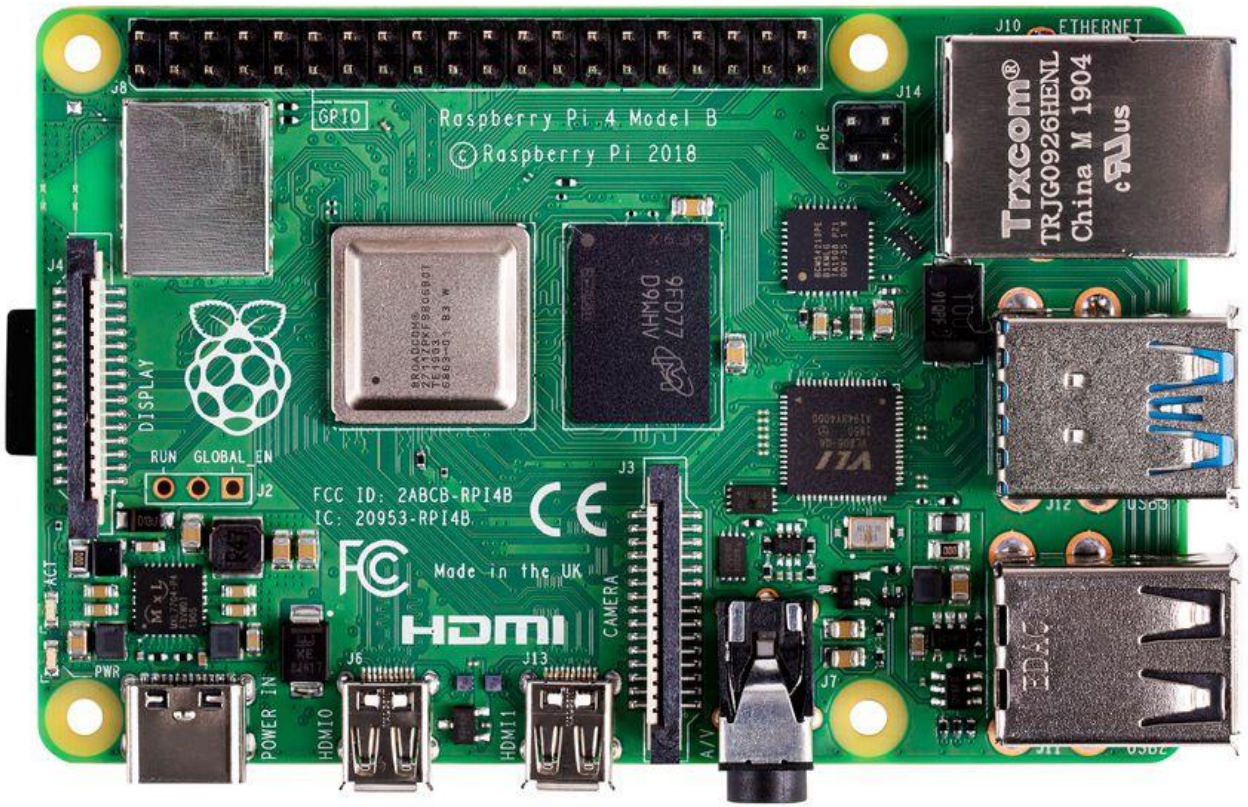

Figure 2 : Raspberry pi 4

RASPBERRY PI PIN CONFIGURATION

- Power Pins: The Raspberry Pi 4 has 3.3V, 5V, and Ground pins for completing electrical circuits.
- 2.GPIO Pins: The GPIO pins are to interface with external components used as digital input or output pins, allowing you to read signals or control devices like LEDs, motors, and sensors.
- 3.Serial Pins: The Raspberry Pi 4 includes UART pins for serial communication. These pins, namely TXD and RXD.
- 4.I2C Pins: The I2C pins, labeled SDA and SCL, enable the Raspberry Pi 4 to communicate with I2C-compatible devices, such as temperature sensors, accelerometers, and displays.
- 5.SPI Pins: The SPI pins, consisting of MOSI, MISO, SCLK, and CE0, allow for high-speed data exchange with SPI devices like LCD screens, ADCs, and flash memory.

