

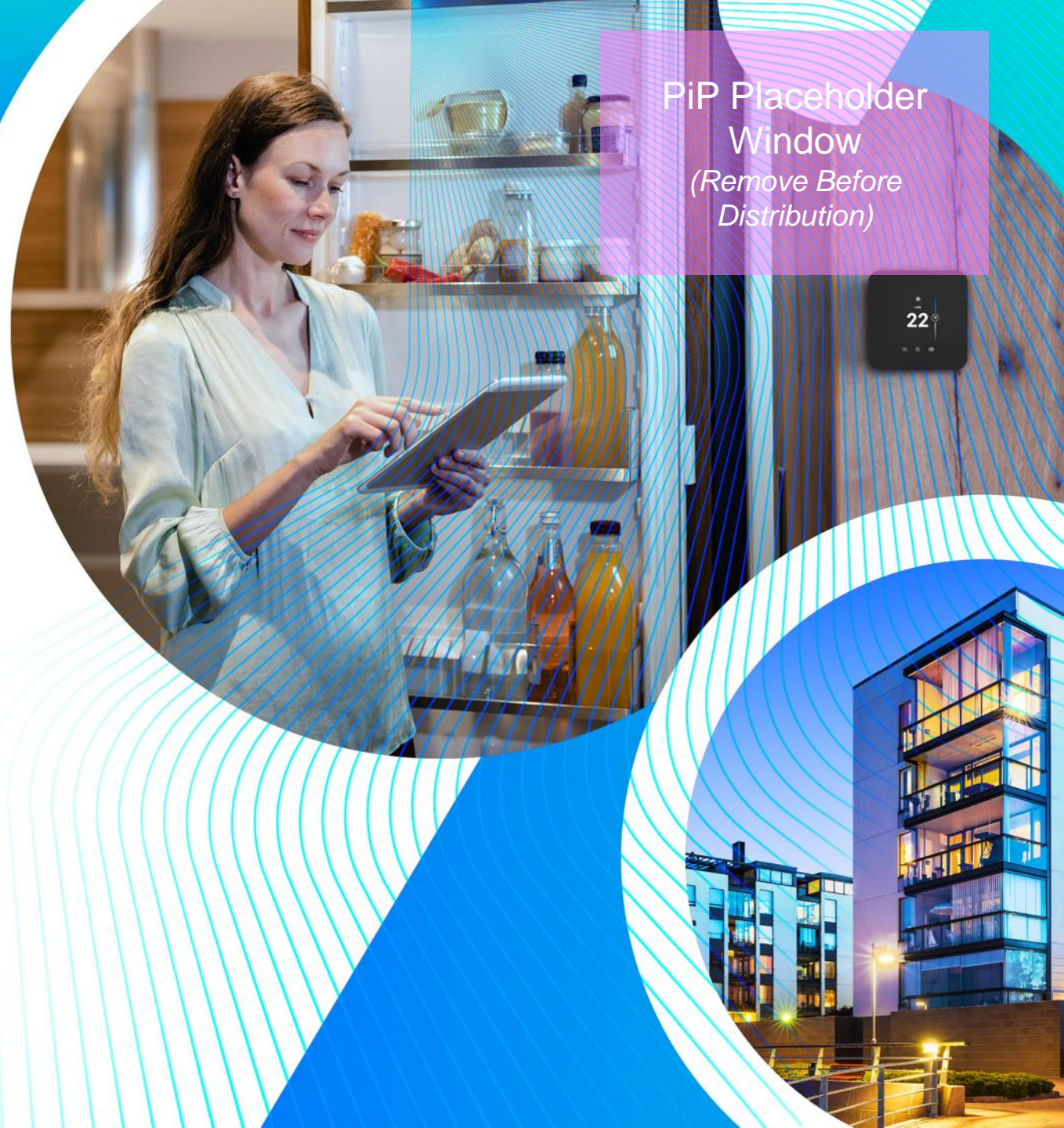


# Enabling AI on the MCU

Next Generation IoT wireless connectivity



Yasser Khan  
CEO | Tech, Inc



PiP Placeholder  
Window  
*(Remove Before  
Distribution)*

# Agenda



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## Session

- 1 Introduction: Yasser Khan, CEO of ONE Tech
- 2 ONE Tech Introduction
- 3 Examples to Highlight Importance of Edge AI
- 4 Benefits: Why – Embedded/Endpoint & Edge AI

