

# Cost-Effective Smart Video Doorbell using ESP32 Cam

Suraj Tayde<sup>1</sup> and Asst Prof. Ankita Rekkewar<sup>2</sup>

Department of ETC<sup>1-2</sup>

Swaminarayan Siddhanta Institute of Technology, Nagpur, India

**Abstract:** *The ESP32-CAM Smart Doorbell is a low-cost innovative security solution that makes home monitoring better through real-time streaming of video and image capture. The system has the ability to stream live video upon doorbell button press or, if there are network limitations, send a captured image of the visitor. By using the ESP32-CAM microcontroller, the system provides fast video processing and wireless data transfer, and so it is a powerful and compact IoT-based security system. One of the standout features of the smart doorbell is that it shows the video in real time the moment a visitor rings the doorbell. The ESP32-CAM board with a built-in OV2640 camera captures and sends the video feed via Wi-Fi, enabling homeowners to remotely see the visitor using an Internet-connected device like a smartphone or computer. When network bandwidth is constrained, the system automatically switches to capturing and sending a snapshot instead of a video so that the homeowner still gets visual verification of the visitor. The smart doorbell is also intended for direct integration with IoT platforms, and as a result, video feeds or images can be accessed from anywhere in the world where there is an internet connection. It employs HTTP and MQTT protocols to transmit data efficiently, and cloud storage technologies can be integrated for saving previous visitor images or video recording. Moreover, the system can be further augmented with the integration of motion detection and facial recognition algorithms for high-end security applications. One of the key benefits of this system is that it has a low price point and is simple to install, using the ESP32-CAM, which is an inexpensive yet powerful microcontroller with in-built camera capabilities. In contrast to traditional video doorbells that take advantage of costly hardware and cloud-subscription services, this solution offers an open-source and DIY-orientated alternative at an affordable price point, accessible to many users. Additionally, it is powerable using a basic 5V power supply, thereby conserving energy effectively. The Smart Doorbell with ESP32-CAM provides a smart and budget-friendly solution for home security. Its capacity to stream live video, take and send photos, and support IoT platforms makes it a very convenient solution for today's smart homes. AI-powered facial recognition and motion-based notifications can further enhance its features, making it an integral part of next-generation home automation and security systems*

**Keywords:** ESP32cam, Video feed , AI , MQTT