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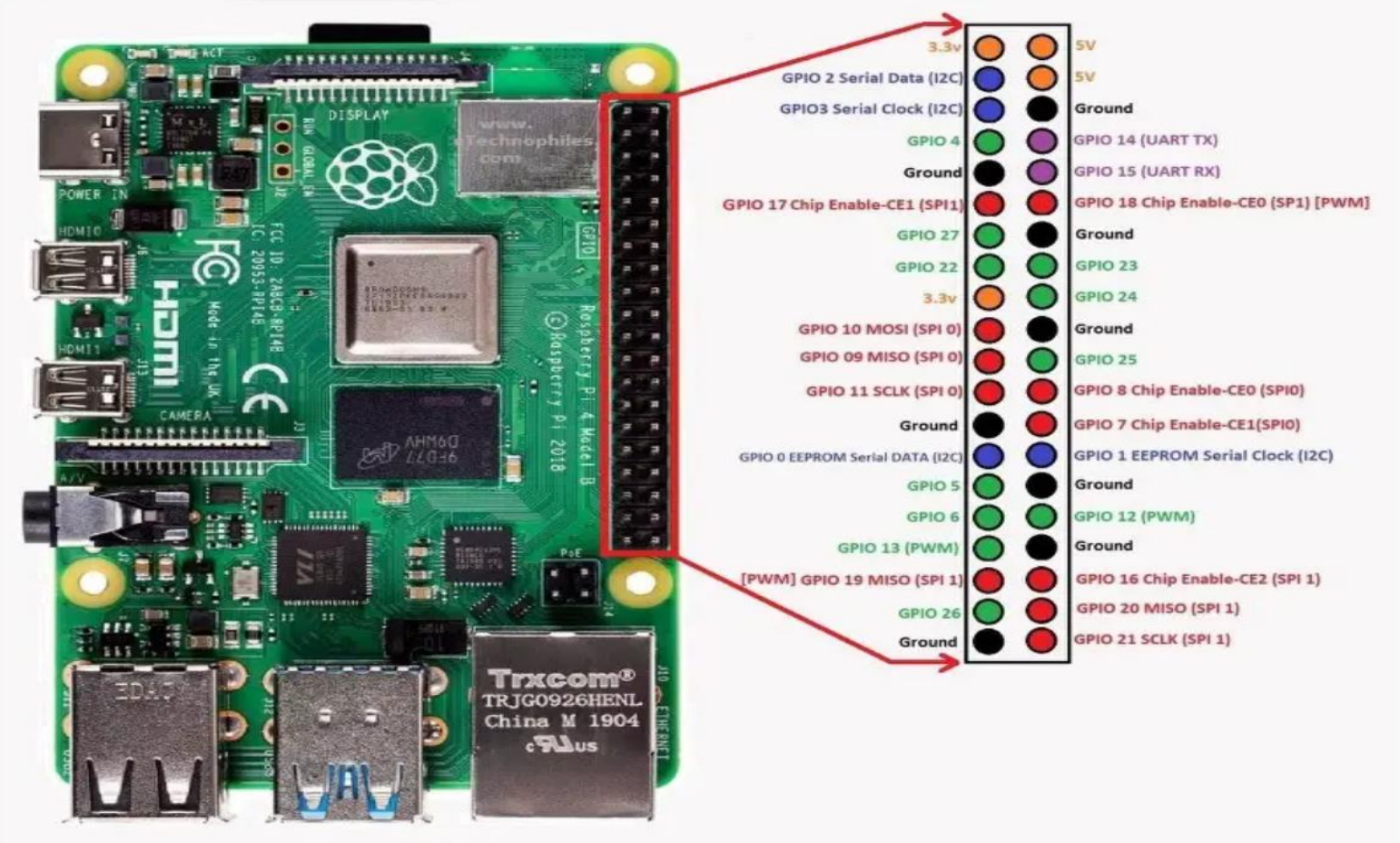

Figure 3 : Raspberry pi pin configuration

WEB CAMERA

- Web cameras, also known as webcam or digital cameras, equipped with a lens and image sensor, allow users to capture and transmit real-time video and audio.
- Web cameras are utilized for remote monitoring and surveillance purposes
- web cameras offer plug-and-play functionality, requiring minimal setup and configuration.
- They can be easily connected to computers, laptops, or other compatible devices via USB to access video and audio capabilities.