Growth of MCU Market

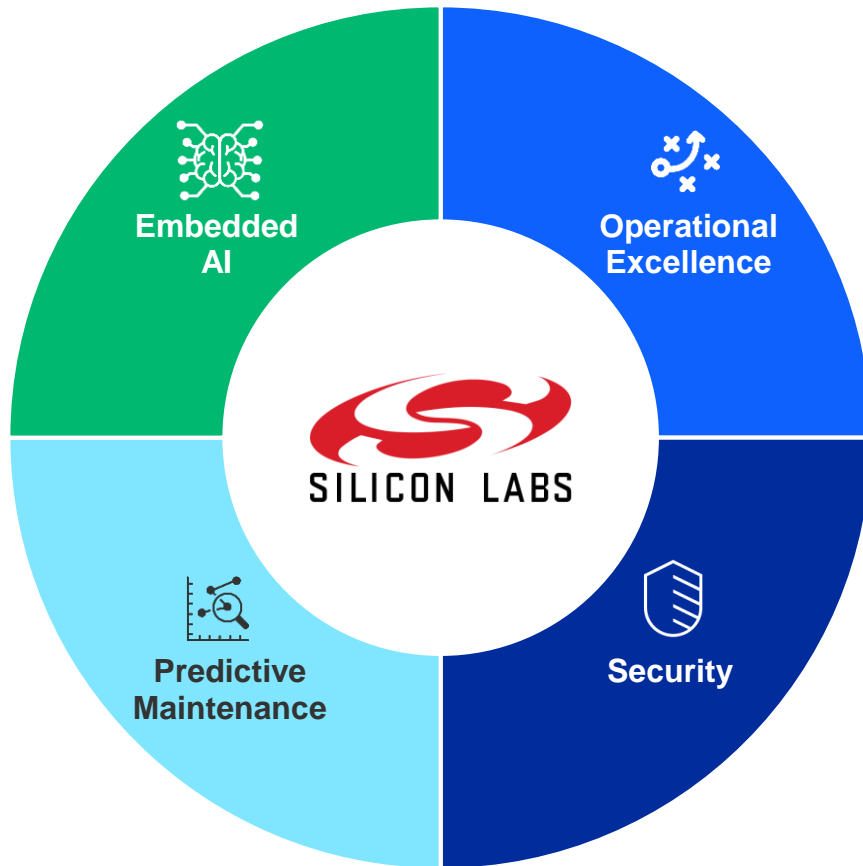
Cloud Challenges

AI Implementation Models

Cloud vs Edge

- 5 MicroAI & Edge Approach
- 6 Verticals & Use Cases

# Who is ONE Tech?



- **Embedded AI/ML Provider:**
  - Machine Health
  - Predictive Maintenance
  - Zero-Day Attack Monitoring
- **Deploy Industrial 4.0 Solutions – Powered by AI**
- **Collect Raw Data, Train and Process on the Endpoint**
- **MicroAI™ operates across multiple verticals**

# Use Case: City of Atlanta



<https://www.kaspersky.com/resource-center/threats/ransomware-threats-an-in-depth-guide>

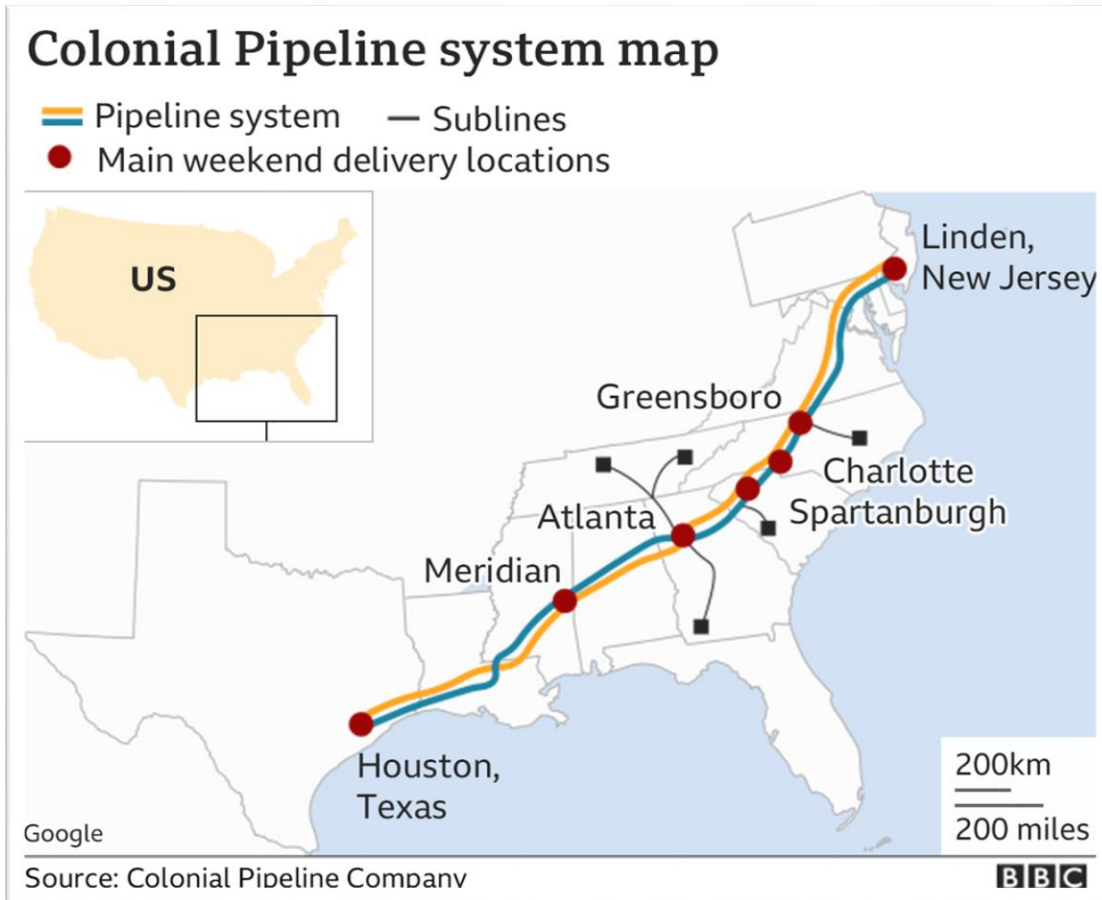
## ▪ Ransomware Attack

- Government network penetrated and vulnerabilities exploited
- Anti-Virus software bypassed
- \$17m paid out
- Negative impact to quality of city services
- \$2.7m budgeted for recovery
- Public data lost

