Scientech

Interactive AI Development Platform

Scientech 6205AIN

AI Nose

Sense Sphere

Ethanol

Carbon Monoxide

Nitrogen Dioxide

VOC

Ammonia

Air

Artificial nose based on multi-gas detection, capable of identifying gases using a trained model.

Interfaces

Bluetooth

WiFi

Ethernet

USB

Patent Pending

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AI Nose

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. This limitation has led to the development of specialized hardware and software solutions designed to overcome these constraints, enabling AI applications in resource-constrained environments.

Scientech 6205AIN is a cutting-edge system that leverages the power of deep learning for smell detection applications. This innovative platform combines the versatility of WIO Terminal with the computational prowess of Raspberry Pi, creating a powerful edge computing solution for AI-driven olfactory analysis.

Features

- Platform to learn, explore, and develop AI - IoT skills.
- Color LCD display.
- Linux operating system.
- Command line interface.
- Working of TinyML on microchip.
- Data Collection for model training.
- Process of model training.
- Creating a library of model.
- Artificial Nose equipped with a multichannel gas sensor.
- Arduino software compatible hardware.
- Wi-Fi connectivity for cloud interface.
- 2 din sockets for sensor interface.
- Ethernet connectivity for internet access.
- Server and Client Pipeline.
- Working of Local ports.
- Compact tabletop ergonomic design.
- Ready experimental details.
- User friendly, self-explanatory system.

