

◎ Training Contents

Embedded System

Embedded System Overview
Application Areas of Embedded System
Embedded Hardware
Embedded Linux

Linux Kernel API

Linked List
Queue
Process Management and Scheduling
Memory Allocation and Deallocation
User Level Direct Memory Access
Kernel Timer
Kernel Thread
Interrupt
Export Symbol

Practice Environment

AI Mavin
Network Connection between PC
and AI Mavin
Development Environment
Equipment Boot Media
Kernel Source Code

Linux Kernel Driver

Virtual File System
Character Device Driver
Misc Device Driver
Device Tree
Platform Device Driver
I²C Device Driver
SPI Interface
Shared Library

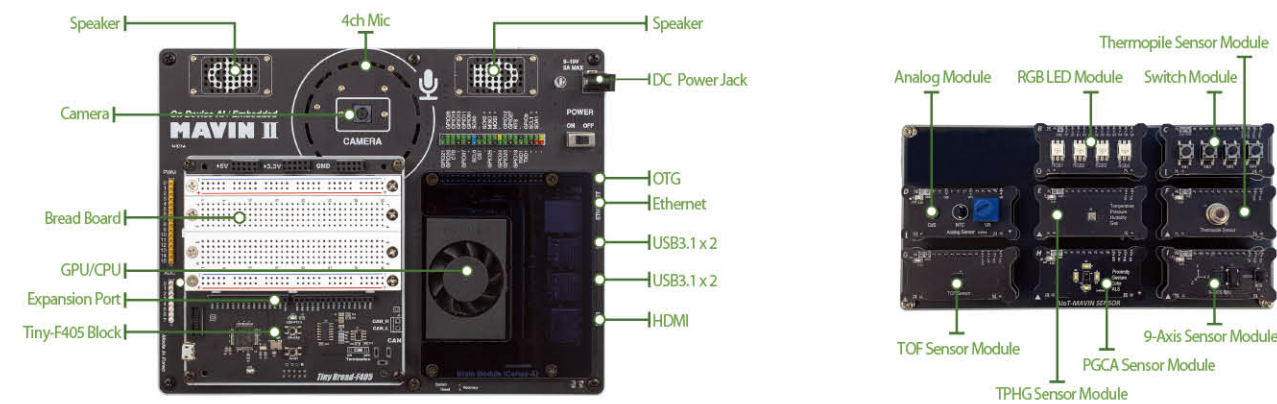
Linux Kernel Module

Module Programming
Kernel Module Implementation
Kernel Debugging
LED Control using Kernel Module
Switch Status Check using Kernel Module

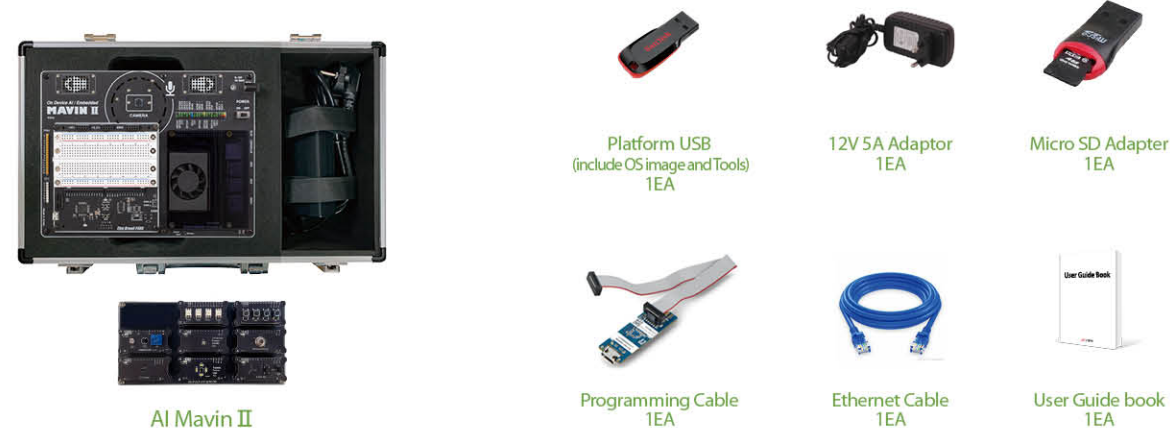
Image Processing

Computer Vision
OpenCV
OpenCV with CSI Camera
Motion Detect
Color Detect
Face Detection

