Scientech

AI+IoT Builder WorkStation

Scientech 6205AI

Sensors

- Temperature & Humidity
- Carbon dioxide
- Oxygen
- PM2.5 & PM10

Interfaces

- Bluetooth
- WiFi
- Ethernet
- USB

The field of Artificial Intelligence (AI) has witnessed tremendous growth in recent years with the advent of Deep Neural Networks (DNNs) that surpass humans in a variety of cognitive tasks. The algorithmic superiority of DNNs comes at extremely high computation and memory costs that pose significant challenges to the hardware platforms executing them.

Scientech 6205AI AI+IoT Builder WorkStation is a powerful system that lets users to run multiple neural networks in parallel for applications like image classification, object detection, segmentation, and speech processing with real time sensor interface. It covers the basic theory of AI to algorithms using TensorFlow for machine learning and deep learning. In addition experience high-performance services such as object and character recognition through learning, face recognition and edge detection through image processing. AI+IoT Builder is also supported by NVIDIA JetPack™, which includes a board support package (BSP), Linux OS, NVIDIA CUDA®, cuDNN, and TensorRT™ software libraries for deep learning, computer vision, GPU computing, multimedia processing, and much more.

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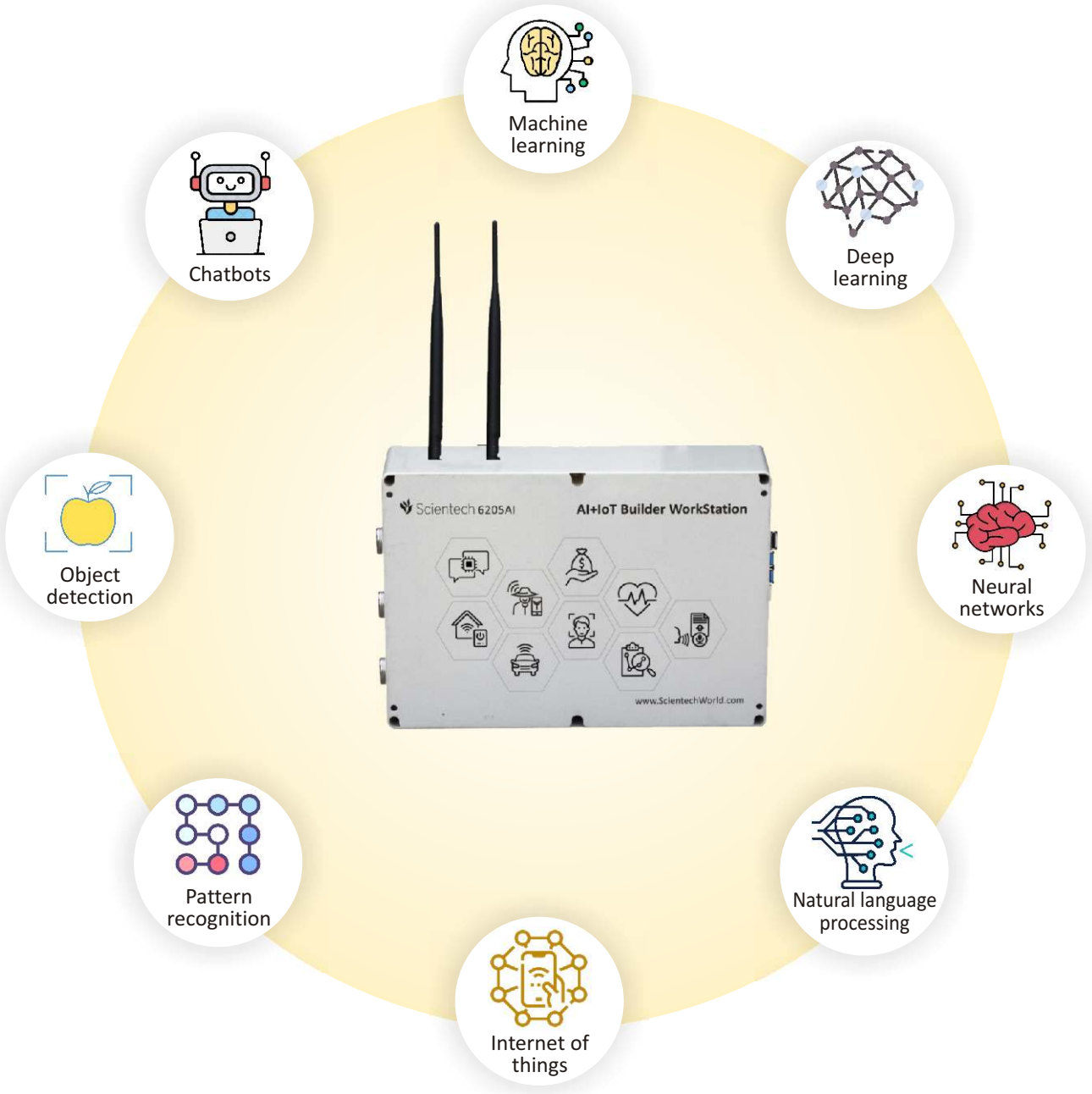
Features

