

운영프로그램 사양

OS

Kernel Linux Kernel 6.x

Desktop · Window Manager : OpenBox
· Display Manager : LightDM
· Panel : Tint2
· System Monitor : conky
· Bluetooth Manager : blueman
· Network Manager : network-manager
· Graphics : NVIDIA Driver, CUDA V12.x, Runtime (cudart)

CLI · Shell : Zsh, Oh-My-Zsh with powerlevel9k thema and nerd fonts
· Terminal Multiplexer : Tmux
· Base Tools : fzf, bat, ls

Tool Chain Python3, NodeJS, Java, Clang, GCC, LLVM

IDE Visual Studio Code, Jupyter Lab, NeoVim

Library · Data analysis : numpy, matplotlib, Pandas, SciPy, seaborn, plotly, Folium
· Image Processing : OpenCV, Mahotas, SimpleCV, Pillow, Scikit-Image, SimpleITK, Pgmagick
· Audio Processing : Pydub, Librosa, Soundfile, Pedalboard, Supriya, Libsox, Pyo, Pippi

AI

CUDA Toolkit, cuDNN, TensorRT

Framework PyTorch, TensorFlow, Keras, Scikit-Learn

Algorithm · Machine Learning : Linear regression, Logistic regression, Decision tree, SVM, Naive Bayes, KNN, K-means, Random forest, Dimensionality reduction, Gradient boosting algorithm and AdaBoosting
· Object Detection : HOG, R-CNN, Faster R-CNN, SSD, YOLO, RetinaNet
· Generative AI : Llama2

NVIDIA Model TrafficCamNet, BodyPoseNet, PeopleNet, PeopleSemSegnet, VehicleMakeNet, VehicleTypeNet, FaceDetectIR, FaceDetect, FaceNet, FPNNet, GazeNet, EmotionNet, HeartRateNet, LPDNet, DashCamNet, TAO Pretrained DetectNet V2, WaveGlow, Flowtron, Fine-tuning Flowtron Model, LangID PearlNet

Pop Library support Linear Regression, Logistic Regression, Perceptron, ANN, DNN, CNN, DQN

Blockly with Pop Library support

CARLA

Unreal Engine 4.x

Scalability via s server multi-client architecture

Actors and blueprints · Managing the blueprint library
· Actor life cycle : Spawning, Handling, Destruction
· Types : Sensors, Spectator, Traffic signs and traffic lights, Vehicles, Walkers
· Add a new vehicle

Maps and navigation · Maps : Changing the map, Landmarks, Waypoints, Lanes, Junctions, Environment Objects
· Navigation : Navigating through waypoints, Generating map navigation
· CARLA maps : Non-layered maps, Layered maps, Custom maps
· HBE maps : SimpleTrack
· Generate maps with OpenStreetMap
· Generating Maps in RoadRunner

Traffic Manager · Localization State
· Collision State
· Traffic Light State
· Motion Planner State
· Vehicle Lights State
· In-Memory Map
· Path Buffer and Vehicle Tracking
· PID controller

Sensors · Cameras : Depth, RGB, Optical Flow, Semantic segmentation, Instance segmentation, DVS
· Detectors : Collision, Lane invasion, Obstacle
· Other : GNSS, IMU, LIDAR, Radar, RSS, Semantic LIDAR

Custom assets Adding props, Adding vehicles, Packaging assets, Custom materials

ROS integration and Pop Library support

기타제공

| 사용자 교육 | 품질보증서 1부 | 1년간 무상 수리 | 용도 : 실험 실습용 | 수요처 지정장소납품

* 위의 내용은 제품의 Upgrade등의 이유로 Spec이 추가되거나 변경될 수 있습니다.