## ▪ MicroAI's Response:

- Edge-native detection of abnormal traffic towards targeted vulnerabilities on endpoint devices and network servers
- Identification of file encryption in real-time
- Alerts generated to notify end user of attack occurring

# Use Case: Colonial Pipeline Attack



<https://cleantechnica.com/2021/05/10/colonial-pipeline-shut-down-by-ransomware-attack/>

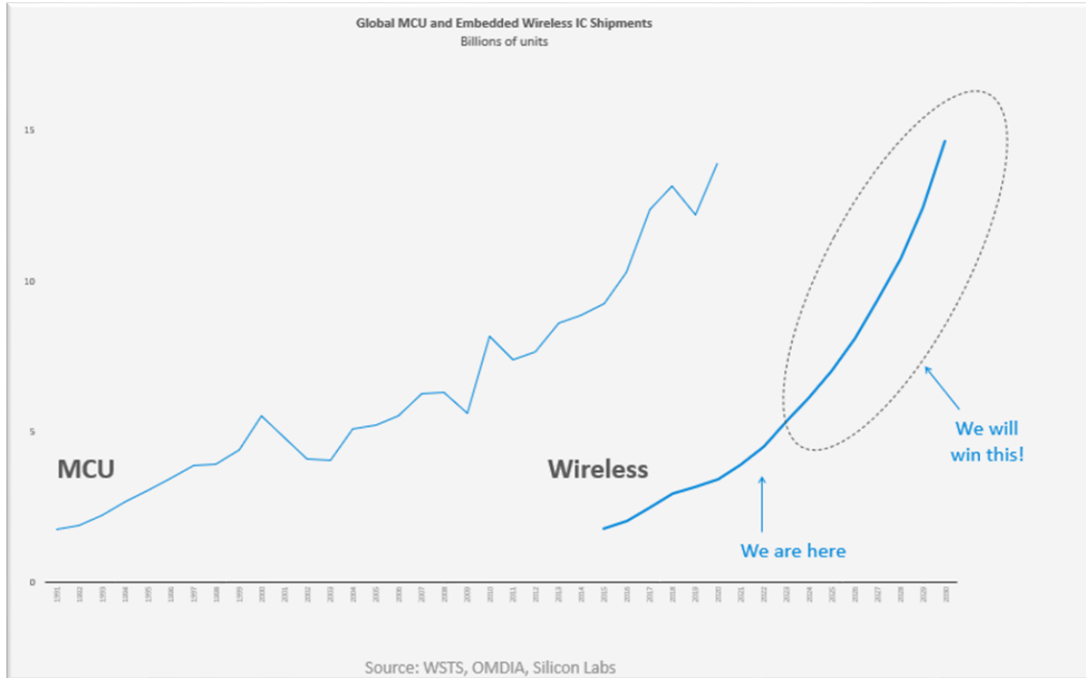
## ■ Ransomware Attack

- Company servers and computers targeted which compromised billing systems
- \$5m paid out
- Catastrophic impact to oil market

## ■ MicroAI's Response:

- Edge-native detection of malware attack
- Ability to prevent compromise of billing system and operation system with custom-made x code
- Alerts sent to end user when attack was being conducted in real-time