- Explore the theory and algorithm development of IoT, Machine learning, Deep learning, and NLP.
- Explore TensorFlow and Keras for high performance numerical computation.
- Work on real time image processing applications using computer vision.
- Real time sensors interface for Machine Learning provided.
- Explore C, C++. R and Python programming.
- AI voice assistance and chatbot using NLP available.
- Build applications for :
  - Natural language processing.
  - Internet of things.
  - Preventive maintenance.
  - Cyber security .
  - Agriculture and food industry.
  - Remote healthcare monitoring.
  - Environment monitoring and forecast.
  - Warehouse and logistics.
  - Retail analysis.
  - Intelligent traffic management.



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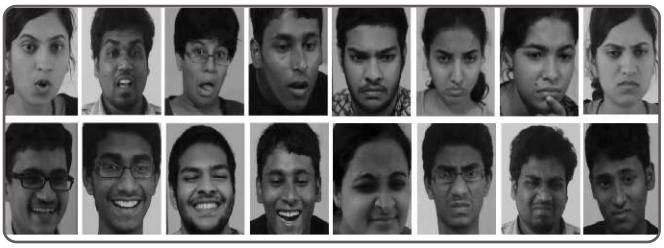
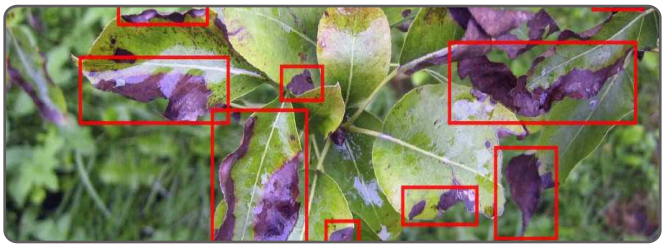
Can build AI applications like