Figure 4: Web Camera

USB-C POWER SUPPLY

- The Raspberry Pi USB-C Power Supply is a dedicated power supply designed specifically for the Raspberry Pi 4 Model B.
- The power supply delivers a maximum power output of 15.3 watts, which is sufficient to the power requirements of the Raspberry Pi 4 Model B.
- It is fully compatible with the Pi's power input requirements, ensuring proper voltage and current delivery to the board.
- The power supply is designed to be energy-efficient, minimizing power wastage and generating less heat during operation.
- The power supply incorporates various safety features to protect the Raspberry Pi and the connected devices from power-related issues.

Figure 5 : USB-C Power supply

BUZZER

- A buzzer is an electronic sound-producing device that generates audible tones or signals when an electrical current passes through it.
- Specifications :

1. The frequency range is 3,300Hz
2. Operating Temperature range from -20 C to +60C
3. Operating voltage range from 3V to 24V DC
4. The sound pressure level is 85dBA or 10cm
5. The supply current is below 15mA

Figure 6: Buzzer

SMTP PROTOCOL

- An SMTP (Simple Mail Transfer Protocol) protocol is a software application that handles the sending, receiving, and routing of email messages over a network.
- SMTP servers act as relays, forwarding email messages between different servers until they reach their recipients.
- Before delivering an email, the SMTP server verifies the recipient's email address.
- SMTP servers often require authentication to prevent unauthorized use.

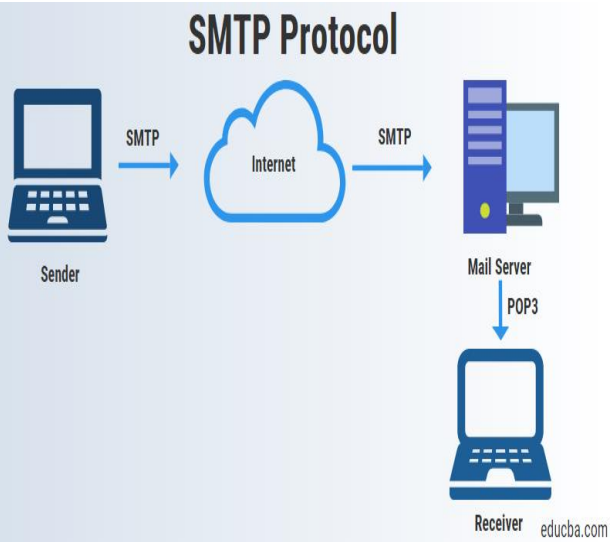

Figure 7: SMTP Protocol

OPENCV

- OpenCV (Open Source Computer Vision) is a popular open-source library that provides a comprehensive set of computer vision and machine learning algorithms.
- OpenCV supports multiple programming languages, including C++, Python, Java, and MATLAB.
- OpenCV offers a wide range of functions and algorithms for image and video manipulation, including image filtering, transformation, segmentation.
- OpenCV includes a computer vision algorithms that can be used for edge detection, corner detection, optical flow estimation, image stitching, and depth estimation.

Figure 9: OpenCV

PYTHON

➢Python is commonly used for developing websites and software ,task automation, data analysis, and data visualization.

➢ Since it's relatively easy to learn

➢Python is an interpreted language means that the code is executed line by line without need for compilation.

➢Python can run on various operating systems, Windows, macOS, Linux.

➢Python has various tasks, such as file I/O, networking, web development, data manipulation.

➢Python has third-party libraries and frameworks like NumPy, pandas, Matplotlib, and TensorFlow.