# A World of MCUs and Sensors



**24.9 B**  
MCU

**\$20.82B**  
Market Size

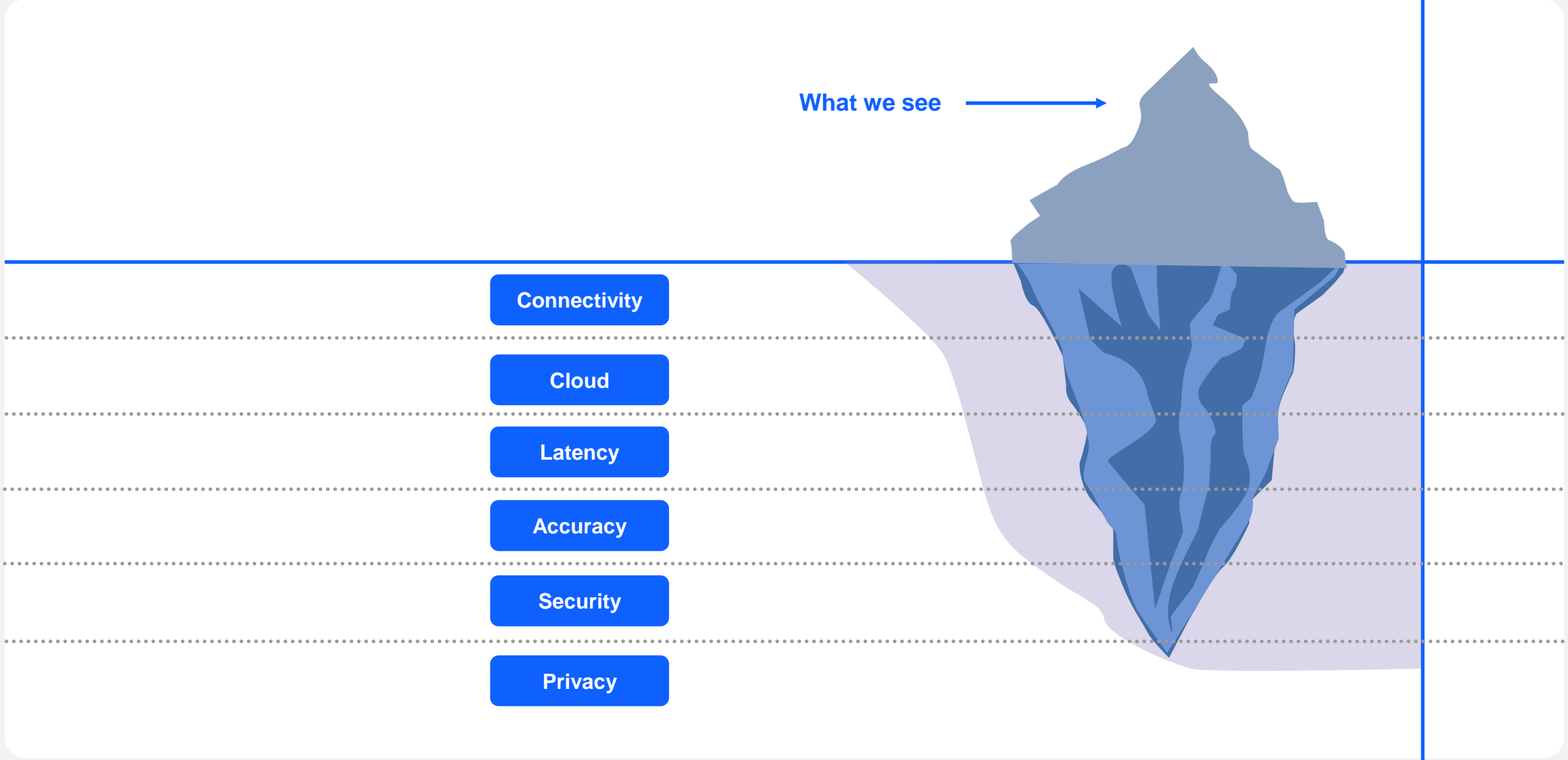
**\$47.7B**  
to be reached

**10.8%**  
Growth Rate

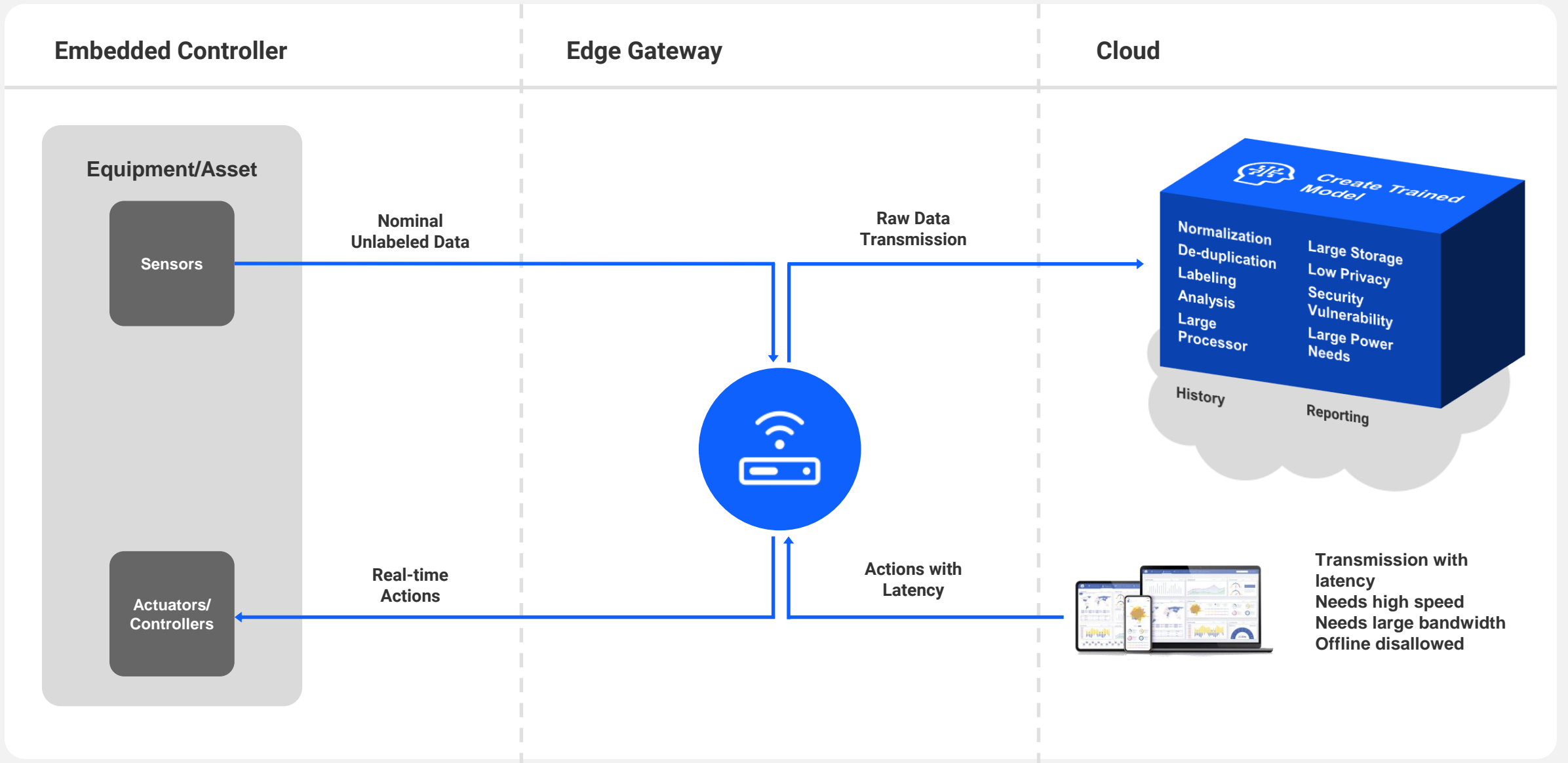
- 24.9 billion MCUs expected to be shipped in 2021
- The global microcontroller market size was valued at USD 20.82 billion in 2019
- The MCU market size is expected to reach USD 47.7 billion by 2027.
- The global microcontroller market is expected to grow at a compound annual growth rate of 10.8% from 2019 to 2027