Emotion recognition

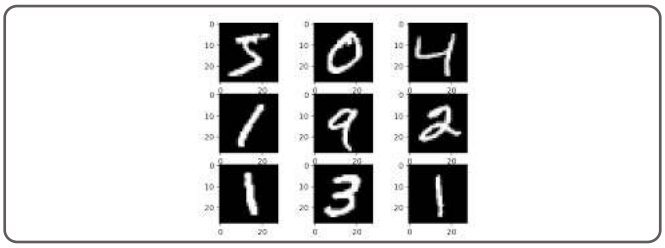


Leaf disease detection and classification

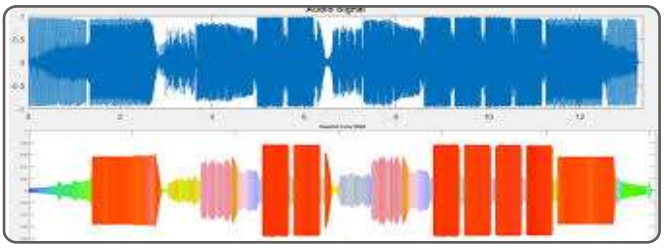


Yolo object detection

Handwritten digit classification using CNN

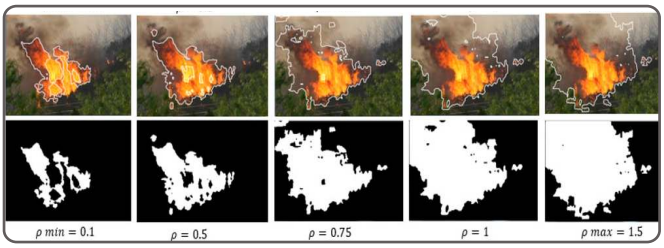


Audio segmentation

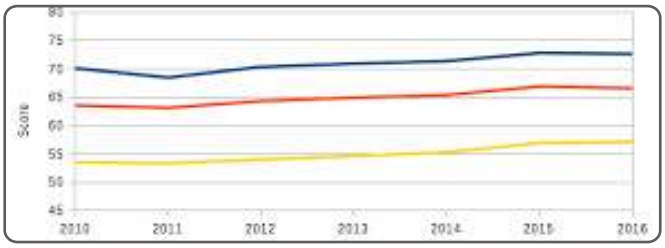


License plate detection

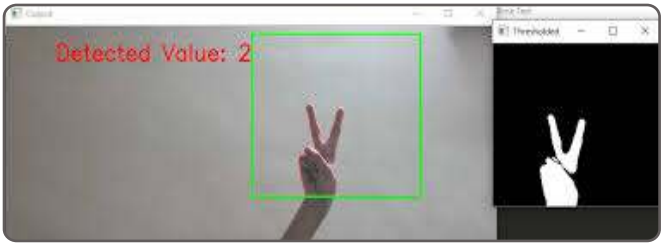
Fire detection



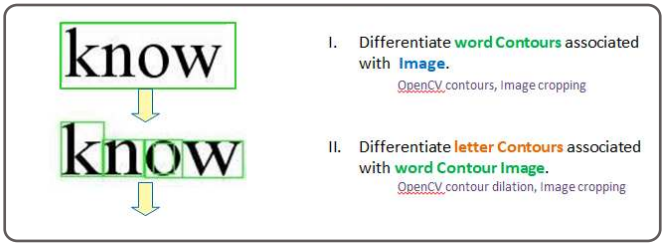
Weather forecasting



Gesture recognition



Character recognition



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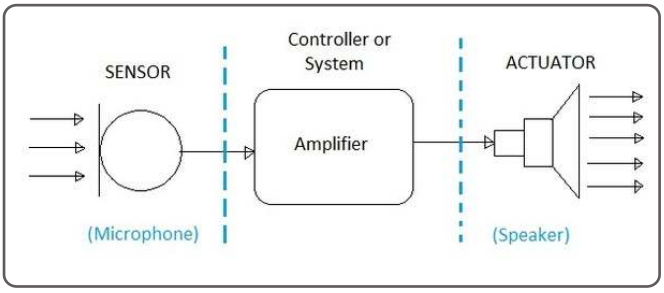
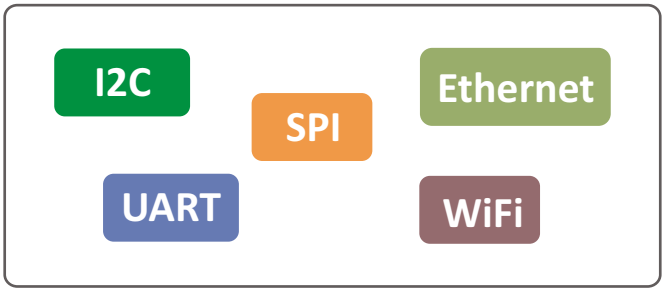
Can build IoT applications like