➢Python supports object-oriented programming, allowing developers to organize code into reusable classes and objects.

Figure 10 : python

RESULT OF THE PROJECT

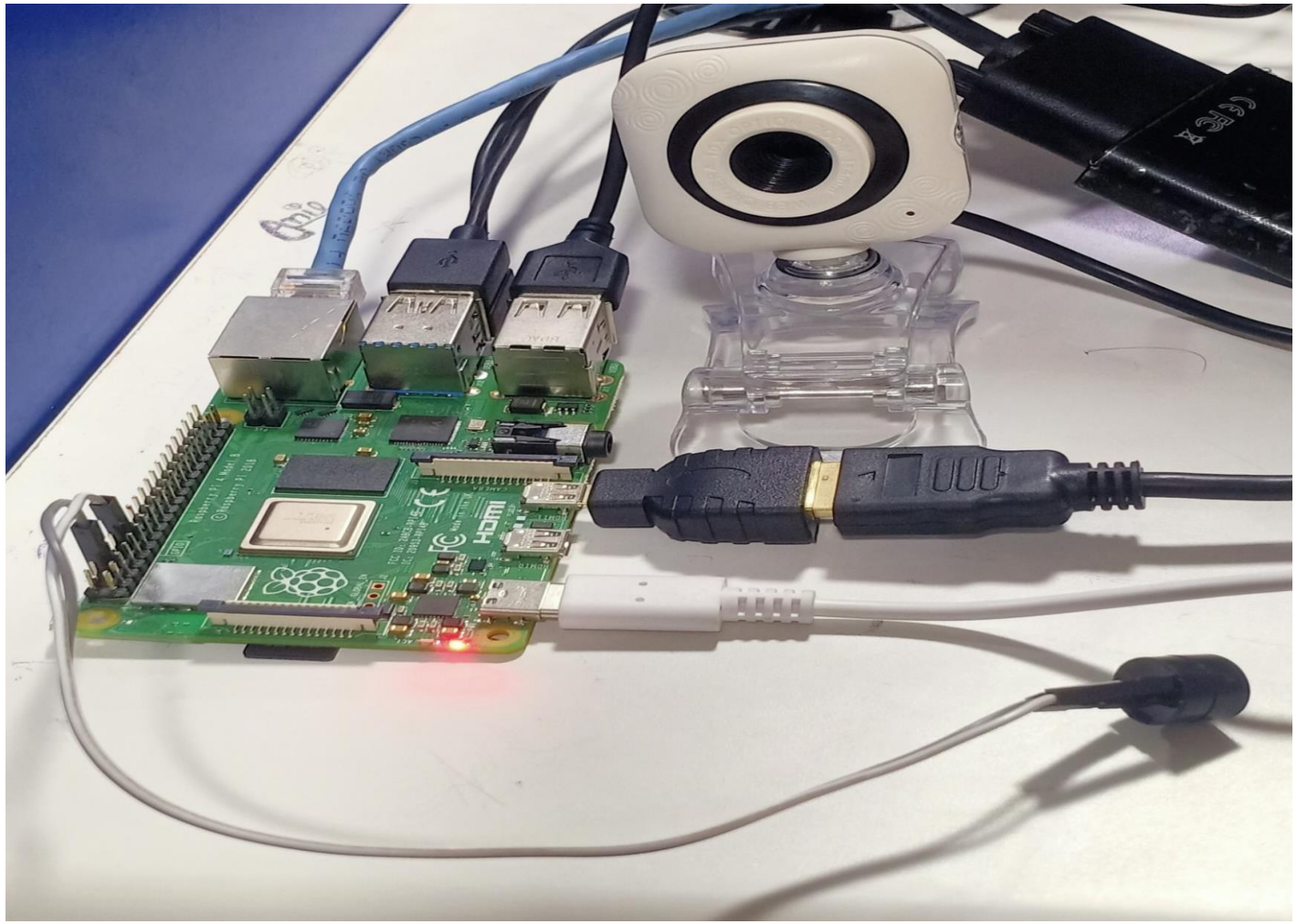

Figure 11: Hardware Setup

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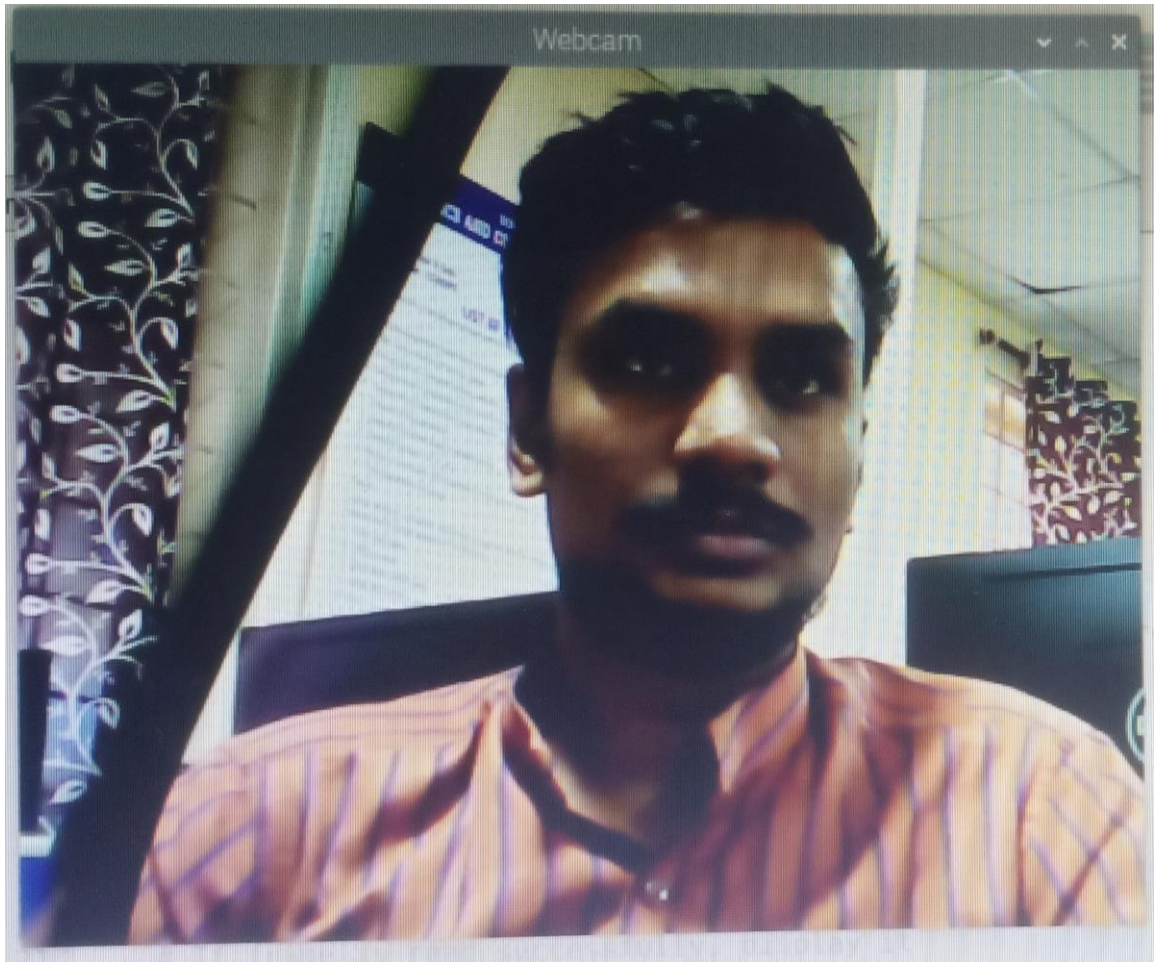

