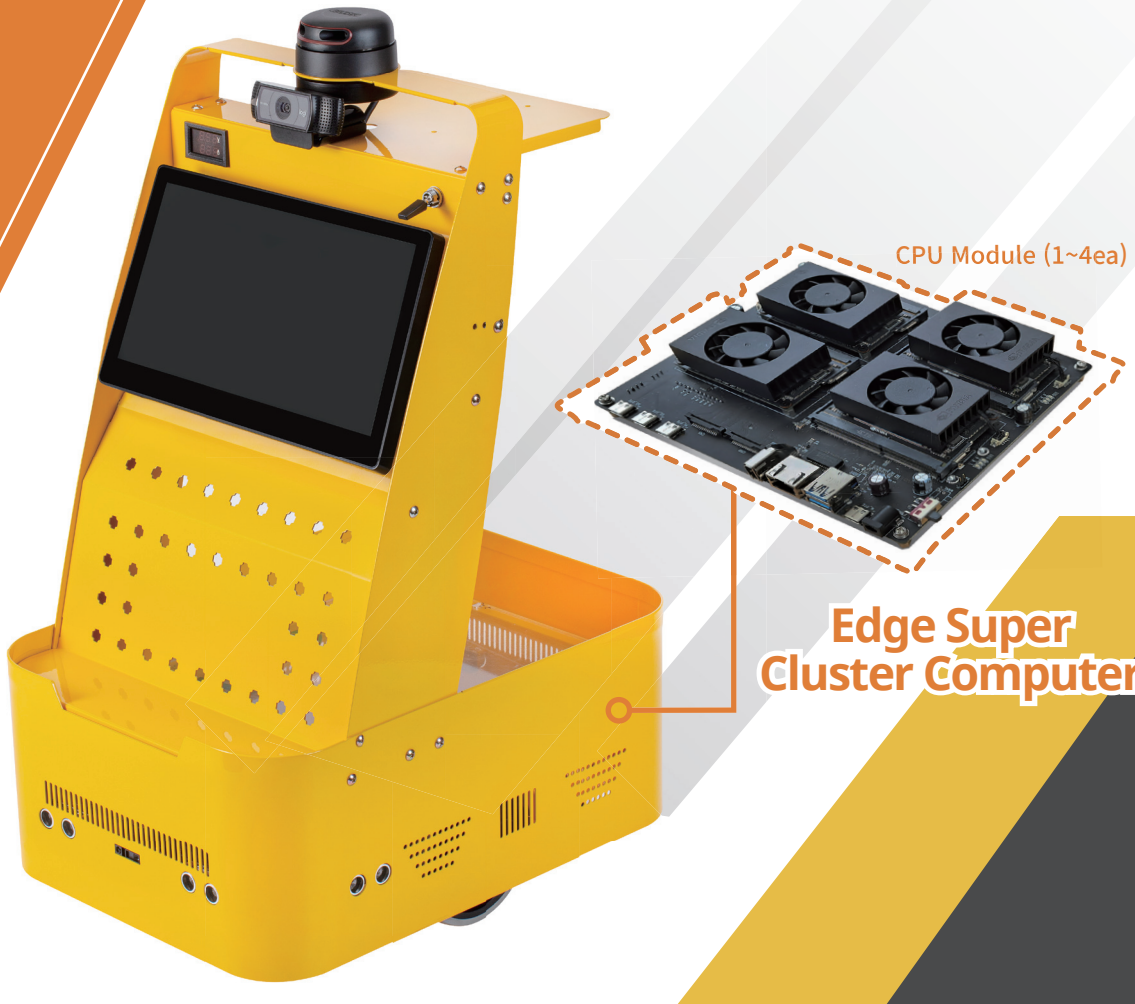
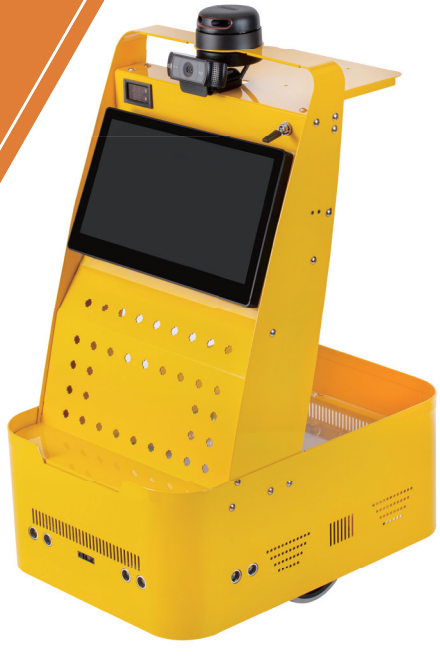
Scientech

