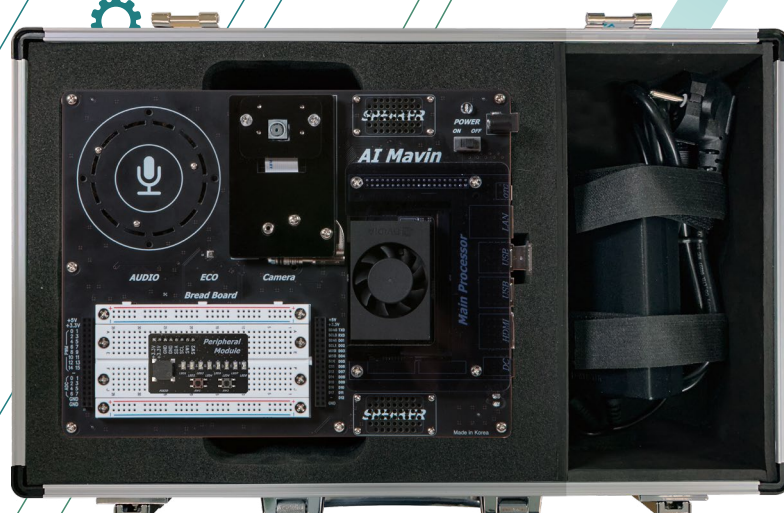


AI MAVIN

The best artificial intelligence equipment for Edge Computing



HANBACK ELECTRONICS

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Product specifications and appearance of this catalog are subject to change without notice.

v2.0.0

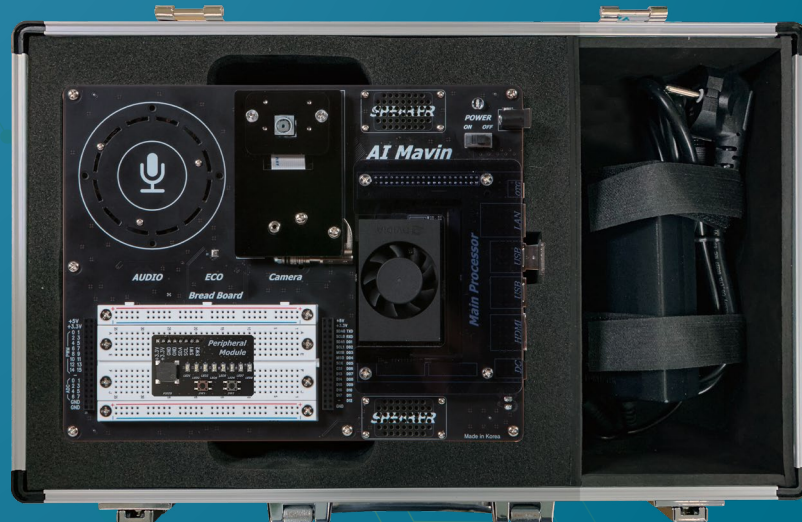
The best artificial intelligence equipment
for Edge Computing

AI MAVIN

Supports Speech to Text, Text to
Speech, and voice commands through
digital microphone and speaker

The main module supporting
AI accelerated calculation, and
multimedia & environment sensors are
integrated into the base board

Supports Soda OS
and Pop library,
the AloT dedicated
operating system



Provides Gigabit Ethernet,
dual-band Wi-Fi and Bluetooth

The main module is an edge
supercomputer with up
to 21TOPS supporting all
popular AI frameworks

- Various IoT sensor modules supported by dedicated expansion interface
- Interpreter-based C/C++ development environments optimized for programming beginners, including Python 3
- A dedicated web browser-based learning environment for training Python 3 and C/C++ simultaneously on PCs and tablets
- mDNS/DNS-SD based distributed name resolution, network service publishing and discovery support
- Open Integrated development environment based on Visual Studio Code for professional application development





Software Specifications

List	Specifications
Soda OS	Linux Kernel : aarch64 4.x
	Desktop : X-Server, Openbox, lxdm, Tint2, blueman, network-manager, conky, pcmanfm, lxterminal
	CLI : Zsh with Oh-My-Zsh, Tmux, Peco, powerlevel9k thema, Powerline fonts
	Tool Chain : GCC (c, c++), JDK, Node JS, Python3, Cling
	IDE : Visual Studio Code, NeoVim, Geany
	Connectivity : SSH Server, Samba Server, Remove Desktop Server, mDNS(avahi), Bluez, MQTT Server(Mosquitto), Blynk Server
	Multimedia : PulseAudio, sox (lame, oggenc), snowboy, Google Assistant, OpenGL ES, CUDA, OpenCV 4
	Data Science & AI : Numpy, Matplotlib, Pandas, Scipy, Seaborn, Scikit-learn, TensorFlow, Keras, PyTorch, TorchVision, OpenAI Gym
Pop Library	Output Object : Led, Laser, Buzzer, Relay, RGBLed, DCMotor, StepMotor, OLed, PiezoBuzzer, PixelDisplay, TextLCD, FND, Led Bar
	Input Object : Switch, Touch, Reed, LimitSwitch, Mercury, Knock, Tilt, Opto, Pir, Flame, LineTrace, TempHumi, UltraSonic, Shock, Sound, Potentiometer, Cds, SoilMoisture, Thermistor, Temperature, Gas, Dust, Psd, Gesture, Co2, Thermopile, Microwave, Lidar
	Multimedia (Python3) : AudioPlay, AudioPlayList, AudioRecord, Tone, SoundMeter
	Voice Assistant Object : GAssistant, create_conversation_stream
	AI Object : Linear Regression, Logistic Regression, Perceptron, ANN, DNN, CNN, DQN
	Pilot with AutoCar & SerBot