<https://www.globenewswire.com/news-release/2020/02/26/1990742/0/en/2020-Microcontroller-Market-Report-Size-Share-Trends-Analysis-and-Outlook-2019-2027.html>

# Challenges of the Connected Industry with a Cloud-Driven AI & ML Approach

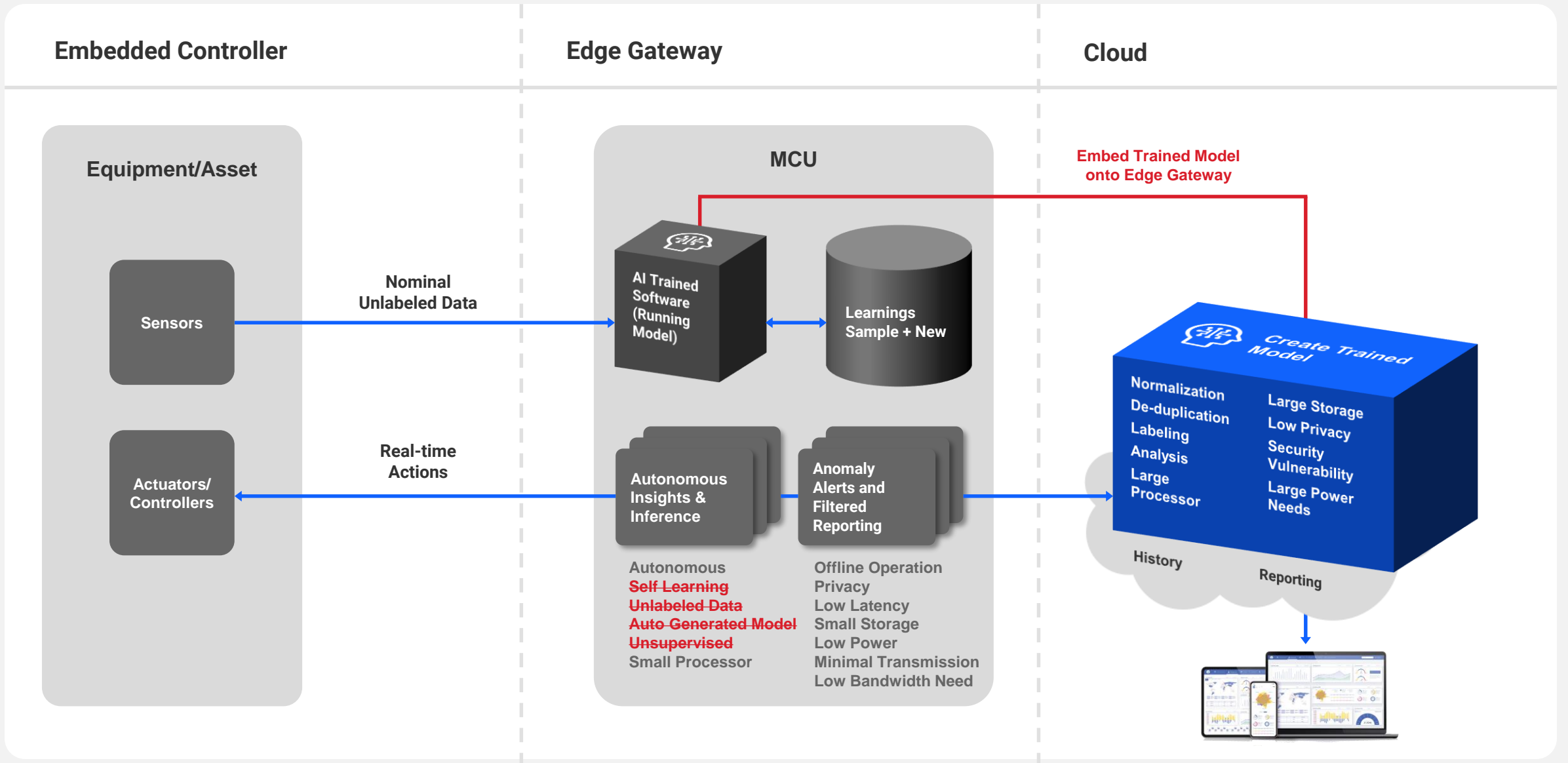