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AI Nose

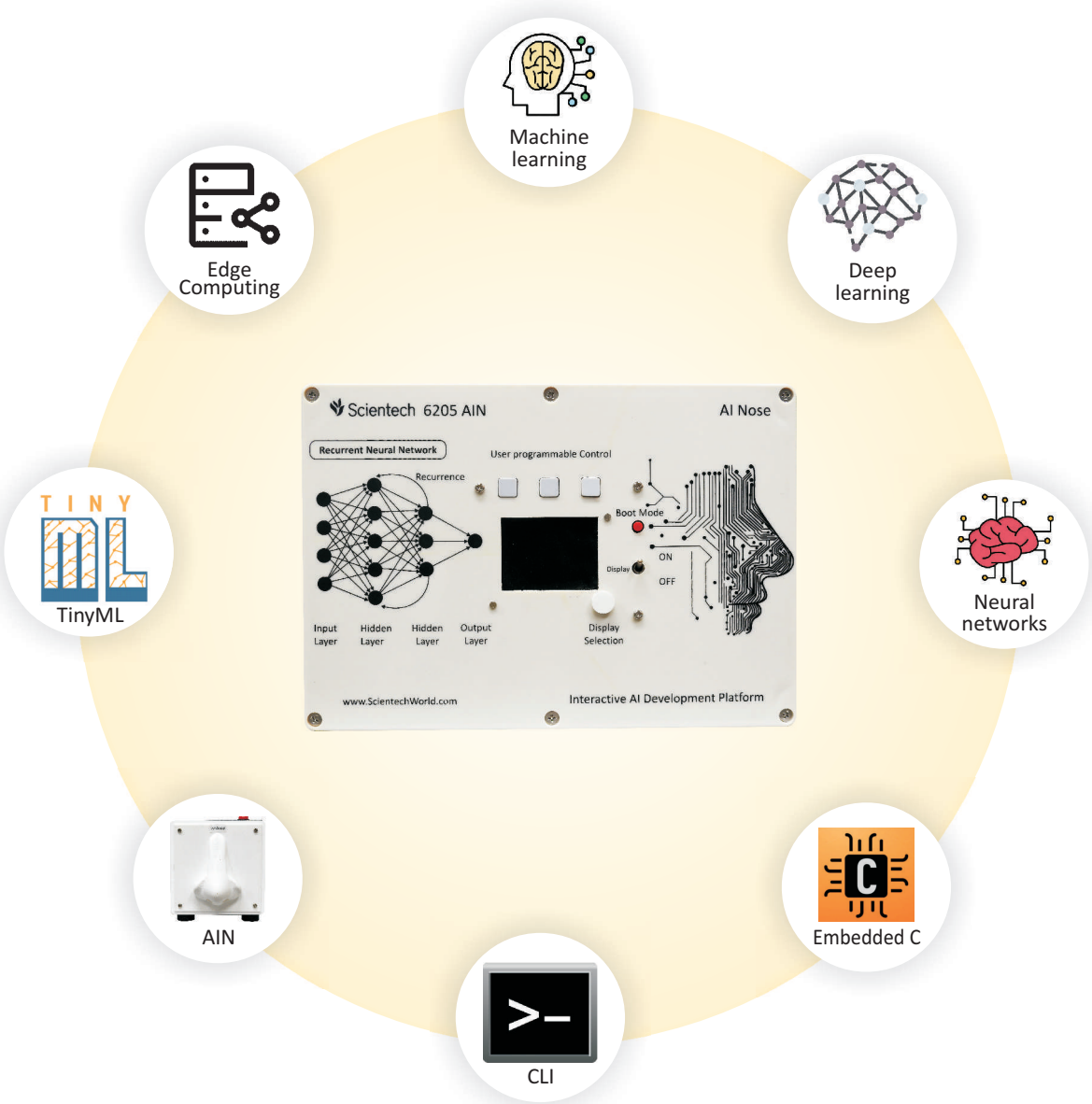
Technical Specifications

Processor	:	64bit ARMv7 Quad Core Processor 1.2GHz
Connectivity	:	802.11 b/g/n Wireless LAN,Bluetooth4.1,USB& Ethernet
RAM	:	4GB
Memory	:	64GB (upgradable)
OS	:	Linux
Ethernet	:	10/100 Base T Ethernet socket
Video Output	:	HDMI and Composite RCA
Microchip	:	ATSAMD51P19 (ARM cortex-M4F core running at 120MHz – Boost upto 200MHz)
Sensors and Actuator connector	:	1 no.
Digital I/O Pins	:	4
Analog Input Pins	:	2
UART	:	1 no.
I2C	:	1 no.
Power Supplies	:	5V and 3.3V
Switches	:	5 nos.
5 Way Switches	:	1 no.
Color LCD	:	2.4 inch
Resolution	:	320 x 240
USB	:	2.0, 3.0
Wi-Fi Module	:	802.11 a/b/g/n 1x1, 2.4GHz & 5GHz
Bluetooth	:	Supports BLE5.0
Artificial Nose	:	1 no.
Program Memory Size	:	512 KB, with external Flash 4MB
Power Supply	:	110V - 260V AC, 50/60Hz
Weight	:	3.5Kg (approximately)
Operating Conditions	:	0-40°C, 85% RH

Interactive AI Development Platform

Scientech Interactive AI Development Platform is an innovative platform developed using the Wio Terminal and Raspberry Pi 5, designed to streamline the process of data collection and model creation for edge AI applications. The platform allows users to connect various sensors to the Wio Terminal, which acts as the data acquisition module. Data is collected through a command-line interface (CLI) installed on the Raspberry Pi 5, ensuring efficient and reliable data transfer.

Once the data is collected, Interactive AI Development Platform automatically sends it to Edge Impulse Studio, where users can easily create and train machine learning models tailored to their specific needs. The seamless integration of hardware and software within development platform makes it a powerful tool for IoT developers, educators, and researchers looking to harness the potential of edge computing and AI. With development platform, building intelligent, responsive systems becomes more accessible, enabling rapid prototyping and deployment of AI-driven solutions.



Scope of Learning

Introduction to Edge Computing, Tiny ML, Deep Learning, Wio Terminal, Artificial Intelligence, Command line interface, Embedded C, Multichannel gas sensor and Machine Learning Deep Learning.

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

Testing and understanding of -

- Multichannel Gas Sensor
- CO, NO_2, C_2H_5OH and VOC sensor
- Tiny ML
- Wio Terminal
- Command line interface
- Embedded C
- EDA
- Smell

TinyML

TinyML is a branch of machine learning focused on creating and implementing AI models on low-power, small-footprint microcontrollers. It enables the execution of machine learning tasks on devices with limited resources, such as Arduino boards, ESP32 modules, or other resource-constrained edge devices.

Key features of TinyML:

- Optimized for memory efficiency and low power consumption.
- Enables real-time processing on microcontrollers.
- Supports various applications like gesture recognition, audio classification, and sensor data analysis.
- Employs specialized frameworks and compilers designed for embedded systems.

