**SmartEdge Access: AI-Based Offline Face Recognition Door Lock System Using ESP32-CAM**

**Problem Statement:**

Conventional door lock systems, including traditional keys, RFID cards, and numerical pin pads, present inherent vulnerabilities such as susceptibility to loss, theft, or unauthorized duplication. Furthermore, touch-based access methods raise significant hygiene concerns, particularly in high-traffic public environments and sensitive healthcare facilities, where the spread of pathogens is a critical consideration. Concurrently, there is a growing and urgent demand for cost-effective, intelligent, and autonomous security solutions that can operate efficiently at the edge level, minimizing reliance on centralized infrastructure.This work directly addresses these critical limitations by proposing an innovative, low-cost, and self-contained AI-based system for secure access control. Utilizing the built-in AI face detection capabilities of the ESP32-CAM module (specifically leveraging ESP-WHO), the system aims to provide a robust alternative to traditional methods. Upon the successful detection and recognition of an authorized face, a signal is securely transmitted to a relay module, thereby unlocking the door. The system is designed for continuous operation, with the camera constantly scanning for faces and matching them against pre-stored templates in its local memory. Crucially, the entire process operates offline, ensuring enhanced privacy, rapid response times, and superior power efficiency, making it an ideal solution for modern edge AI deployments in various security and access management applications.