

Smart Home Gate Automation Using Face Recognition

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ABSTRACT: This project presents a smart and affordable home security system using an ESP32-CAM and a Telegram Bot. The main idea is to improve door security by allowing homeowners to see visitors remotely and control the door lock from anywhere. When someone presses the doorbell, the system captures an image using the camera and sends it to the user through Telegram. The user can then decide whether to lock or unlock the door using simple commands. The system does not require expensive servers or subscriptions, making it cost-effective. The results show that images are delivered within a few seconds, and the system responds quickly to commands. Overall, this project provides a reliable, secure, and modern solution for home security.

I. INTRODUCTION

With the growth of IoT (Internet of Things), traditional home security systems are becoming outdated. Earlier systems depended on keys, basic doorbells, or expensive smart devices. This project uses modern technology like ESP32-CAM and internet connectivity to create a smarter system. It allows users to monitor their door remotely and act instantly. The motivation behind this project is to: Reduce dependency on costly commercial systems Improve security by giving real-time access Maintain user privacy without cloud storage This system focuses on a single door entry point and provides essential security features like image capture and remote locking.

II. LITERATURE SURVEY FOR PROBLEM IDENTIFICATION AND SPECIFICATION

Literature Survey

❖ Many traditional and modern systems have limitations:

- Existing Systems Issues
- Conventional locks can be easily broken or lost
- Video doorbells require subscriptions and cloud storage
- Limited remote access in basic systems
- Privacy concerns in cloud-based systems
- Research Findings

❖ Studies show that IoT-based systems improve:

- Real-time monitoring
- Remote accessibility
- Automation in security
- Problem Identified
- There is a need for:
- Low-cost security systems
- Real-time visitor verification
- Secure and private communication
- Easy-to-use remote control
- Proposed Solution

- ❖ **This project solves these problems by:**
- Using ESP32-CAM for image capture
 - Sending data via Telegram instead of cloud storage
 - Allowing direct user control of door lock

Project Objectives: -

Primary Objectives

- To design a smart door security system
- To capture visitor images when doorbell is pressed
- To send images to the user via Telegram
- To control door lock remotely using commands

Secondary Objectives

- To ensure secure communication (HTTPS)
- To avoid false triggers using debounce logic
- To reduce system delay
- To make the system portable and battery-powered

III. WORKING

The working of the system is simple and effective:

Step-by-Step Working

1. The system starts and connects to Wi-Fi
2. It waits for the doorbell press
3. When the button is pressed:

Camera captures image

Image is sent to user via Telegram

4. The user checks the image.
5. The user sends command:

/lock → Door locks.

/unlock → Door unlocks.

6. The relay controls the solenoid lock physically.

System Layers (as explained in page 10).

Sensing Layer: Detects doorbell press.

Camera Layer: Captures image.

Communication Layer: Sends data via internet.

Action Layer: Controls door lock.

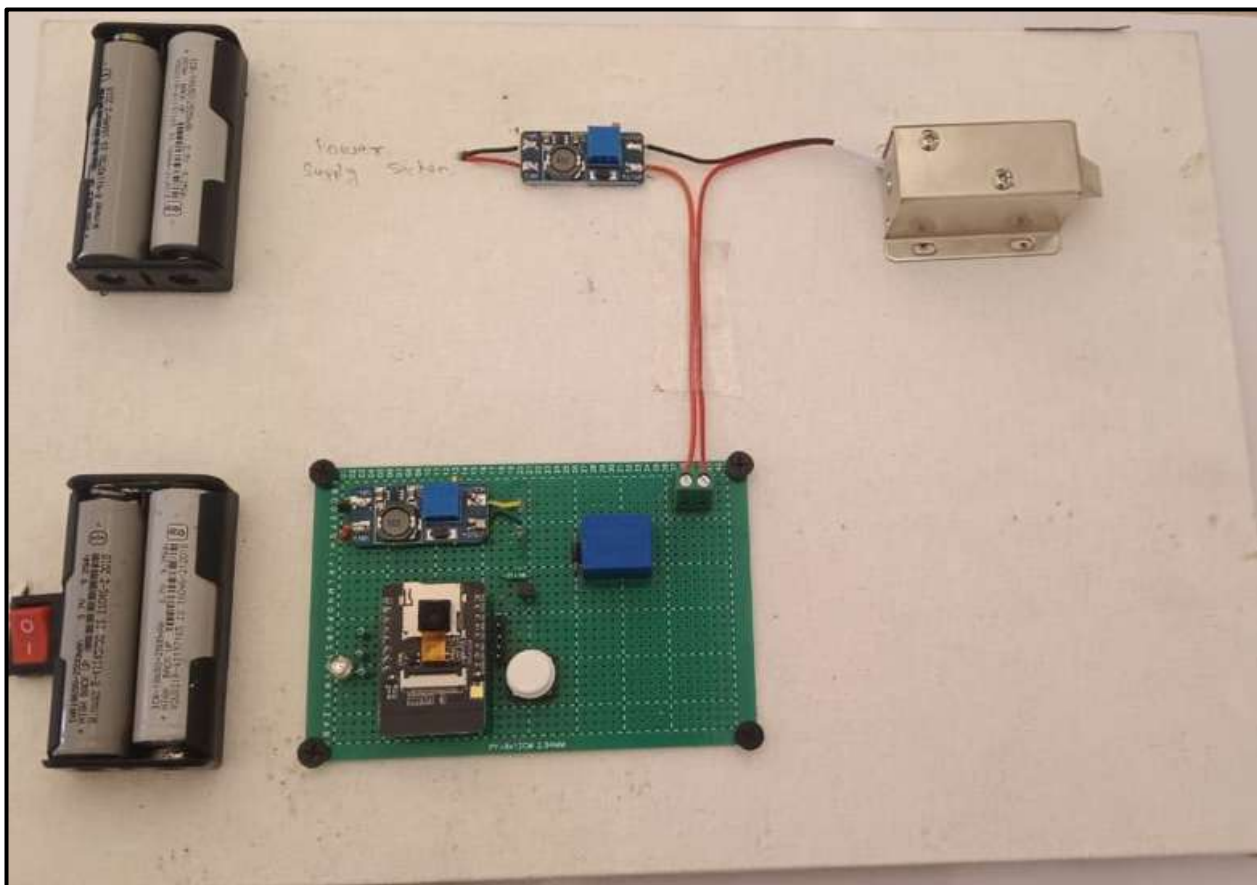
This process runs continuously in a loop.

V. EXPECTED RESULT

The system is expected to perform efficiently:

- Fast image delivery (around 4–6 seconds)
- High accuracy in capturing images
- Quick response to commands (within seconds)
- Reliable operation under normal Wi-Fi conditions
- Low power consumption
- From testing (page 16):
- 100% image capture success
- 98% delivery success rate
- Very low delay in lock/unlock response

VI. PROJECT SNAPSHOT



VII. CONCLUSION

This project successfully demonstrates a smart home security system using IoT technology. It provides real-time monitoring and remote control of door locks in a simple and affordable way. The system overcomes major challenges like hardware conflicts, communication issues, and system delays. It also ensures better privacy compared to commercial systems. In future, this system can be improved by adding features like face recognition, motion detection, and solar power. Overall, it is a practical and innovative solution for modern home security.

VII. REFERENCE

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