

## Raspberry Pi AI Vision Kit – Sony IMX500 Edition

Bring the power of edge AI and advanced image recognition directly to your Raspberry Pi projects with the **Raspberry Pi AI Vision Kit – Sony IMX500 Edition**. Designed for developers, makers, and engineers, this high-performance vision module combines **Sony's cutting-edge 12MP IMX500 image sensor** with integrated AI inferencing capabilities and an **RP2040 microcontroller**, providing a compact yet powerful solution for real-time image processing and object detection applications.

### Revolutionary AI-Powered Imaging

At the heart of this vision kit lies the **Sony IMX500 sensor**, a groundbreaking 12-megapixel image sensor that integrates an **AI processor directly within the chip**. Unlike traditional camera modules that rely on external processing, the IMX500 can perform **on-chip AI inferencing**, drastically reducing latency and enabling **real-time object recognition, tracking, and classification** without requiring cloud computation or high CPU/GPU load.

This innovative design makes it perfect for **edge AI applications** where speed, privacy, and energy efficiency are critical.



### **Integrated RP2040 Microcontroller**

The kit also features a **built-in Raspberry Pi RP2040 microcontroller**, the same dual-core ARM Cortex-M0+ chip that powers the Raspberry Pi Pico. The RP2040 manages firmware, controls sensor operations, and handles neural network models, providing seamless integration and flexibility. Developers can easily deploy, update, and manage **AI models directly on the module**, simplifying the workflow for embedded AI vision systems.

### **Pre-Loaded with MobileNet for Out-of-the-Box AI**

The Raspberry Pi AI Vision Kit comes **pre-loaded with MobileNet**, one of the most efficient and widely used convolutional neural networks for image classification and detection. This allows users to get started immediately with **AI-powered vision tasks** such as detecting people, objects, or specific patterns.

Whether you're building a **smart security camera, industrial inspection system, or autonomous robot**, the pre-configured AI model provides a strong foundation to accelerate your development.

### **High-Resolution Image Sensor Performance**

The **Sony IMX500** delivers crisp, detailed images with a **maximum resolution of 4056×3040 pixels at 10fps**, or **2028×1520 pixels at 30fps** for smoother video capture. The camera's **76° field of view** and **manually adjustable focus** allow users to fine-tune image clarity for various environments and distances.

From precision robotics to computer vision research, the IMX500 sensor ensures **exceptional low-light performance**, minimal noise, and true-to-life color accuracy — all crucial for reliable AI-based detection.

### **Real-Time AI at the Edge**

One of the most compelling features of the **AI Vision Kit** is its ability to perform **real-time AI inferencing directly on the camera**. Because processing happens locally on the IMX500 chip, there's no need to transmit large image data to an external processor or cloud server. This edge-based approach enhances **response speed, privacy, and power efficiency**, making it ideal for embedded AI applications in **IoT, robotics, smart surveillance, and automation**.

### **Seamless Compatibility with Raspberry Pi**

The module connects easily to any **Raspberry Pi board equipped with a CSI camera port**, including the **Raspberry Pi 4, Raspberry Pi 5, and Raspberry Pi Compute Modules**. Integration with the Raspberry Pi ecosystem means developers can leverage existing libraries, software frameworks, and community support to rapidly prototype and deploy AI vision solutions. Using Python or C++, developers can easily access video streams, run AI models, and interface with sensors or actuators to build complete **AI-driven systems**.

### **Applications**

- **Smart Cameras & Vision Systems** – Detect, track, and identify objects or people in real time.
- **Robotics & Automation** – Enable autonomous navigation, object avoidance, and environment mapping.
- **Industrial Inspection** – Perform quality control and defect detection on production lines.
- **Smart Home & IoT Devices** – Add AI vision capabilities to home automation projects.
- **Research & Education** – Ideal for universities, AI researchers, and STEM learners exploring machine learning at the edge.

### **Key Specifications**

- **Sensor:** Sony IMX500, 12 Megapixels
- **AI Processor:** Integrated neural network inferencing on-chip
- **Microcontroller:** Built-in Raspberry Pi RP2040
- **Pre-Installed Model:** MobileNet

- **Resolution Modes:**
  - 4056×3040 @ 10fps
  - 2028×1520 @ 30fps
- **Field of View:** 76°
- **Focus:** Manual adjustment
- **Interface:** Compatible with Raspberry Pi CSI camera port
- **AI Processing:** Real-time, on-device

### **Why Choose the Raspberry Pi AI Vision Kit – Sony IMX500 Edition**

This kit represents a **new era in embedded AI vision**. It eliminates the need for expensive, power-hungry AI systems by combining powerful local processing, compact design, and seamless Raspberry Pi integration. Whether you're a hobbyist experimenting with computer vision, an engineer building smart devices, or a researcher developing edge AI solutions, the **Raspberry Pi AI Vision Kit – Sony IMX500 Edition** delivers professional-grade performance in a developer-friendly package.