Figure 12:Video Display

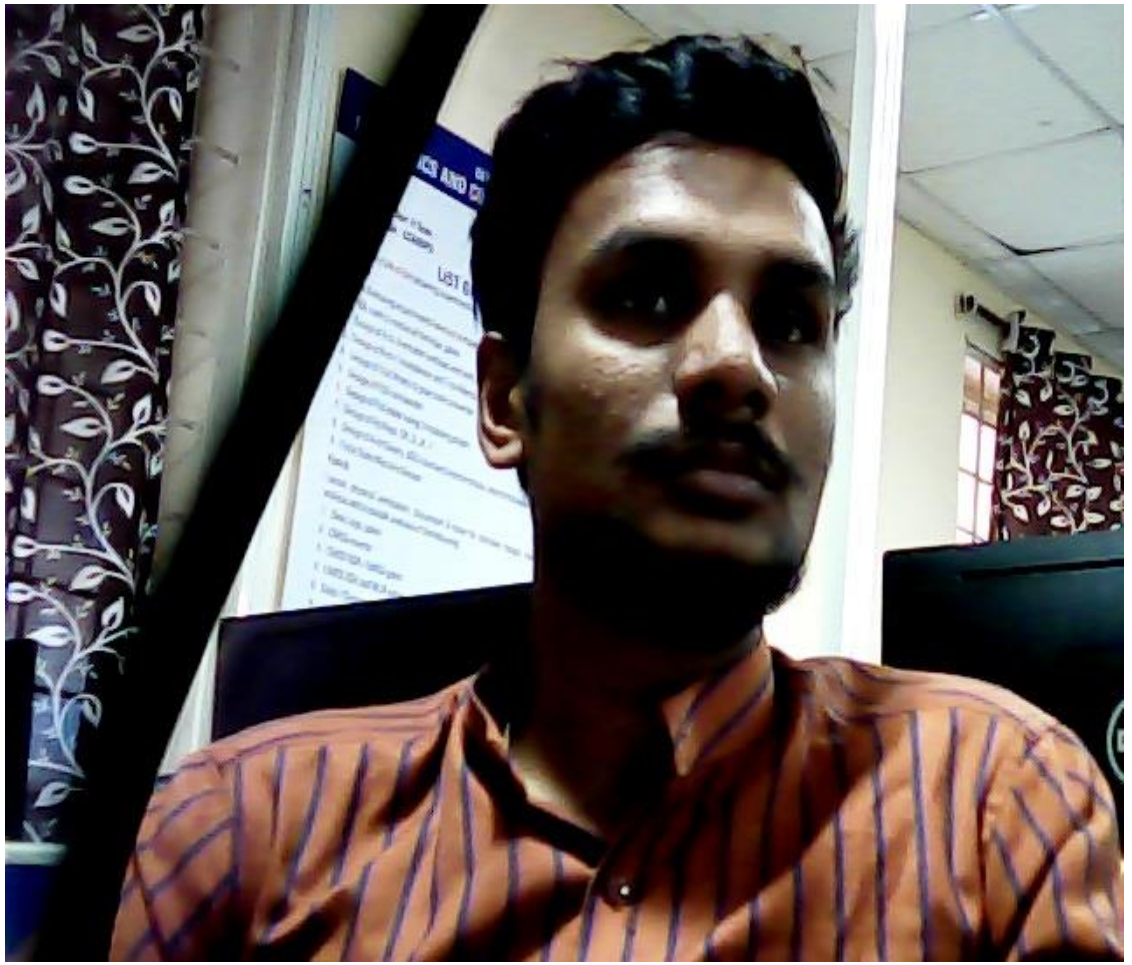

Figure 13 : Photo Capture