AIoT SerBot AGV



AIoT SerBot AGV



- Deep learning based indoor service robot developing platform composed of cluster computing-artificial intelligence unit (recognition/judgment) and MCU-operation control unit
- The artificial intelligence unit is composed of a computer cluster where 1-4 industrial-use high-performance NVIDIA edge super computing modules are tied with the Gigabit switch on-board enabling to develop and operate high-performance deep learning models in the robot operating system (ROS2) environment
- The artificial intelligence unit provides the interfaces of Gigabit Ethernet, 802.11ac Wi-Fi, Bluetooth, USB 3.0, USB OTG, CAN, I2C, SPI, GPIO so that operating control of unmanned vehicle can be possible
- The operating control unit connected to the artificial intelligence unit with CAN is composed of high-performance STM Cortex-M4 processor, motor driver, ultrasonic sensor, proximity sensor, Zigbee V3.0, and CAN transceiver to control the unmanned vehicle in real time
- Camera and high-performance 360-degree Lidar are provided to realize autonomous driving service that learns and operates the surrounding situation
- The 11.6-inch touch display with a resolution of 1080p is provided to realize the GUI-based intelligent service robot interface
- High-performance digital microphone and speaker are provided to control the robot and check service robot condition by voice
- Ultrasonic sensor and PSD sensor are provided to sense obstacles and autonomous driving of the service robot, and DC motor including an encoder is also provided to calculate the driving distance
- Wi-Fi and Bluetooth communication are provided to enable remote control of the service robot through PC, smartphone, and tablet, and ZigBee V3.0 is provided to enable the platoon driving and collaboration among service robots
- Enable continuous training with the large capacity battery and efficient charging system
- Minimize the time required to install and set the corresponding library and framework with controlling Soda OS where Ubuntu Linux is optimized for robot operating system (ROS2) and CUDA-based deep learning framework
- Supports Visual Studio Code based open integrated development environment for professional application development
- Learning models of deep learning based service robot and training contents are provided

Hardware Specifications

List		Specifications		
Body	Dimension	330 x 450 x 680 (mm)	Motor	DC Geared Motor DC 12V, Max. 4.7Kg-cm, 180rpm
	Weight	17kg (about)	Display	11.6" TFT LCD(1920x1080) Resolution: 1920 x 1080 Interface: HDMI
	Battery	14.8V/12000mA	Camera	Resolution: 1080p/30fps Focus: Auto Lens: Full HD glass Field of View: 78° Interface: USB
	Wheels	2Wheels, Auxiliary wheel 4ea	LiDAR	Distance Range : 12m Angular Range : 0 ~ 360degree Distance Resolution : <0.5(0.15 ~ 1.5meters) Angular Resolution : 0.9degree Sample Duration : 0.25 millisecond Sample Frequency : 4KHz Scan Rate : 10Hz
	Microphone	High Performance Digital Microphone x 4ea Sensitivity : -26 dBFS(Omnidirectional) Acoustic Overload Point : 120dBSPL SNR : 63dB		
	Voltage/Current Meter	DC 4~28V measurement Current 0~10A measurement Tolerance +- 1% Operation temperature -10°C ~ 65°C		