Sensors and actuators interfacing

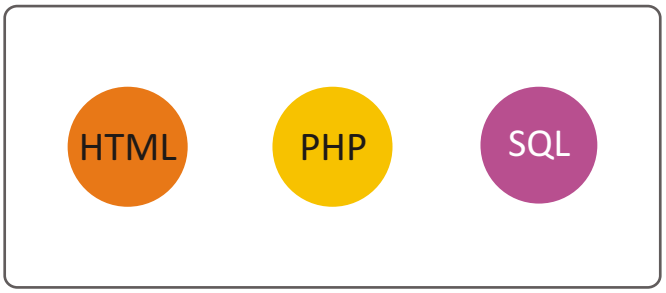


Protocol study



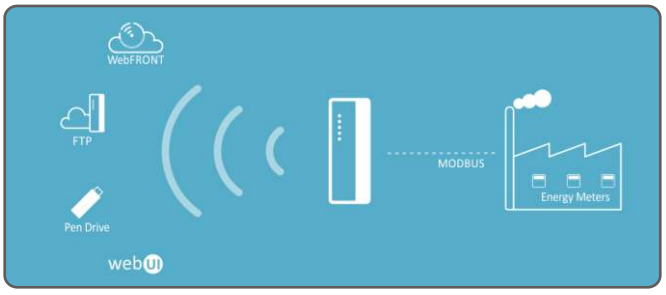
Programming languages

Cloud & web applications



Precision agriculture applications

Energy monitoring & control



Building automation

Telemedicine & Healthcare

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Technical Specifications

GPU	:	128-core Maxwell
OS	:	Linux (Ubuntu 18.04)
CPU	:	Quad-core ARM A57 @ 1.43 GHz
Memory(RAM)	:	4 GB 64-bit LPDDR4 25.6 GB/s
Storage	:	microSD 64 GB (for OS storage)
Video Encode	:	4K @ 30 | 4 x 1080p @30 |9x 720p @ 30 (H.264/H.265)
Video Decode	:	4K @ 60 | 2x 4K @ 30 |8x 1080p @30 |18x 720p @ 30 (H.264 / H.265)
Arduino UNO	:	Yes
Camera	:	USB camera with in-build microphone
Internet Connectivity	:	Gigabit Ethernet, wi-fi
Bluetooth connectivity	:	Yes
Display	:	External monitor
USB	:	4 x USB hub
External storage	:	240 GB SSD
Audio	:	Speaker set
Input device	:	wireless keyboard and mouse
GPIO extension	:	I2C, I2S, SPI, UART
Sensors and actuator connector	:	6 nos.
LED and switches	:	On external Jetson expansion board
Power Supply	:	230V AC
Weight	:	1.5Kg (approximately)
Operating conditions	:	0-40^{0}C, 85% RH

Package contains

		Quantity (in nos.)
• Scientech 6205 AI+IoT builder	:	1
• SS150 Temperature and Humidity sensor	:	1
• SS160 O2 sensor	:	1
• SS165 CO2 sensor	:	1
• SS178 Air quality sensor (PM2.5,PM10)	:	1
• Mains power cord	:	1
• Ethernet cable	:	1
• USB cable for arduino interface	:	1
• Monitor	:	1
• 4XUSB hub	:	1
• Wireless keyboard and mouse	:	1
• USB camera	:	1
• 240 GB SSD	:	1
• Speaker set	:	1
• Jetson expansion board	:	1

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Scope of Learning

- Introduction to IoT, AI, Machine Learning, Neural Network & Deep Learning.

Supervised and Unsupervised learning

- Linear regression.
- Logistic regression.
- Gradient descent.
- Decision tree.
- Random forest.
- Bagging & boosting.
- KNN.
- K-Means.
- Hierarichal clustering.

Deep Learning

- Neural Network overview and representation.
- Convolutional Neural Networks.
- Recurrent Neural Networks.
- Activation Function.
- Loss Function.

Testing and understanding of:

- Air temperature & humidity sensors.
- Air quality PM1, PM2.5 and PM10 sensors.
- CO2 sensor.
- O2 sensor.

Learn and explore:

- Python programming.
- C and C++ programming.
- AI frameworks like TensorFlow, Keras, PyTorch GoogleAI, Amazon web services and Caffe.
- IoT sensors and cloud application.

Interfacing of:

- LED and switches program.
- Sensor and actuators.

Applications using machine learning and OpenCV

- Face detection & tracking.
- Face recognition.
- Emotion recognition
- Gesture recognition.
- Smile detection.
- Vehicle detection.
- Object detection using YOLO algorithm.
- Drowsiness detection.
- License plate recognition.
- Fingerprint recognition.
- Text identification.
- Traffic sign recognition.
- Motion detection.

Applications using audio processing and deep learning:

- Audio fingerprinting.
- Music recommendation.
- Speech recognition.
- Sentiment analysis.
- Dialog flow – Chatbot using NLP.
- Text classification using NLP.
- Machine translation using NLP.
- Named entity recognition using NLP.

Subject to change - Version 1.0

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