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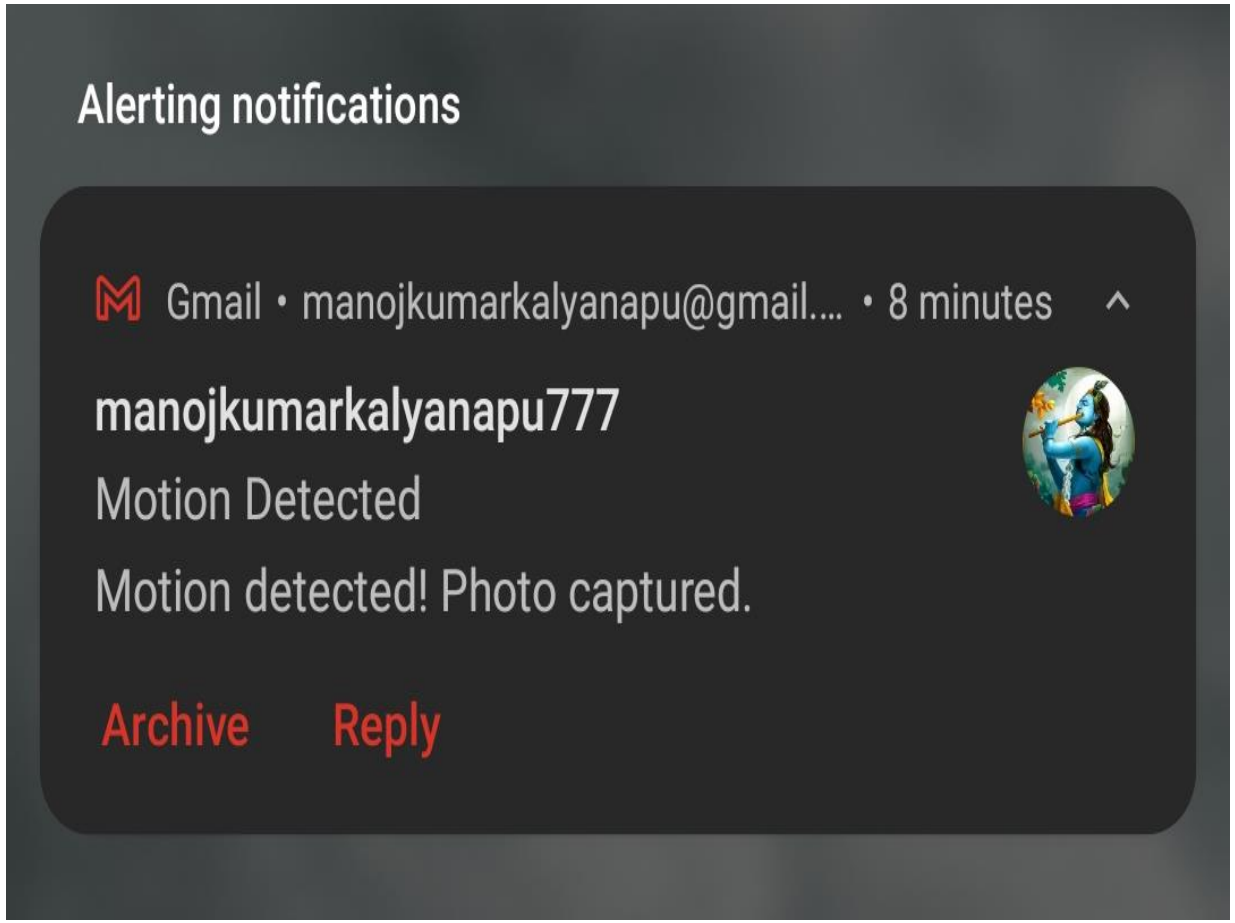