Hardware Specifications

List		Specifications
Artificial Intelligence (cognitive/judgment) Unit	Cluster board with up to 4 System-on-Modules connected to gigabit switches	260pin SODIMM Edge Connector x 4ea Cooling Fan connector x 4ea 5Port gigabit switches (Internal x 4ea, External x 1ea) Fully ISO 11898-2/5 & SAE J2284 Compliant CAN Transceiver x 1ea USB 3.0 x 4ea, OTG x 4ea HDMI 2.0 x 1ea M.2 Key-M NVMe with PCIex4 x 1ea, M.2-Key E with PCIex1 x 1ea MIPI CSI-2, D-PHY 1.2(up to 30 Gbps) x 2ea MicroSD card slot x 1ea
	System-o n-Modules with Industrial (1~4ea)	CPU: NVIDIA 6-core Carmel ARM v8.2 64-bit GPU: NVIDIA 384 CUDA Cores and 48 Tensor cores DLA: 2x NVDLA Engines Memory: 8GB 128-bit LPDDR4x@51.2GB/s Storage: 16GB eMMC 5.1 Video Encoder: 4k@30(HEVC), 1080p@60/30(HEVC) Video Decoder: 4k@60/30(HEVC), 1080p@60/30(HEVC), 1080p@30(H.264)
	Storage	NVMe(M.2) SSD 256GB
	Connectivity	Dual Band Wireless WiFi 2GHz/5GHz Band, 867Mbps, 802.11ac Bluetooth 4.2 10/100/1000 Base-T Ethernet
	External Interfaces	CAN x 1ea, SPI x 1ea, I2C x1ea, GPIO x 3ea
Operation Control Unit	Tiny MCU	Cortex™-M4 core (with floating point unit) running at 168 MHz 1x USB OTG (one with HS support) 1x SPI running at up to 42 Mbit/s 1x I2C 1x CAN 6x 12-bit ADCs reaching 2.4 MSPS or 7.2 MSPS in interleaved mode 12x GPIO 1x SWD
	Motor Driver x 2ea	Operation Voltage 12V Peak output current per channel 2A
	Ultrasonic Tx/Rx x 6 pair	Operation Voltage 5V Measurement Range 4cm – 400cm
	PSD x 2ea	Operation Voltage 5V Detecting distance 10cm – 80cm Distance Output type : Analog Voltage
	ZigBee V3.0 x 1ea	Operation Voltage 3.3V Data rate RF 250Kbps, Serial up to 1 Mbps Indoor/urban range up to 60m Outdoor/RF Line-of-sight range up to 1200m Serial data interface : UART Frequency band : ISM 2.4GHz
	CAN Transceiver	Fully ISO 11898-2, 11898-5 & SAE J2284 Compliant CAN FD Ready Communication Speed up to 5 Mbps
Option Module	Sensor Interface	1x CAN
	3D LiDAR	
	3D Camera	

Operating Program

List		Specifications
Soda OS	Linux Kernel	aarch64 4.x
	Lightweight Desktop	X-Server, Openbox, lxdm, Tint2, blueman, network-manager, conky pcmanfm, lxterminal
Option Module	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, JAX Framework
	Middleware	ROS2 Eloquent(or Higher), Rviz, DDS, Colcon Build System

Operating Program

List		Specifications
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 Series
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

Training Contents

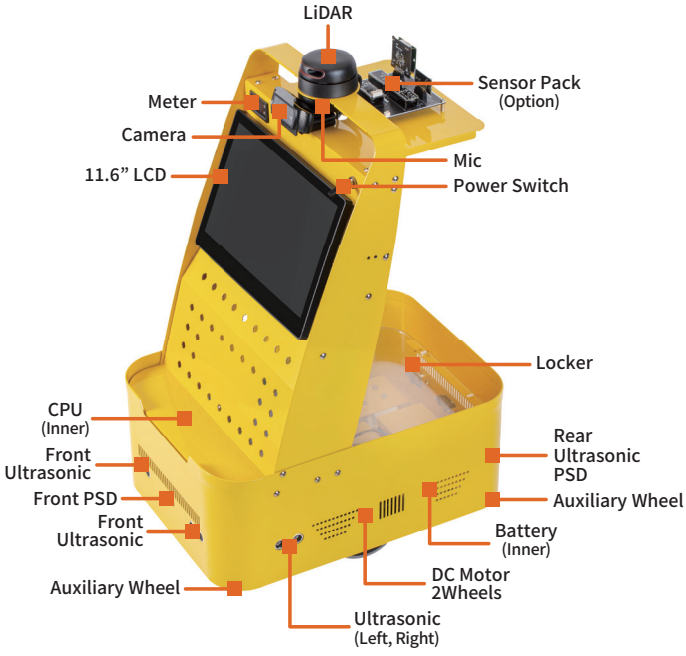
Introduction of SerBot AGV
Composition of SerBot AGV
Training Environment of SerBot AGV

Robot Operating System
Basic Concept of Robot Operating System
Autonomous Driving HW Abstraction Layer
Applications of Topic and Service
Applications of Action and Parameter

Technology based on Artificial Intelligence for Autonomous Driving
Pop.AI based Linear & Logistic Regression Theory and Training
Pop.AI based ANN, DNN, and CNN Theory and Training
Image Processing
Deep Learning and YOLO

Realization of Deep Learning Autonomous Driving
Overview of Deep Learning based Autonomous Driving Technology
Basic Driving Training
Remote Control Training
Collision Prevention Traning
Object-following Movement Training
Transfer Learning

Layout



Components


Platform USB
(include OS image and Tools)
1EA


19V 6A Charger
1EA


USB to Ethernet Adapter
1EA


Ethernet Cable
1EA


Micro USB Cable
1EA

User Guide book
1EA

Scientech Technologies Pvt. Ltd.
94, Electronic Complex, Pardesipura, Indore-452010, India.
✆ +91-731-4211100, ✉ info@scientech.bz, www.ScientechWorld.com, Helpline : +91 9893270301