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인공지능 서비스로봇학습 및 평가에 필요한
테스트 필드와 미션 판정 시스템

X-Field



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본 카탈로그의 제품사양 및 외형은 품질개선을 위해 예고 없이 변경될 수 있습니다. V1.0.0



홈페이지 바로가기



- 인공지능 서비스로봇 학습 및 평가에 필요한 테스트 필드와 미션 판정 시스템으로 구성
- 테스트 필드는 알루미늄 재질의 가이드와 가변형 벽체로 구성되며 수요기관과 사전 협의 하에 제작 및 설치
- 테스트 필드는 가변형 벽체의 전체 또는 일부를 분리해 필요한 크기의 공간 분할 및 미로 제작 가능
- 테스트 필드는 서비스로봇 전체를 충전할 수 있는 전원 콘센트 내장
- Wi-Fi 6E 기반 고성능 메시 라우터 AP로 대규모 무선 네트워크 구축 지원
- 미션 판정 시스템은 24코어, 32스레드 CPU와 570TOPs 급 인공지능 성능을 제공하는 GPU내장
- 대용량 데이터 처리를 위해 64GB 메인 메모리와 2TB SSD 내장
- 대용량 인공지능 워크로드를 처리할 수 있도록 고효율 쿨링 시스템 탑재
- 충분한 작업공간 확보를 위해 최소 시스템 패키지로 재구성한 우분투 리눅스 배포판 제공
- 쉽게 시스템을 초기 상태로 되돌릴 수 있도록 파일 시스템 복구 모드 지원
- CUDA 설정을 비롯해 인공지능 프레임워크 및 알고리즘과 학습 모델 사전 탑재
- CUDA 기반 PyTorch 및 Tensorflow 딥러닝 프레임워크 및 개방형 대형 언어 모델 지원
- 개방형 디지털 자산이 포함된 오픈 소스 기반 CARLA 시뮬레이터 내장
- 65인치 대형 모니터를 통해 미션 수행 과정과 딥러닝 판정 결과 출력 지원
- 미션 판정에 필요한 천장 설치형 최저 조도 0룩스 CMOS 네트워크 카메라 제공
- 미션 판정 시스템은 네트워크 카메라를 통해 딥러닝으로 사용자 미션 자동 판정 지원
- 전문적인 응용 개발을 위해 Visual Studio Code 기반 통합개발환경 지원
- 서비스로봇용 사용자 미션 테마 제공

하드웨어 사양

Test Field : Custom made in grid format		Display
Size	Customized installation location (Sample: 4800 x 4800 x 600(H) mm)	Size 65 Inches (163cm)
Material	Aluminum, Reinforced acrylic	Resolution 3840x2160 (4K UHD), 60Hz
Floor	· Thickness : 12mm · Color : Gray series · Size : Custom made(Sample : 1210x2400 mm)	Video Quantum High Dynamic range, HDR 10+, Hybrid Log Gamma, Supreme UHD Dimming, Contrast Enhancer, Smart Calibration
Interior partition	· Thickness : 8mm · Size : Custom made(Sample: 1168x450 mm)	Sound 2CH 20W Speaker, Q-Symphony support, Bluetooth Audio connection support
Fixed bar	Detachable for variable wall separation	I/O Port HDMI x 3ea, USB x 2ea
Power	Provides power for charging all SerBot•1x Gigabit Ethernet	Connectivity Wi-Fi, Wi-Fi Direct, LAN, Bluetooth
Display	1x HDMI	
4x USB 3.0 Type-A, 1x Micro-USB (device mode)		

Network Camera	
Type	hard coating dome Resolution 6MPixel
Angle of view	42.0°(Wide Angle)~15.0°(Narrow), 10.9~29mm(2.7x), Motorized Varifocal Lens
Color	0.06Lux(F1.7, 1/30초, 30IRE) White Balance 0.006Lux(F1.7, 1/30초, 30IRE), 0Lux(IR LED on)
IR Visible distance	70m, WDR 120dB, WiseNR II (AI Engine used)
AI-based object detection	Person, Face, Vehicle, License Plate
Analytics events	defocus detection, motion detection, tampering, fog detection, audio detection, sound source classification, shock detection
Function	virtual line/area, entry/exit detection, loitering, direction detection, appearance/disappearance detection, intrusion detection
Supports audio input/output and alarm input/output	Certification IP52, IK10