Figure 14 : Notification Alert

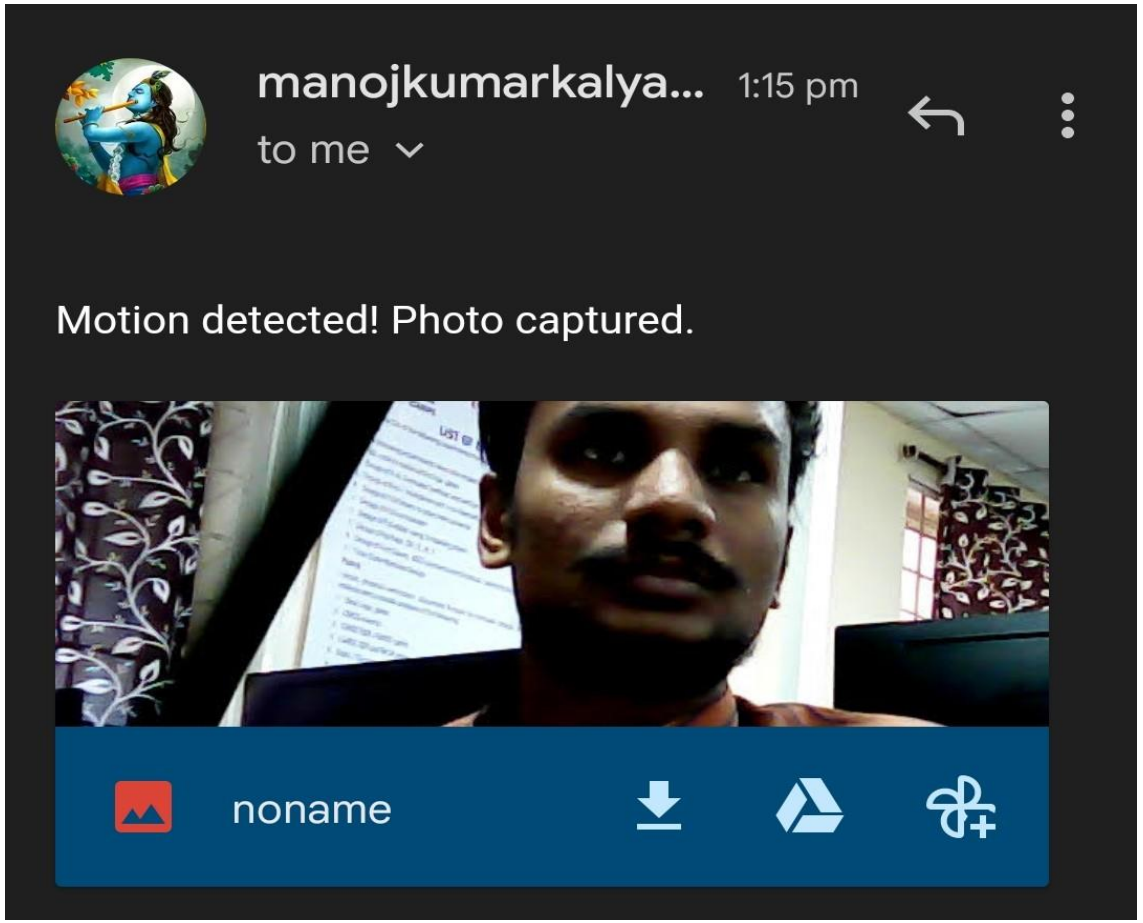

Figure 15 : Received Captured Photos

ADVANTAGES

- 1.Enhanced Security
- 2.Real-time Alerts
- 3.Deterrent Effect
- 4.Customizable Settings
- 5.Integration with Other Security Systems
- 6.Remote Monitoring and Control
- 7.Energy Efficiency

APPLICATIONS

- 1.Home Security
- 2.Office and Commercial Security
- 3.Outdoor Surveillance
- 4.Elderly or Patient Monitoring
- 5.Smart Home Automation
- 6.Industrial Safety

FUTURE SCOPE

- Integration with Artificial Intelligence : Implementing AI algorithms can improve the accuracy of motion detection and reduce false alarms.
- Mobile Applications: Developing dedicated mobile applications can provide users with convenient access to the system
- Cloud Integration: Storing captured images, videos, and logs in the cloud can enable easy access and retrieval from anywhere.
- Integration with Home Automation Systems: Integrating the motion detection system with home automation platforms
- Integration with Machine Learning: By continuously analyzing data collected over time, the system can learn and adapt to patterns

CONCLUSION

- In conclusion, motion detection and intrusion alert systems offer a solution for enhancing security, safety, and efficiency. Whether it is protecting homes, offices, commercial spaces, or monitoring valuable assets,
- these systems provide real-time detection of unauthorized movements or intrusions. By promptly alerting users and triggering appropriate responses, such as alarms, notifications, or automated actions,

THANK YOU