# AI Implementation Models Historic Cloud AI Implementation

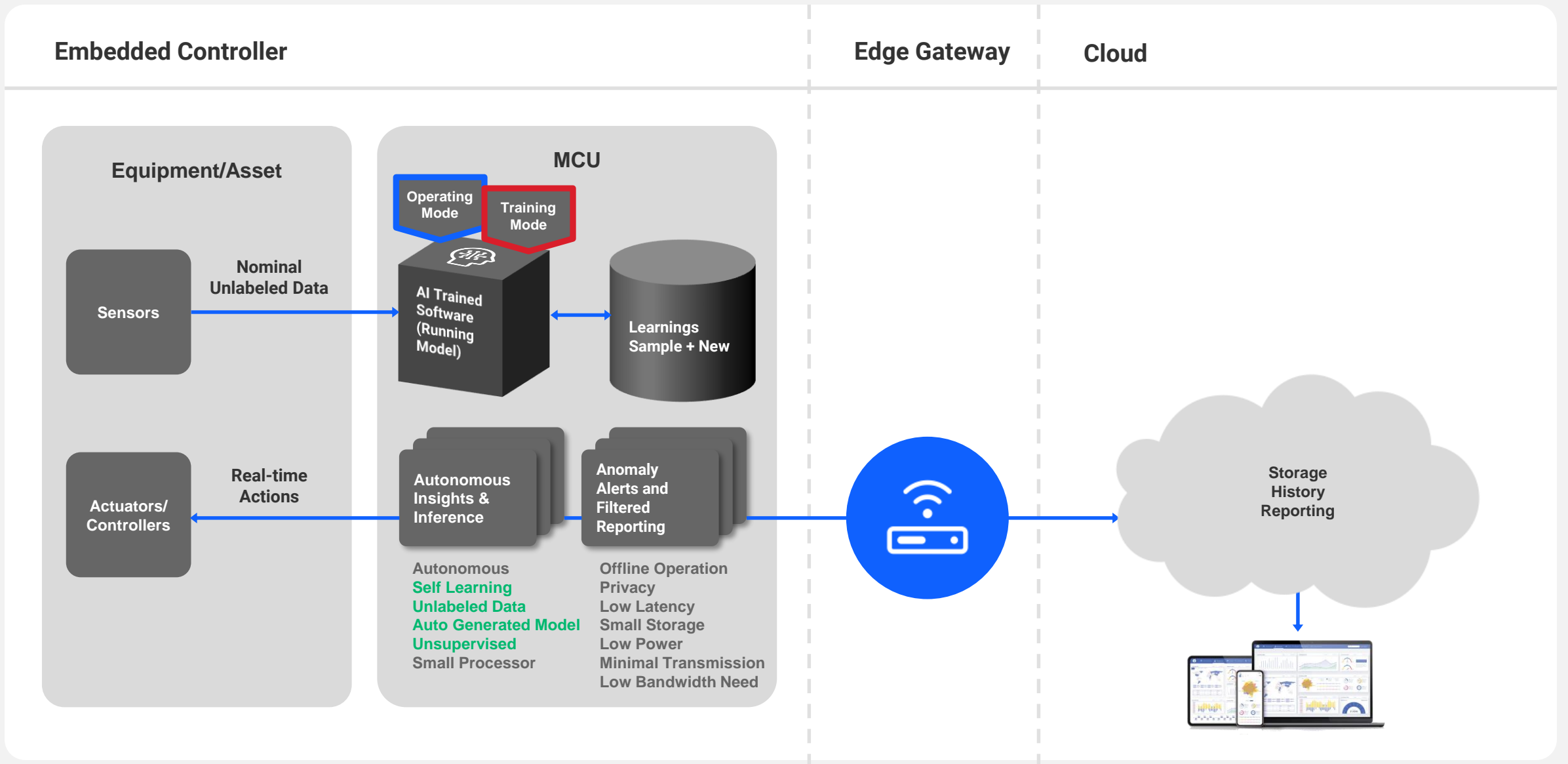




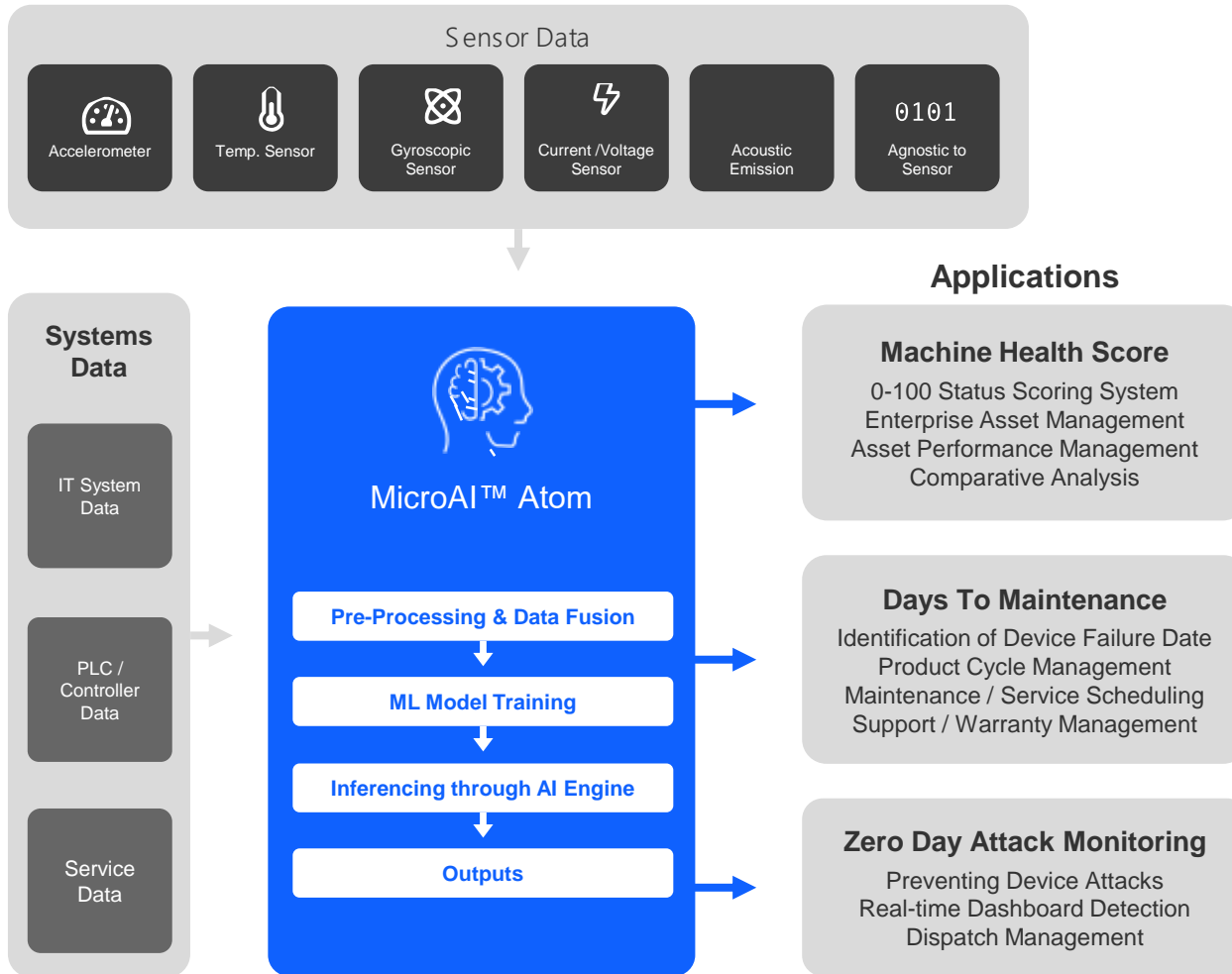
# AI Implementation Models Edge-Native AI Implementation



