Cam2Cart: Vision-Based Product Search using ESP32-CAM and Raspberry Pi

Abstract

In today's fast-moving world, automation and smart vision systems are becoming an essential part of daily life. This project, titled *Cam2Cart*, is designed to help users instantly search for products online just by writing their names on paper. The system uses an ESP32-CAM module to capture an image containing handwritten or printed text. That image is then processed on a Raspberry Pi using the EasyOCR model to recognize the text content. Once the text is recognized, it is automatically searched in an online browser such as Google or Amazon. This combination of computer vision and embedded systems provides a smooth interaction between the physical and digital worlds, allowing real-time recognition and response.

Problem Statement

Typing product names manually on search engines or shopping websites is time-consuming, especially when users have handwritten lists or non-digital information. There is a need for a simple, camera-based system that can automatically recognize and search for products without any typing effort.

Proposed Solution

The proposed system uses an ESP32-CAM to capture images of handwritten or printed text. A Raspberry Pi processes the captured image using EasyOCR, a deep-learning model for Optical Character Recognition (OCR). The recognized text is then used to perform an automatic product search on the web, removing the need for manual input.

Advantages

- Simple and low-cost design using easily available hardware.
- Real-time recognition of printed and handwritten text.
- Integration of AI (EasyOCR) with embedded IoT hardware.
- Works offline for OCR processing and supports online search.
- Saves time, improves convenience, and reduces typing effort.

Applications

- **Smart Retail Systems:** Instantly identify and search for items in stores or warehouses.
- **Assistive Technology:** Helps differently-abled users or the elderly perform web searches easily.

- **Educational Tool:** Ideal for teaching AI, IoT, and embedded vision concepts in colleges or labs.
- **Library Management:** Automatically identifies and catalogs books from title labels.
- **Inventory Automation:** Reads handwritten labels or part numbers for logistics tracking.
- **Research and Development:** Demonstrates integration of AI models with low-power embedded boards.