TinyML bridges the gap between traditional microcontroller programming and advanced AI capabilities, allowing developers to integrate intelligent features into resource-limited devices without requiring powerful processors or extensive computational resources.

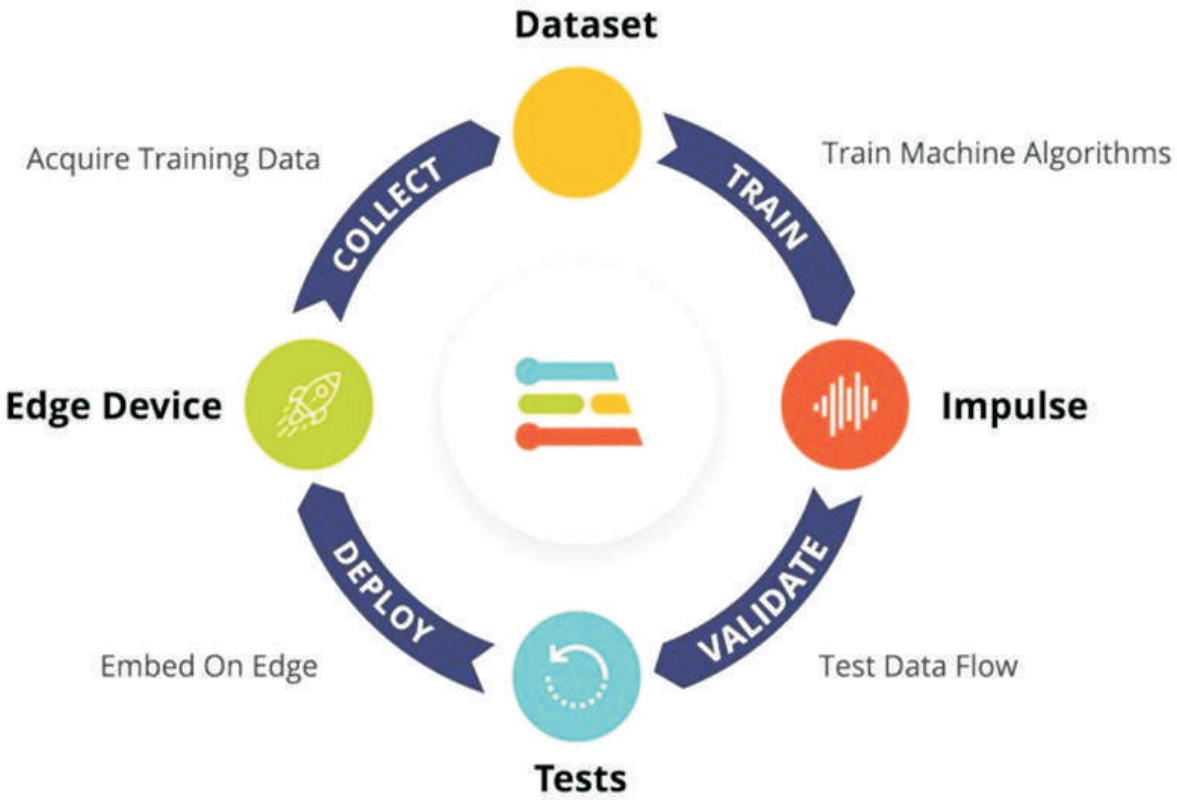
Edge Impulse

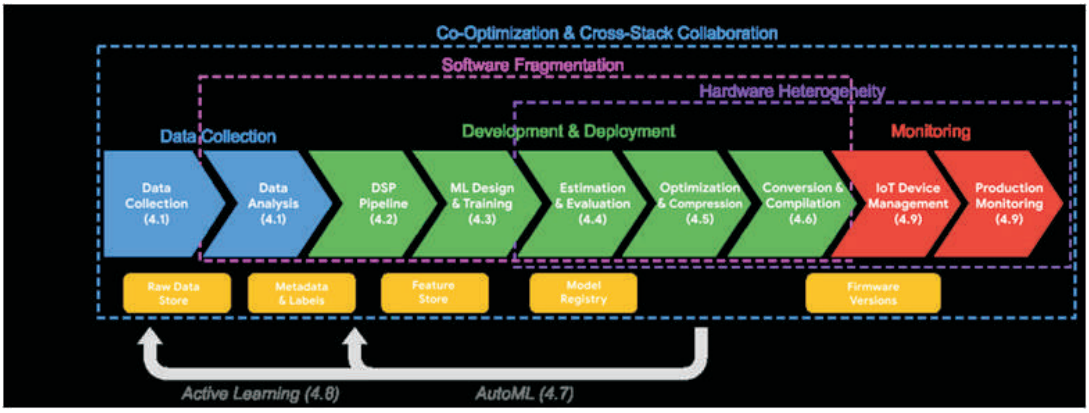
Edge Impulse is a cloud-based machine learning platform specifically designed for developing and deploying audio, speech, and sensor signal processing models. It empowers developers to create custom AI solutions without extensive expertise in deep learning.

Key features:

- End-to-end workflow from data collection to deployment.
- Optimized for resource-constrained edge devices.
- Support for various hardware platforms and frameworks.
- Real-time collaboration tools for teams.
- Extensive library of pre-trained models and tutorials.

Edge Impulse simplifies the process of building efficient machine learning models for real-world applications, making it accessible to developers across various industries, from consumer electronics to industrial IoT devices.





