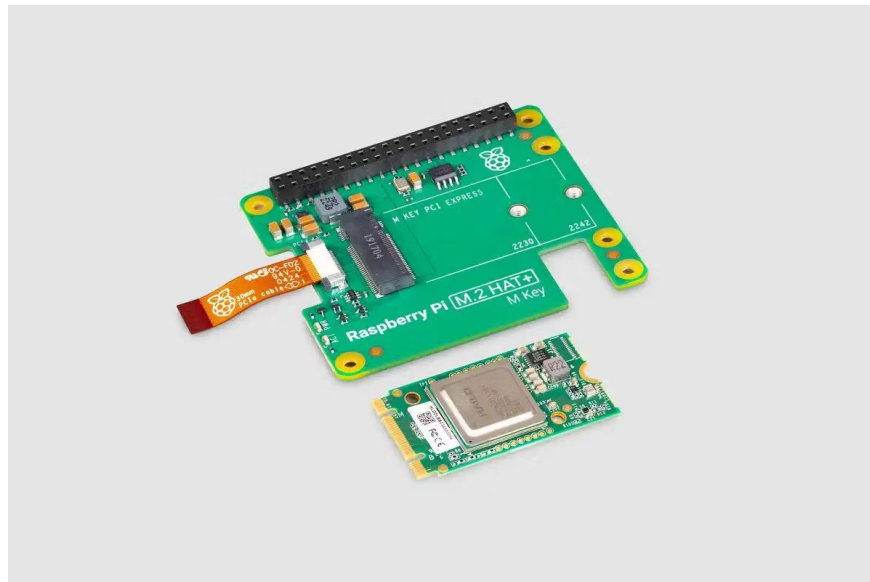


Raspberry Pi AI Kit: Bring AI to Raspberry Pi

The Raspberry Pi AI Kit is essentially Raspberry Pi's new M.2 HAT+ board integrated with the Hailo-8L acceleration module.

Raspberry Pi 5 is a versatile single-board computer that balances price, performance, and energy efficiency. However, it lacks an important feature that most modern computers are aiming for: Neural Processing Unit, or NPU for short.

What is Raspberry Pi AI Kit?



The Raspberry Pi AI Kit is essentially Raspberry Pi's new M.2 HAT+ board integrated with the Hailo-8L acceleration module.

The Hailo-8L module is an entry-level accelerator module capable of reaching up to 13 tera operations per second (TOPS) of real-time, low-latency inference performance (for comparison, computer chips Intel's Meteor Lake laptops offer around 10 TOPS, while its new Lunar Lake chips will deliver up to 40 TOPS). The M.2 HAT allows it to communicate with the Raspberry Pi 5, making it easier for the computer to handle AI workloads like object detection, image segmentation, and pose estimation.

The main advantage of running AI workloads on an NPU is that it reduces power consumption and frees up the main processor on the Raspberry Pi 5 for other computing tasks. Raspberry Pi AI Kit is compatible with first-party and third-party camera modules and supports load sharing with multiple cameras.

The kit also includes a 16mm GPIO stacking header, a thermal pad between the HAT+ and the module, as well as spacers and screws for mounting the AI ??Kit on the Raspberry Pi 5. The kit is available for pre-order with \$70 from CanaKit and approved Raspberry Pi resellers.

What can the Raspberry Pi AI Kit be used for?

In addition to the Raspberry Pi 5, you will need certain hardware and software to use the AI ??Kit's full potential. This includes an updated installation of the 64-bit Bookworm operating system and the Raspberry Pi camera module.

A Raspberry Pi 5 device running an updated 64-bit Bookworm image will automatically detect the Hailo module and support processes directly to the NPU. This feature works through the rpi-cam application software library built into the Raspberry Pi operating system.

So what are the potential uses of the Raspberry Pi AI Kit? This toolkit is primarily aimed at computer vision projects, i.e. applications that allow computers to understand and extract deep information from still or moving images. Raspberry Pi AI Kit can be used to speed up tasks such as:

1. Detect/recognize objects, display descriptive text, and objects detected by the artificial neural network
2. Image segmentation, which includes a neural network that performs object detection and segments different objects using color masks
3. Pose estimation detects up to 17 keypoints related to the position and orientation of each person and object in the image.

These capabilities can be applied in home automation, security, advanced vision-guided robotics, industrial process control and even in building 51 TOPS AI computers, as Jeff Geerling shows. Shown in my video:

Hailo's Raspberry Pi 5 example repository hosts a number of useful demos. Additionally, Hailo model zoo contains many pre-trained neural networks, which can serve as a springboard for your embedded projects.

Be sure to consult Raspberry Pi's official AI Kit documentation, including installation instructions, getting started guides, and other resources.

<https://www.raspberrypi.com/documentation/accessories/ai-kit.html>

Some limitations of Raspberry Pi AI Kit

The Raspberry Pi Company has partnered with AI startup company Hailo to create a toolkit that expands the potential of the Raspberry Pi 5. However, it has limitations.

For example, the Raspberry Pi 5 is a low-cost single-board computer that consumes a small amount of power and has only one PCI Express lane to communicate with the AI ??Kit. Therefore, AI Kit will not replace ChatGPT or DALL-E, but it will allow certain AI computing tasks to run quickly and efficiently on Raspberry Pi 5.

Still, it's a nifty little upgrade for the Raspberry Pi, and the on-device AI processing opens up even more doors for how the Raspberry Pi 5 can be used.

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