◎ Layout



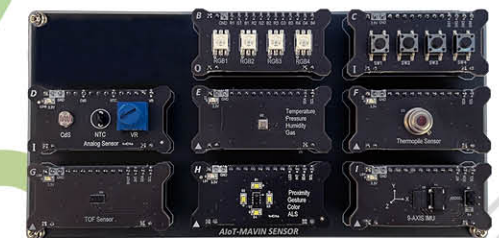
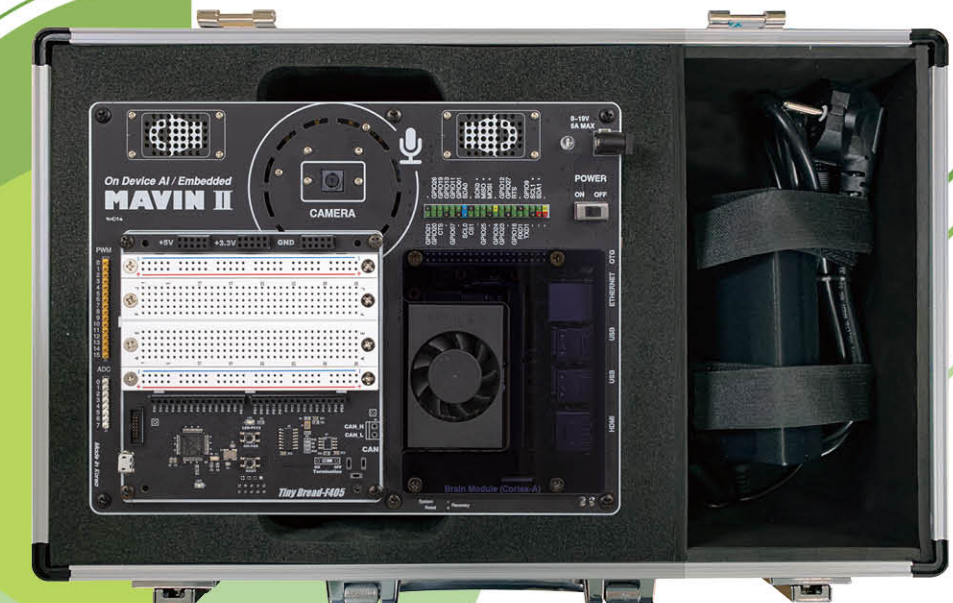
◎ Component



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Embedded Training Equipment

AI Mavin II



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ELECTRONICS
(주)한백전자
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HANBACK ELECTRONICS

518 Yuseong-daero, Yuseong-Gu, Daejeon 34202, South Korea
TEL. +82-42-610-1111, 1164 (Dir.)
FAX. 042. 610. 1199
E mail. support@hanback.co.kr



AI Mavin II



- ARM Cortex-A based high-performance embedded system training Equipment for Linux-based device driver implementation and application
- Main module is an edge supercomputer with a built-in GPU of up to 21 TOPS level. Applications support popular AI frameworks such as TensorFlow2, PyTorch, Caffe/Caffe2, MXNet, Keras, etc.
- Integrated configuration of main module that supports CUDA artificial intelligence acceleration calculation, speaker, digital array microphone, camera, high-precision environmental sensor, and breadboard
- User circuit configuration is possible through a breadboard, and application sensor modules are provided to integrate with the ARM Cortex-M processor
- High-resolution dual CSI camera with adjustable angle to enable image processing and deep learning-based vision processing learning is provided
- Gigabit Ethernet, dual-band Wi-Fi, and Bluetooth for IoT service to support PLC equipment and OPC-UA communication
- Support for MQTT-based IoT connectivity, OpenCV-based image processing, and QT-based GUI practice in conjunction with device driver
- Support Xeus-python and Cling interpreter for aarch64 and VSCode-based IDE to enable learning C/C++ and Python 3
- Linux kernel configuration and build, system call, platform device driver, MISC device driver, and application program implementation contents are provided