Hardware Specifications

List	Specifications
Main Module	CPU : 6-core NVIDIA Carmel ARM v8.2 64-bit, 6MB L2 + 4MB L3
	CPU Max Freq : 2-core@1900MHz, 4/6-core@1400Mhz
	GPU : 384-core NVIDIA VoltaTM GPU with 48 Tensor Cores
	GPU Max Freq : 1100MHz
	Memory : 8GB 128-bit LPDDR4x@ 1600MHz
	Storage : 16GB eMMC 5.1
	Video Encoder : 2x464MP/sec(HEVC), 2x4k@ 30(HEVC), 6x 1080p@ 60(HEVC), 14x 1080p@ 30(HEVC)
	Video Decoder : 2x690MP/sec(HEVC), 2x4k@ 60(HEVC), 4x4k@30(HEVC), 12x1080p@ 60(HEVC), 32x 1080p@ 30(HEVC), 16x 1080p@30(H.264)
	CSI Camera : Up to 6 cameras(36 via virtual channels), 12 lanes MIPI CSI-2, D-PHY 1.2(up to 30 Gbps)
	Connectivity : Dual Band Wireless Wi-Fi 2GHz/5GHz Band, 867Mbps, 802.11ac, Bluetooth 4.2, 10/100/1000 Base-T Ethernet
	Display : 2 multi-mode DP 1.4/eDP 1.4/HDMI 2.0
	USB : 4x USB 3.0, USB 2.0 Micro-B
	Image Sensor : Sony IMX219
	Resolution : 8M pixel native resolution sensor (3280 x 2464 pixel static images)
CAMERA(Rear/Front)	Video : 1080p30, 720p60 and 640x480p90
	Linux Integration : V4L2 driver available
	Focal length : 3.04 mm
	Horizontal field of view : 62.2 degrees
	Vertical field of view : 48.8 degrees
	Focal ratio (F-Stop) : 2.0
	High Performance Digital Microphone x 4ea
Sound	Sensitivity : -26 dBFS(Omnidirectional)
	Acoustic Overload Point : 120dBSPL
	SNR : 63dB
	Speaker : 2W x 2ea
Eco Sensor	Light Sensor : Illuminance to digital converter, Wide range : 1 ~ 65535(lx)
	Temperature Measure : -40 ~ 85°C
	Humidity Measure : 0 ~ 100%r.H.
	Pressure Range : 300 ~ 1100hPa
	VOC Measure : Ethane, Ethanol, Acetone, Carbon Monoxide, Butadiene, Methyl
Basic Module	I/O Interface : I2C
	Input Device : Tact Switch x 2ea(GPIO)
	Output Device : LED 8ea(I2C)
Sensor Module Interface	Actuator : Passive Buzzer
	Interface : +5V, +3.3V, GND, I2C, ADC, GPIO, SPI



Training Contents

• Case of Artificial Intelligence

• Lab Environment

Introduction to Equipment
Network Connection
Development Environment

• Camera Utilization

Image Utilization
Camera Utilization
Outline Detection
Face Detection

• Audio Utilization

Audio Sub system
PyAudio
Text to Speech
Google Assistant

• Data Science

Numpy
Pandas
Matplotlib

• Artificial Intelligence

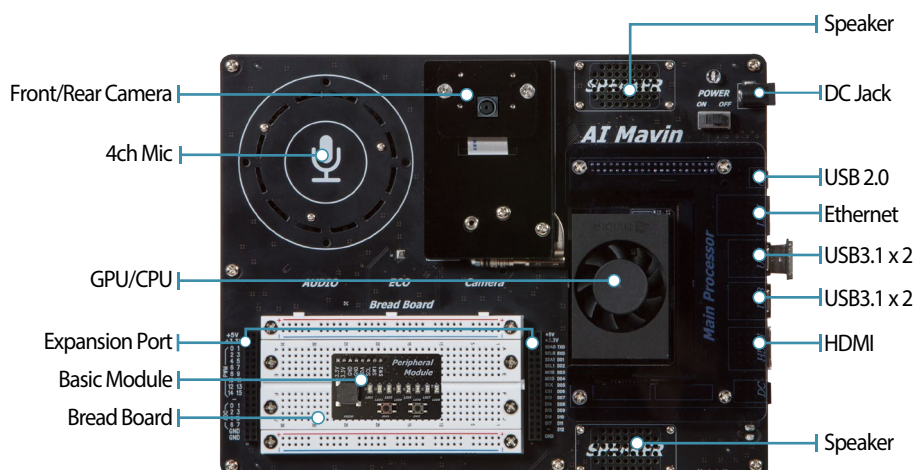
Machine Learning
Deep Learning
Reinforcement Learning
Tensorflow
Keras

• On-Device AI

Image Classification
Voice Classification
Handwriting Classification
Object Recognition



Layout



Product Composition



Platform USB
(include OS image and Tools)
1EA



12V 5A Adaptor
1EA



Micro SD Adaptor
1EA



USB to Ethernet
Adapter
1EA



Micro USB Cable
1EA



Ethernet Cable
1EA



User Guide book
1EA