

Mayreau: a  
platform for A.I.  
on the Edge



**Blackiot**  
BREAK THE EDGE

# Artificial Intelligence on the edge



please describe briefly the importance of artificial intelligence on the edge



Artificial intelligence (AI) on the edge refers to the use of AI algorithms and models on devices that are located close to where data is generated, such as sensors or smartphones, instead of relying on a centralized cloud-based infrastructure. This approach has gained importance due to several reasons:

- 1) **Reduced Latency:** Edge AI enables faster response times as it eliminates the need for data to travel to the cloud for processing, thus reducing the latency of the system.
- 2) **Improved Privacy and Security:** With edge AI, sensitive data can be processed locally on the device, reducing the risk of data breaches or cyber-attacks. This also eliminates the need to transmit data to a centralized cloud, thus enhancing data privacy.
- 3) **Lower Bandwidth Usage:** Processing data on the edge reduces the amount of data that needs to be transmitted to the cloud, reducing bandwidth requirements and associated costs.
- 4) **Offline Capabilities:** Edge AI allows devices to operate autonomously even when there is no internet connection, making it suitable for use cases in remote areas or where internet connectivity is unreliable.
- 5) **Real-time Decision Making:** Edge AI enables devices to make real-time decisions, which is crucial for applications such as autonomous vehicles or drones, where decisions need to be made in real-time to avoid accidents.

# Artificial Intelligence on the edge



Overall, the importance of AI on the edge lies in its ability to bring **intelligence and autonomy to devices** and systems that were previously reliant on a centralized cloud infrastructure. This has the potential to revolutionize a wide range of industries, from healthcare to manufacturing to transportation, by enabling smarter, more efficient, and secure systems.



Human



ChatGPT

# The Mayreau Board

## MCU Core:

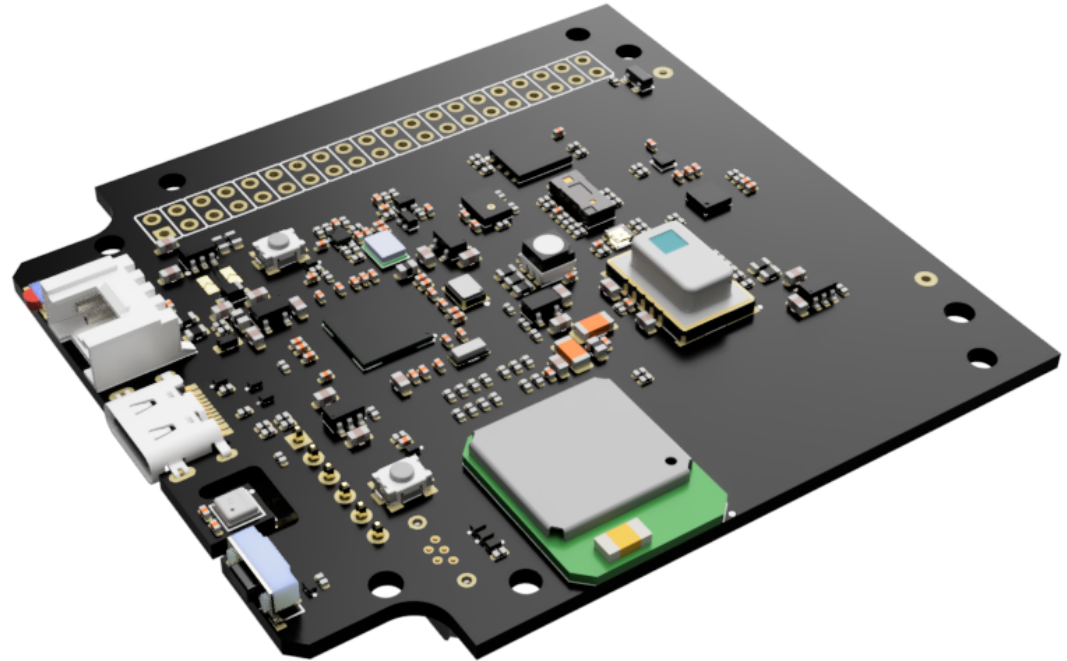
- ARM® Cortex®-M4+ CPU at 120 MHz
- 2048 kBytes Flash
- 640 kBytes RAM
- Low power modes down to 0.29  $\mu\text{A}$
- Run at 43  $\mu\text{A}$  / MHz
- 12 bit ADC up to 5 MSPS

