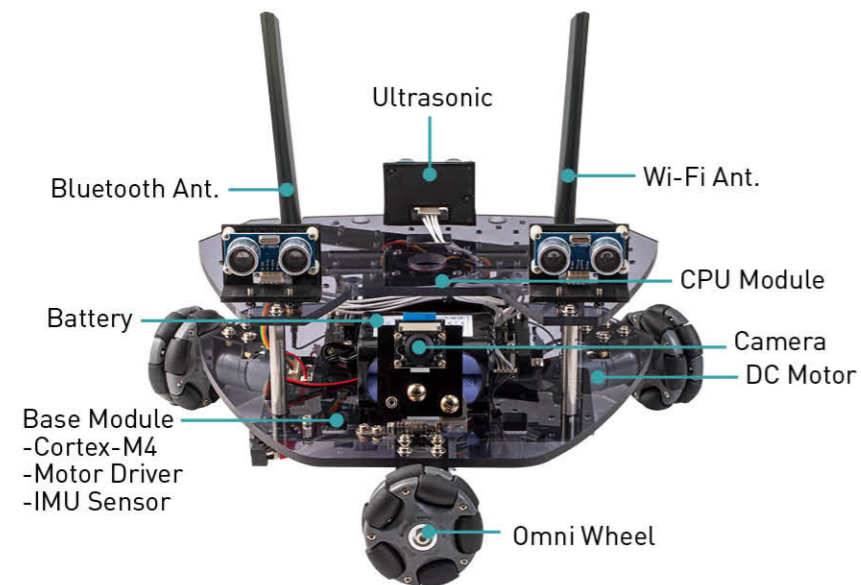## Training Contents

- **Introduction to AIoT SerBot Mini**
  AIoT SetBot Mini - Configuration
  AIoT SetBot Mini - Assembly Procedure
  AIoT SerBot Mini - Practice Environment

- **IoT Sensor and Actuator Contrlo Technology**
  Sensor Contrlo and Usage
  Control and Usage of Actuator
  MQTT based Communication Application

- **Artificial Intelligence Technology**
  Data Preprocessing Technology
  Linear Logistic Regression and Data Prediction
  Perceptron and Logical Operation
  CNN, Image Classification and Exploration

- **Service Robot Application Technology**
  IMU-based Posture Control Practice
  CAN Cpmmunication Practice
  Remote Control Practice
  Deep Lerning-based Driving Practice

- **Intelligent Service Robot Project**
  Sensor Fusion and Driving Algorithm
  Tansfer Learning for Deep Learning Exploration
  Models
  Localizarion and point-to0point movement

Layout

- Ultrasonic
- Bluetooth Ant.
- Wi-Fi Ant.
- CPU Module
- Battery
- Camera
- DC Motor
- Base Module
  -Cortex-M4
  -Motor Driver
  -IMU Sensor
- Omni Wheel

Components

AIoT SerBOT Mini

Platform USB
(include OS image and Tools)
1EA

19V/2.1A Charger
1EA

Micro SD Adapter
1EA

USB to Ethernet
Adapter
1EA

Ethernet Cable
1EA

USB Cable
1EA

User Guide book
1EA

AIoT SerBOT Mini

Assembleable Indoor Intelligent IoT Service Robot Practice
Equipment with Brain module and Driving module

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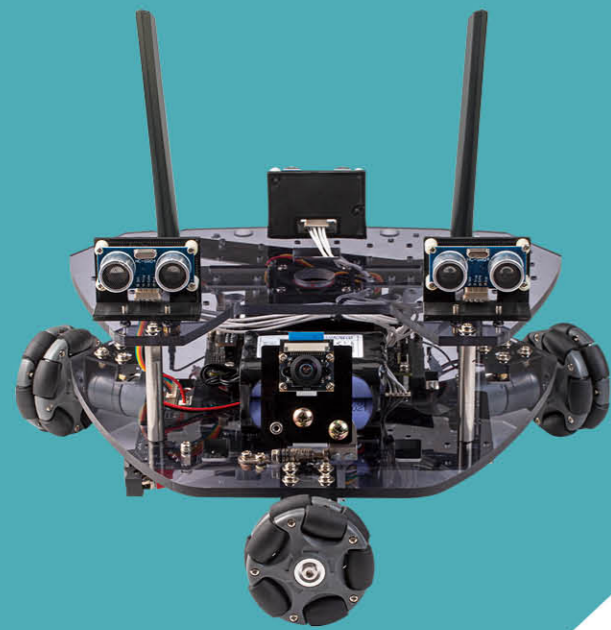
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Homepage