Operating Program

List		Specifications
Linux OS	Desktop	X-Server, Openbox, LightDM, Tint2, blueman, network-manager, conky
	CLI	Zsh, Oh-My-Zsh with powerlevel9k thema and nerd fonts, Tmux, fzf, bat, lsd
	Tool Chain	Python3, NodeJS, Java, Clang, GCC, LLVM
	IDE	Visual Studio Code, Jupyter Lab, NeoVim
	Connectivity	Remote Desktop Server with NoMachine, MQTT Broker with mosquitto, Jupyter Lab Server Bluez, paho-mqtt
	Multimedia	portaudio. sox, OpenCV, Google Assistant
	Data Science & AI	Python3, Numpy, Matplotlib, sympy, Pandas, Seaborn, Scipy, Gym Scikit-learn, Tensorflow, Keras
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
	Multimedia	AudioPlay, AudioPlayList, AudioRecord, Tone, SoundMeter
	Voice Assistant	GAssistant, create_conversation_stream
	AI	Linear Regression, Logistic Regression, Perceptron, ANN, DNN, CNN, DQN

Hardware Specification

List		Specifications
Main Module	CPU	6-core ARM v8.2 64-bit 6MB L2 + 4MB L3 Max Freq: 6-core@1900MHz
	GPU	384-core NVIDIA VoltaTM GPU with 48 Tensor Cores Max Freq: 1100MHz
	Memory	8GB 128-bit LPDDR4x@ 1600MHz
	Storage	16GB eMMC 5.1, NVMe 256GB SSD 1ea(M.2)
	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 WiFi 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
Camera	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)
	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
Sound	High Performance Digital Microphone	4ea
	Sensitivity	-26 dBFS(Omnidirectional)
	Acoustic Overload Point	120dB SPL
	SNR	63dB
	Speaker	2W x 2ea
Expansion Interface	GPIO	12 Pin (Alternative Function: I ² C, SPI)
	ADC	8 Pin
	PWM	16 Pin
	UART	1 Port
	Power	+5V 4 Pin, +3.3V 2 Pin, GND 6 Pin
	BreadBoard	Terminal Strip : 2ea / 350 holes, Distribution Strip : 2ea / 120 holes
Expansion Module	Tiny-F405 Module	+5V, GND, I/O Connector ARM®32-bit Cortex®-M4 CPU CAN, ADC, I ² C, SPI, GPIO etc Mixed CAN 2.0B and CAN FD STDC14 debug connector Serial Wire Debugging(SWD), Virtual COM Port(VCP) support
	Switch Module	Power : +3.3V, GND Input Device : Tact Switch x 4ea(GPIO 4)
	RGB LED Module	Power : +3.3V, GND output device : RGB LED 4ea(GPIO 12)
	Analog Module	Power : +3.3V, GND output device : CdS, NTC, VR(Analog 3)
	TPHG Sensor Module	Power : +3.3V, GND I/O Interface : I ² C Temperature Measure : -40 ~ 85°C Pressure range : 300 ~ 1100hPa Humidity Measure : 0 ~ 100%r.H. VOC Measure : Ethane, Ethanol, Acetone, Carbon Monoxide, Butadiene, methyl
	Thermopile Sensor Module	Power : +3.3V, GND I/O Interface : I ² C Factory calibrated in wide temperature range : -40 ~ +125°C for sensor temperature and -70 ~ +380°C for object temperature. High accuracy of 0.5°C over wide temperature range (0 ~ +50°C for both Ta and To) High (medical) accuracy calibration Measurement resolution of 0.02°C
	TOF Sensor Module	Power : +3.3V, GND I/O Interface : I ² C 940 nm laser VCSEL Measures absolute range up to 2 m Eye Safe : Class 1 laser device compliant with latest standard IEC 60825-1 : 2014 - 3rd edition
	PGCA Sensor Module	Power : +3.3V, GND I/O Interface : I ² C, GPIO Proximity Sensing Gesture Detection RGB Color Sensing & Ambient Light Operating Range : 4-8in (10-20cm) White BackLight LED 4ea(GPIO Control)
	9-Axis Sensor Module	Power : +3.3V, GND I/O Interface : I ² C an advaced triaxial 16bit gyroscope, a versatile, leading edge triaxial 14bit accelerometer and a full performance geomagnetic sensor Gyroscope Range switchable ±125/S to ±2000°/S Low-Pass filter bandwidth 523Hz - 12Hz Accelerometer Range : ±2, ±4, ±8, ±18g Low-Pass filter bandwidth 1kHz -< 8Hz Magnetic field rage typical ±1300uT(x-,y-axis), ±2500uT(z-axis) Magenetic field resolution of ~0.3uT