**Abstract**

**ECE SEC – 2**

**BATCH - 1**

**PROJECT TITLE**

# **REAL TIME IMAGE STREAMING FROM ESP32 CAM MODULE TO TELEGRAM CHATBOT**

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**Abstract**

In today’s increasingly interconnected world, security remains a paramount concern across both digital and physical domains. With rapid technological advancements and the pervasive growth of the Internet of Things (IoT), traditional security measures are evolving to address modern threats. Among these advancements, digital door locks have emerged as a popular alternative to conventional keys, leveraging technologies such as RFID, fingerprint recognition, facial identification, PINs, and passwords. These systems not only provide convenience but also offer enhanced security by reducing the risk of unauthorized access.

In this project, we present an innovative security solution that combines IoT, artificial intelligence, and real-time communication through a Telegram chatbot interface. The core of our system is built around the ESP32-CAM module—a cost-effective development board featuring an OV2640 camera, integrated Wi-Fi and Bluetooth connectivity, and a micro SD card slot for local storage. Powered by a robust 32-bit LX6 CPU, the ESP32-CAM provides sufficient processing power to support advanced functionalities such as real-time image capture and preliminary processing.

Our design integrates sophisticated face detection capabilities, which serve as the first line of identification. When the system detects a face at the door, it immediately captures an image and initiates a multi-layer security protocol. This includes verifying the individual’s identity through face recognition algorithms before triggering the smart door lock mechanism. The door lock, actuated by a solenoid, is designed to respond only to authorized inputs, thereby significantly reducing the risk of intrusions.

A standout feature of our system is its remote monitoring and control capability. Through a dedicated Telegram chatbot, users can receive real-time notifications and alerts on their mobile devices whenever a person is detected near the entrance. This immediate feedback loop enables homeowners to take prompt action if an unidentified individual is spotted, ensuring a higher level of security. Furthermore, the chatbot interface allows users to remotely control the door lock, review captured images, and even adjust system settings—all from the convenience of their smartphone.

This project not only demonstrates the successful integration of IoT and AI technologies for enhanced home security but also highlights the potential for future applications in areas such as surveillance, remote monitoring, and smart automation. By bridging the gap between traditional physical security measures and modern digital solutions, our system offers a robust and efficient approach to securing homes and other sensitive environments. The innovative use of low-cost components combined with intelligent processing paves the way for scalable security solutions that are accessible to a broader market, ultimately contributing to safer communities in the digital age.