AIoT SerBOT Mini

- Indoor intelligent IoT service robot training equipment can be assembled and consists of brain module and driving module
- Drive unit adopts a 3-axis omni wheel to maximize the robot's movement efficiency and minimize the turning radius
- Main module is an edge supercomputer to support all popular AI framework
- Gigabit Ethernet, dual-band Wi-Fi and Bluetooth for IoT connectivity are provided
- Camera-based self- driving algorithm is implemented and vision camera for AI recognition judgment is built-in
- Large-capacity battery and built-in charger
- Supports dedicated operating system, Soda OS and Pop library, to minimize hardware dependence
- Supports interpreter-based C/C++ development environment optimized for IoT programming including Python 3
- Supports web browser-based dedicated learning environment that can simultaneously learn Python 3 and C/C++ on PC and tablet
- Confirming the name of mDNS/DNS-SD based dispersion and supporting the posting and discovery of network service
- Supports integrated development environment for public use based on Visual Studio Code for professional application development
- Provides IoT learning contents and deep learning-based service robot learning model

⩔ Operating Program

List		Specifications		
Soda OS	Linux Kernel	aarch64 4.x		
	Lightweight Desktop	X-Server, Openbox, lxdm, Tint2, blueman, network-manager, conky pcmanfm, lxterminal		
	CLI	Zsh with Oh-My-Zsh, Tmux, Peco, powerlevel10k thema, Powerline fonts		
	Tool Chain	GCC (c, c++), JDK, Node JS, Python3, Cling, Clang		
	IDE	Visual Studio Code, NeoVim		
	Connectivity	SSH Server, Samba Server, Remove Desktop Server, mDNS(avahi) Bluez, MQTT Server(Mosquitto), Blynk Server		
	Multimedia	PulseAudio, sox (lame, oggenc), Google Assistant OpenGL ES, CUDA, OpenCV 4, Qt5		
	Data Science & AI	Numpy, Matplotlib, Pandas, Scipy, Seaborn Scikit-learn, TensorFlow, TensorRT, Keras, PyTorch, TorchVision, OpenAI Gym		
	Middleware	ROS2 Eloquent (or Higher), Rviz, DDS, Colcon Build System		
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 Object	AudioPlay, AudioPlayList, AudioRecord, Tone, SoundMeter, Camera(Single&Stereo)		
	Voice Assistant Object	GAssistant, create_conversation_stream		
	AI Object	Linear Regression, Logistic Regression, Perceptron, ANN, DNN, CNN, DQN Pilot with AutoCar & SerBot		
PC linkage development environment	Jupyter Lab	Python3 and Cling support IPython Widgets Terminal support Pop Library support	Visual Studio Code Insiders	Remote SSH Python3 and Debugging support Terminal support Pop Library support

⩔ Hardware Specifications

List		Specifications
Main Module	CPU	Quad-core ARM A57 @ 1.43 GHz
	GPU	Maxwell Core 128ea
	Memory	4GB 64-bit LPDDR4 25.6 GB/s
	Storage	microSD (64GB)
	Video Encoder	4K@30 | 4x 1080p@30 | 9x 720p@30 (H.264/H.265)
	Video Decoder	4K@60 | 2x 4K@30 | 8x 1080p@30 | 18x 720p@30 (H.264/H.265)
	Camera	MIPI CSI-2 DPHY lanes
	Connectivity	Dual Band Wireless WiFi 2GHz/5GHz Band, 867Mbps, 802.11ac Bluetooth 4.2 Gigabit Ethernet
	Display	HDMI and display port
	USB	4x USB 3.0, USB 2.0 Micro-B
Base Board	Driver and Measure Part	32bit Cortex-M4 Processor Motor Driver 3ea Ultrasonic Tx/Rx 3 pair CAN Communication
	IMU Sensor	Gyroscope Range: ±125°/s to ±2000° Accelerometer Range: ±2g/±4g/±8g/±16g Magnetic field range: ±1300uT(X-, Y-axis), ±2500uT(Z-axis) Interface: I²C Supply Voltage: 3.3V
Body	Size	285 x 285 x 150 mm
	Weight	3.2Kg
	Battery	11.1V / 5800mA Battery Temperature Monitoring
	Wheels	3 Omni-directional Wheel(58mm)
	Motor	DC Motor 3ea (with Encoder) Speed 170RPM
Vision Processing	Camera	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 Angle of view: 160 degreesFocal ratio (F-Stop): 2.35