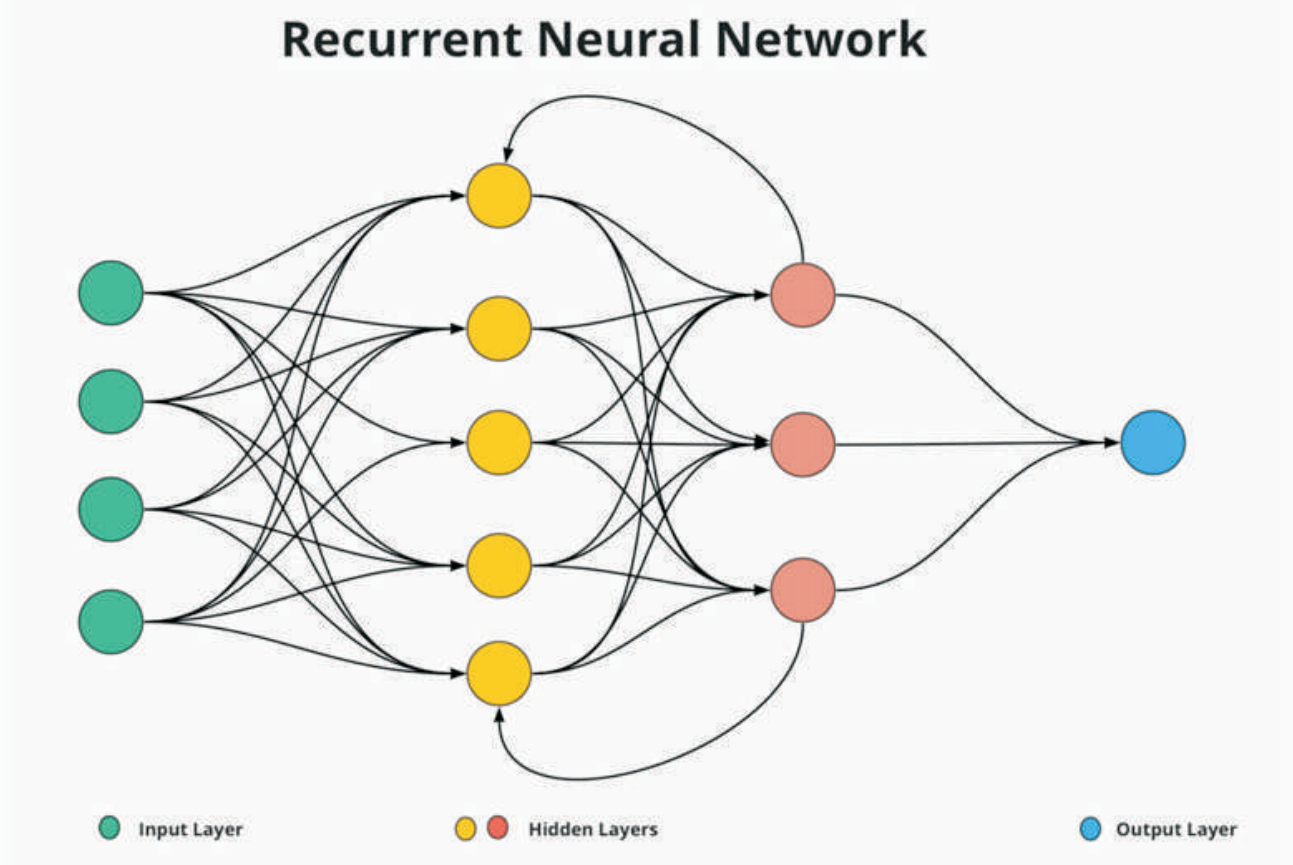
RNN

Recurrent Neural Networks (RNNs) are a type of artificial neural network well-suited to modeling complex sequences of data. They are particularly effective at handling temporal data such as text, speech, video, and time series.

Key characteristics of RNNs :

- Ability to maintain internal state and use this information when making predictions.
- Sequential processing of input data.
- Memory of previous inputs in hidden state.
- Handling variable-length input sequences RNNs find applications in various domains.
- Natural Language Processing (NLP).
- Speech recognition and synthesis.
- Time series prediction.
- Handwriting recognition.

RNNs have shown remarkable performance in tasks requiring understanding and generating sequential data, making them crucial components in many modern AI systems.



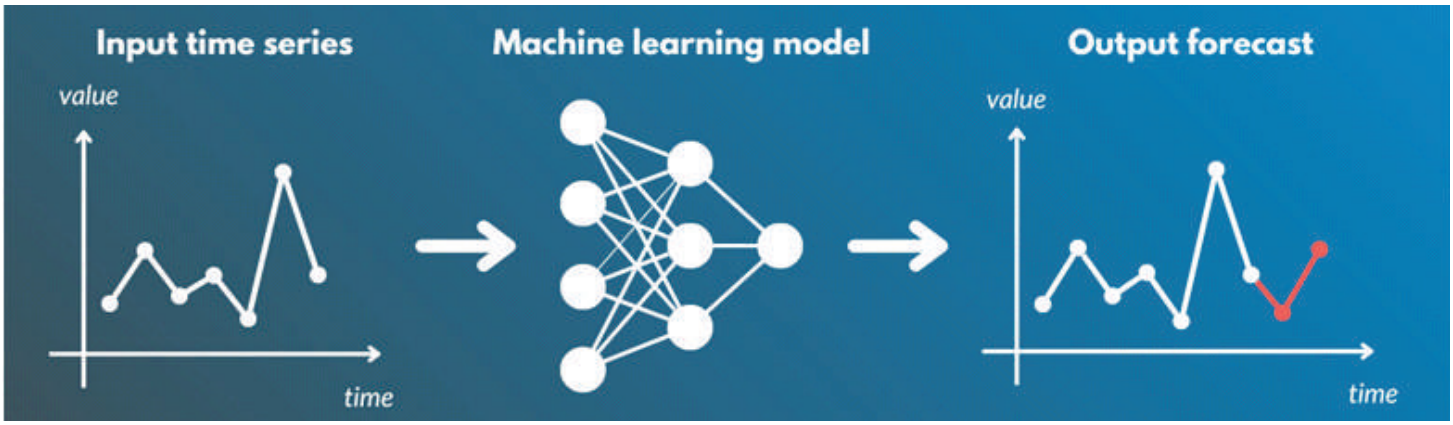
Time series forecasting

Time Series Forecasting is a statistical technique used to predict future values based on historical data patterns. It analyzes sequential data points over time to identify trends, seasonality, and anomalies.

Key aspects:

- Predicting future values in a series based on past observations.
- Identifying patterns such as trends, cycles, and seasonal variations.
- Handling missing data and outliers.
- Evaluating forecast accuracy using metrics like Mean Absolute Error (MAE).

Time Series Forecasting finds applications in various fields including finance, weather prediction, demand forecasting, and IoT device management. It helps businesses make informed decisions by providing insights into future trends and potential outcomes.



Applications

Identification of toxic fumes

Detection of leakage

Quality assurance of products

Maintaining Hygiene level

Subject to Change

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