## Mass Memory:

- 4 MBytes SPI Flash Memory

## WiFi+BLE 5.0:

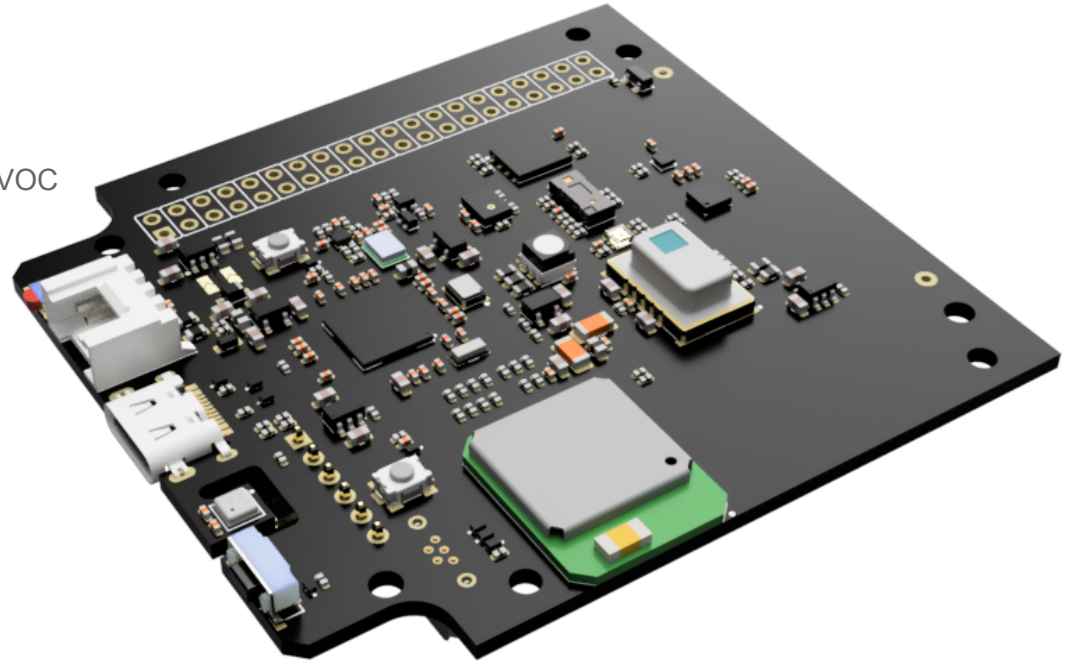
- WE310F5-I from Telit
- WiFi 802.11 b/g/n
- BLE 5.0



Live 3D Model: <https://a360.co/3zwwsBP>

# The Mayreau Sensors

- BHI160B accelerometer + gyroscope
- BMM150 magnetometer
- BME688 pressure, temperature, humidity & VOC
- IMP34DT05 digital audio
- IMP23ABSU analog audio, ultrasound
- TSL25911FN light sensor
- VL53L3CX 8x8 multitarget ToF proximity
- AMG8833 8x8 IR thermal sensor

