Smart Object Detection and Identification System

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Abstract: *In the era of automation and intelligent systems, the ability to recognize and classify physical objects in real-time has become increasingly vital across various domains, including smart homes, retail, inventory management, and educational technology. This project presents a low-cost, efficient, and real-time Smart Object Identification System using the ESP-CAM microcontroller integrated with a machine learning model. The ESP32- CAM captures images of objects and transmits them over Wi-Fi to a Python-based Flask server running a per- trained image classification model developed using Google's Teachable Machine. The server processes the images and returns the predicted object class, which can be displayed or used for further automated actions. By leveraging edge computing and lightweight machine learning techniques, this system demonstrates how embedded devices can be used for intelligent visual recognition tasks without relying heavily on cloud-based infrastructure. The solution is scalable, customization, and suitable for use in low-resource environments where affordability and portability are key.*

Keywords: ESP-32 Cam Module, Digital Image Processing , Open-CV in python, Control in web-server