Mesh Router x 3ea	
Dimensions	4 x 11 x 8 inches (each) Weight 1.8kg (each)
Technical	· WiFi Coverage : 9,000 sq. ft · Antennas : Twelve (12) high-performance internal antennas with high-power amplifiers · Beamforming : Implicit & Explicit Beamforming for 2.4GHz, 5GHz & 6GHz bands MU-MIMO capable for simultaneous data streaming to multiple devices · Processor : Powerful Quad-Core 2.2GHz processor · AXE10000 Quad-Band WiFi : 900 + 2400 + 2400 + 4800Mbps · Router Ports : 10Gbps Multi-Gigabit Ethernet WAN port x 1ea, 2.5Gbps Multi-Gigabit Ethernet LAN port x 1ea, 10/100/1000Mbps Gigabit Ethernet LAN ports x 3ea · Satellite Ports : 2.5Gbps Multi-Gigabit Ethernet LAN port(each) x 1ea, 10/100/1000Mbps Gigabit Ethernet LAN ports(each) x 3ea · Memory : 512MB NAND Flash and 1GB RAM · Security : Advanced cyber threat protection for your home network and connected devices, with comprehensive anti-virus & data theft protection for your PC, Mac · Standards-based WiFi Security(802.11i, 128-bit AES encryption with PSK). · Guest WiFi Network is easy to setup separate & secure Internet access for guests

Judgment System	
Dimensions	505 x 230 x 480mm Color White
Material	SGCC Steel, Ultra-clear Tempered Glass
CPU	· Performance cores 8 + Efficient cores 16 · Total Threads 32 · MAX Turbo Frequency 5.80GHz · Performance-core MAX Turbo Frequency 5.40GHz · Efficient-core MAX Turbo Frequency 4.30GHz · Performance-core MAX Base Frequency 3.00GHz · Efficient-core MAX Base Frequency 2.20GHz · Cache 36MB, Total L2 Cache 32MB
GPU	· CUDA Cores : 16384 · Boost Clock : 2.52GHz · Memory Size : 24GB(GDDR6X) · Memory Interface Width : 384bit · Ray Tracing Cores : 3rd Generation · Tensor Cores : 4Th Generation · NVIDIA Architecture : Ada Lovelace · NVIDIA Encoder(NVENC) : 2x 8th Generation · Maximum Resolution & Refresh Rate : 4K at 240Hz or 8K at 60Hz with DSC, HDR · Maximum GPU Temperature : 90C · Idle Power : 19W · Video Playback Power : 25W · Average Gaming Power : 315W · Total Graphics Power : 450W · Required System Power : 850W
Base Board	· Memory : 64GB DDR 5x, Tested Speed 6400MT/s · Storage : PCIe 4.0 NVMe M.2 SSD 2TB. Reading MAX 7,000MB/s, Writing: MAX 6,500MB/s · Audio : ALC1220 Codec, 32-bit/92kHz DAC, 120dB SNR DAC with Differential Amplifier · Connectivity: RTL8125BG 2.5GbE LAN, Wi-Fi 6E AX211, Bluetooth v5.2 · VRM: 16(VCORE) + 1(VCCGT) + 2(VCCIN_AUX) · Interface : PCIe x16 x 3ea, PCIe x1 M.2Socket(Key E) x 1ea, USB 3.2 (10Gbps) x 1ea, USB 2.0 x 2ea, USB 3.2 (20Gbps) Type-C x 1ea, USB 3.2 (5Gbps) x 1ea
Cooling System	· Water Block : Copper Housing, 75 x 56 mm · Pump: Motor Speed 800~2800RPM · Radiator : Aluminum, 121 x 394 x 27 mm · Tube : Ultra-low Evaporation Rubber with Nylon Braided Sleeve, 400mm · FAN : Top 120 x 120 x 26mm x3ea Front 120 x 120 x 26mm x 3ea Rear 140 x 140 x 26mm x 1ea
Power	· Cable Type : Full Modular · DC Output : 1000W(+3.3V 20A, +5V 20A, +12V 83A, -12V 0.3A, +5Vsb 3A)