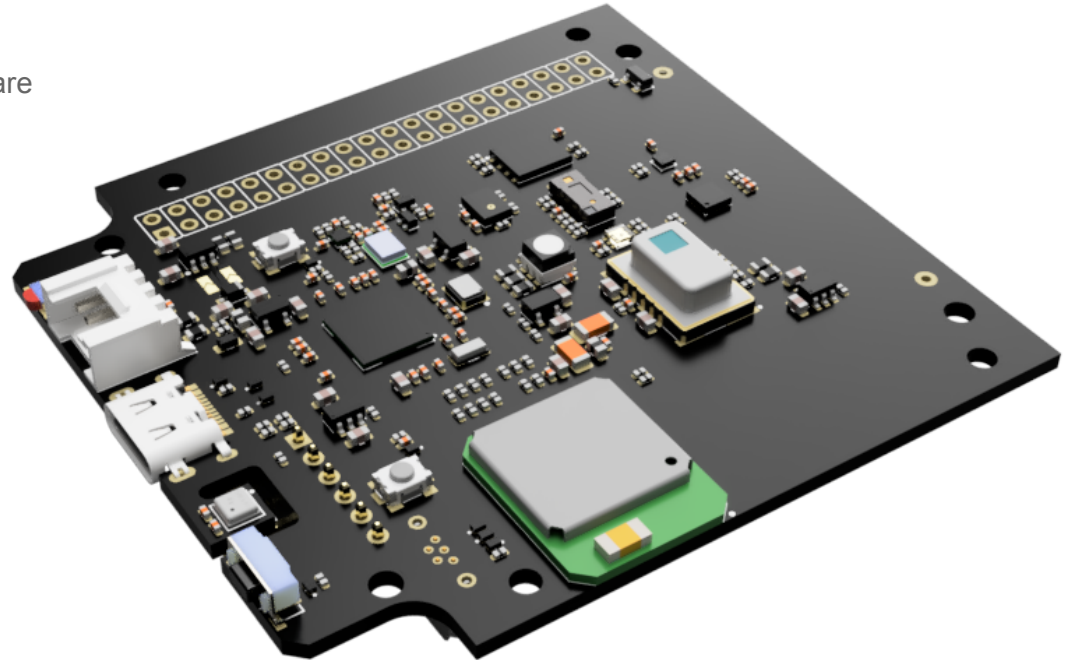


# The Mayreau Connectors

- USB-C connector for power and data, with Firmware Upgrade capability
- SWD connector for MCU program/debug
- Raspberry PI Connector for peripheral interfacing
- Grove Connector with I<sup>2</sup>C
- Battery connector 4xAA
- WE310G5 USB connector (optional)
- WE310G5 Serial debug connector (optional)

## Extra:

- User Button
- Firmware Upgrade Button / User Button 2
- RGB LED



# The Mayreau Ecosystem for Edge AI

Development on microcontroller board:

- STM32CubeIDE from ST Microsystems
- X-Cube-AI expansion from ST Microsystems

On the cloud (Raspberry PI / old PC is enough):

- Mosquitto MQTT Broker
- MongoDB non-relational database server
- NodeRed visual programming environment

For Artificial Intelligence:

- Tensorflow/Tensorflow Lite



## The Information Flow

Create your TensorFlow A.I. Model.

Export T.F. Lite model in .h5 format file.

Import .h5 file in STM32Cube.AI .

Generate source code in STM32CubeIDE.

Get data from Mayreau Sensors.

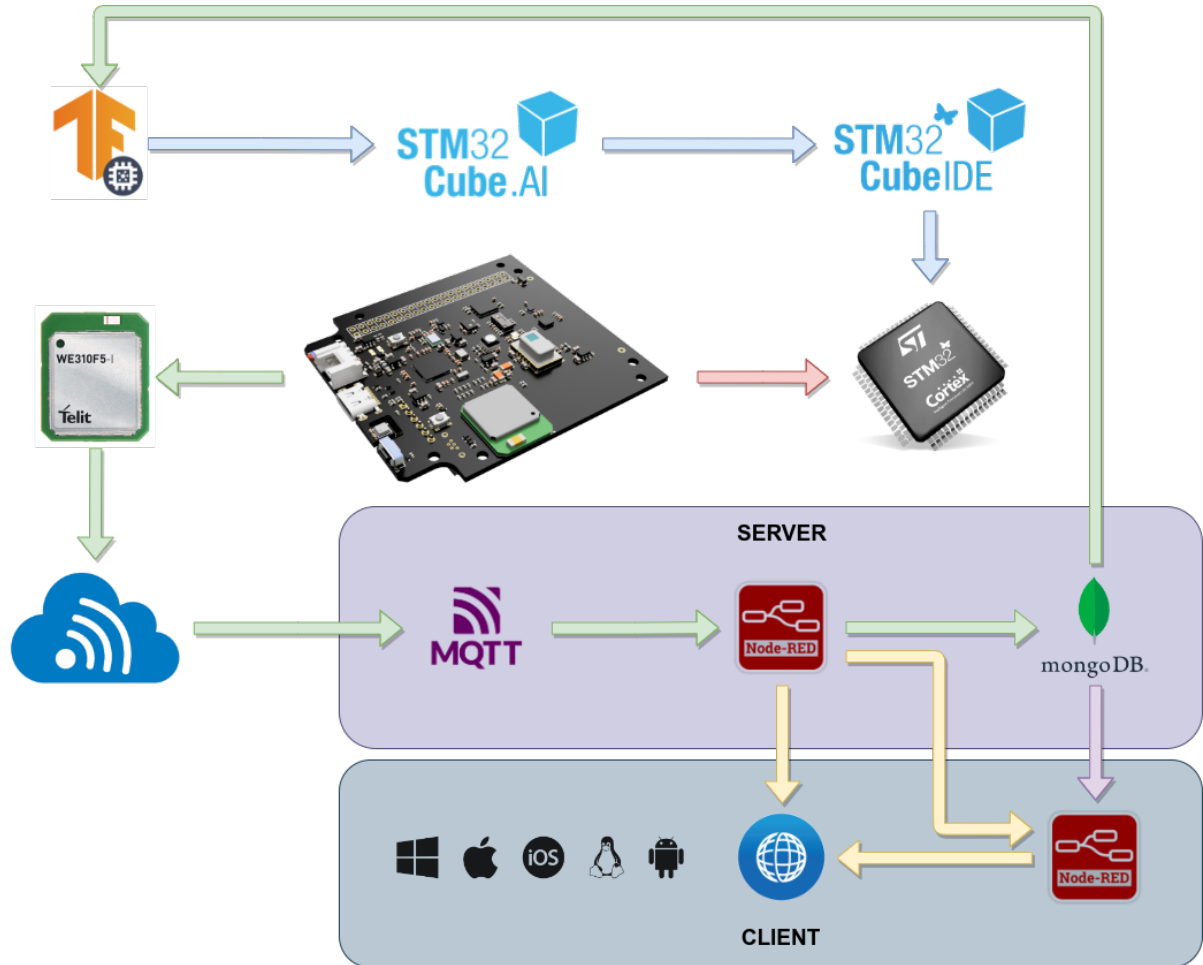
Send data over WiFi connection using MQTT protocol to the MQTT Broker on Server.

Use NodeRED to store data in MongoDB.

Expose data in Web Dashboard from Server.

Create NodeRED Client App to show real time, saved data and configurations on the Web Dashboard.

Use saved data to train you T.F. model.





# Use Cases

## Indoor/Outdoor Environmental Monitoring:

- Temperature, Pressure, Humidity
- AIR Pollution / VOC Detection
- Ambient Light both visible and Infrared
- Motion/Vibration/Seismic sensor
- Noise Detection/Intensity
- Ultrasound Detection/Intensity
- Infrasound Detection/Intensity

## Artificial Intelligence:

- Trainable Smell detection
- Wake words recognition
- Position and gestures recognition
- Your fantasy is the limit...

Thanks!



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