# AI Implementation Models MicroAI™ Edge-Native AI Implementation

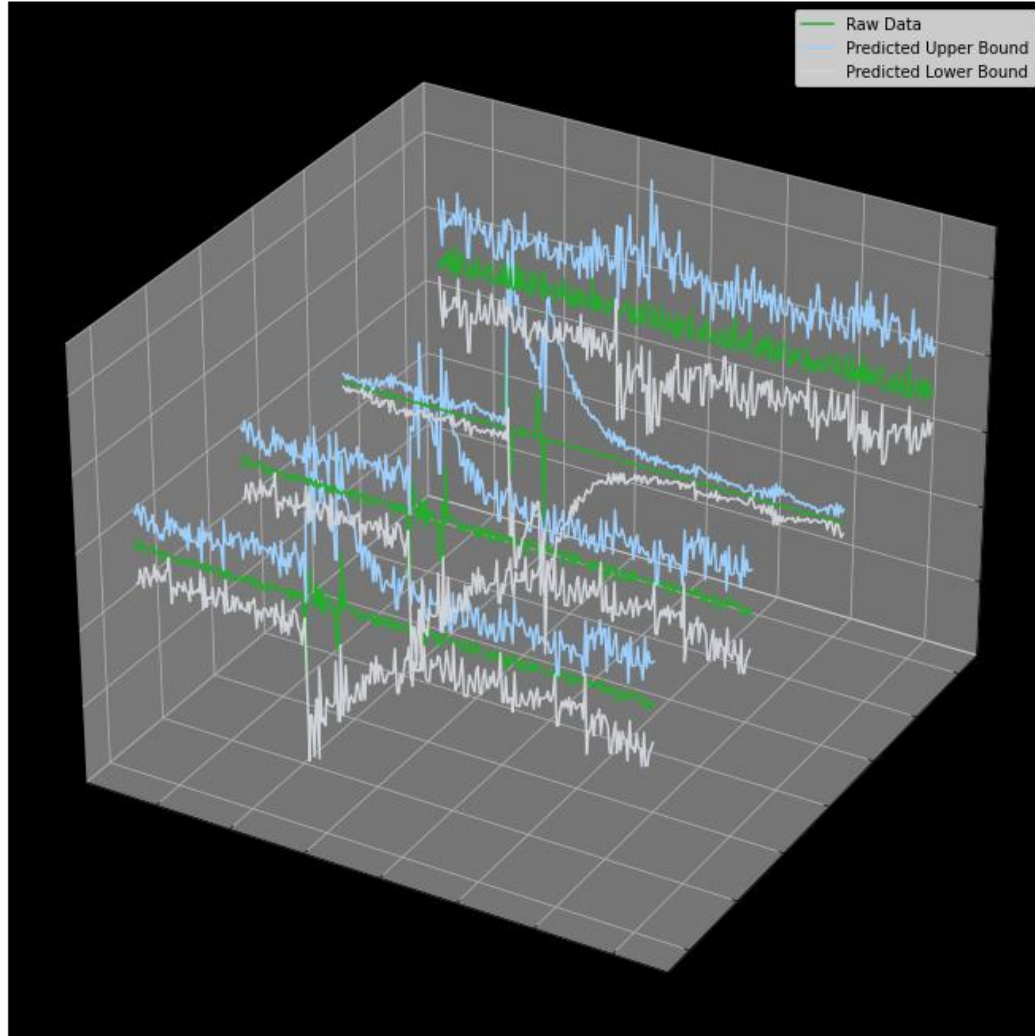


# MicroAI & Edge Ecosystem



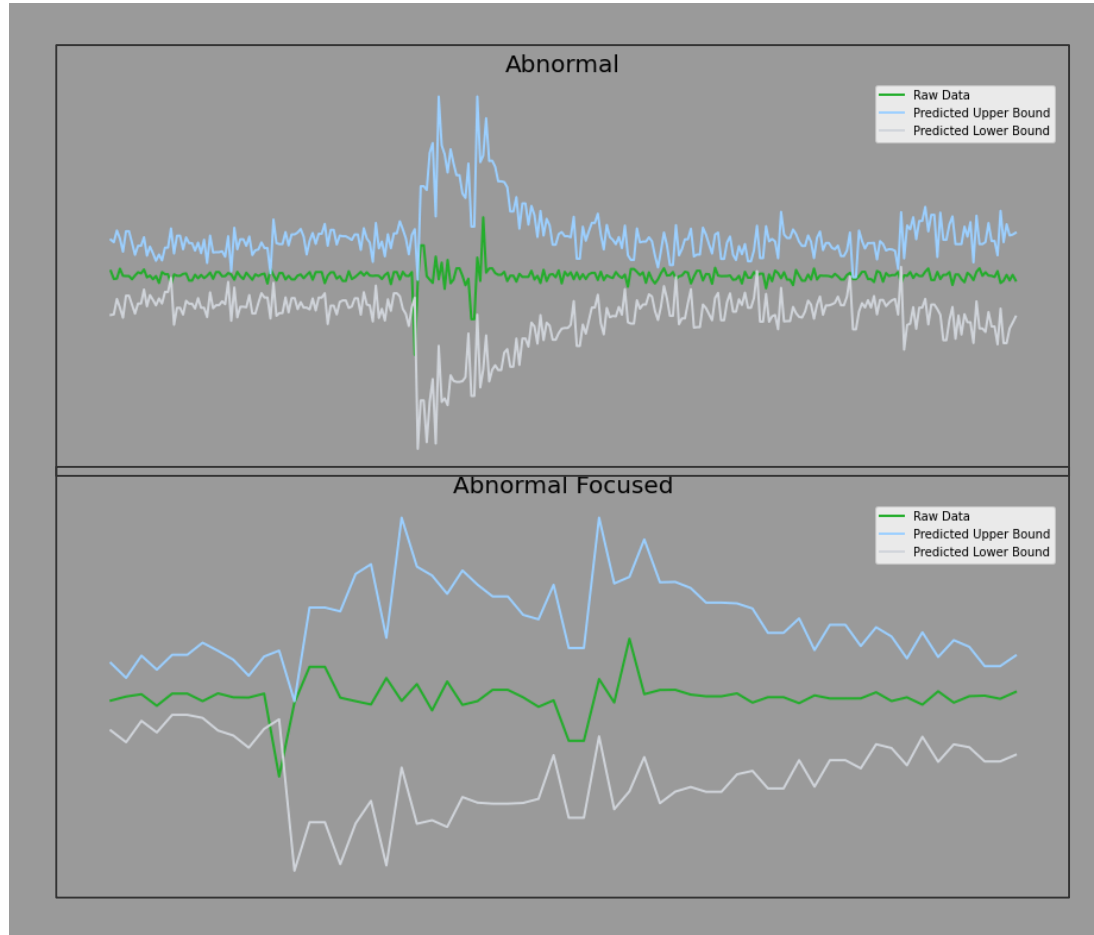
- **Machine Learning Platform for Embedding into MCU Hardware Architecture**
- **Integrate IoT Sensor, OT / System Data**
- **Sensor / Data Agnostic**
- **Communication Protocol Agnostic**
- **Train Models and Process at the Endpoint and/or Edge**
- **Multidimensional Behavioral Algorithm Running Recursive Analysis**
- **Use Cases Range from Predictive Maintenance of Industrial Assets and Consumer Appliances to Commercial deployments of Smart meters for End Users to Gain Further Insight**

# MicroAI™ & Edge-Native Process



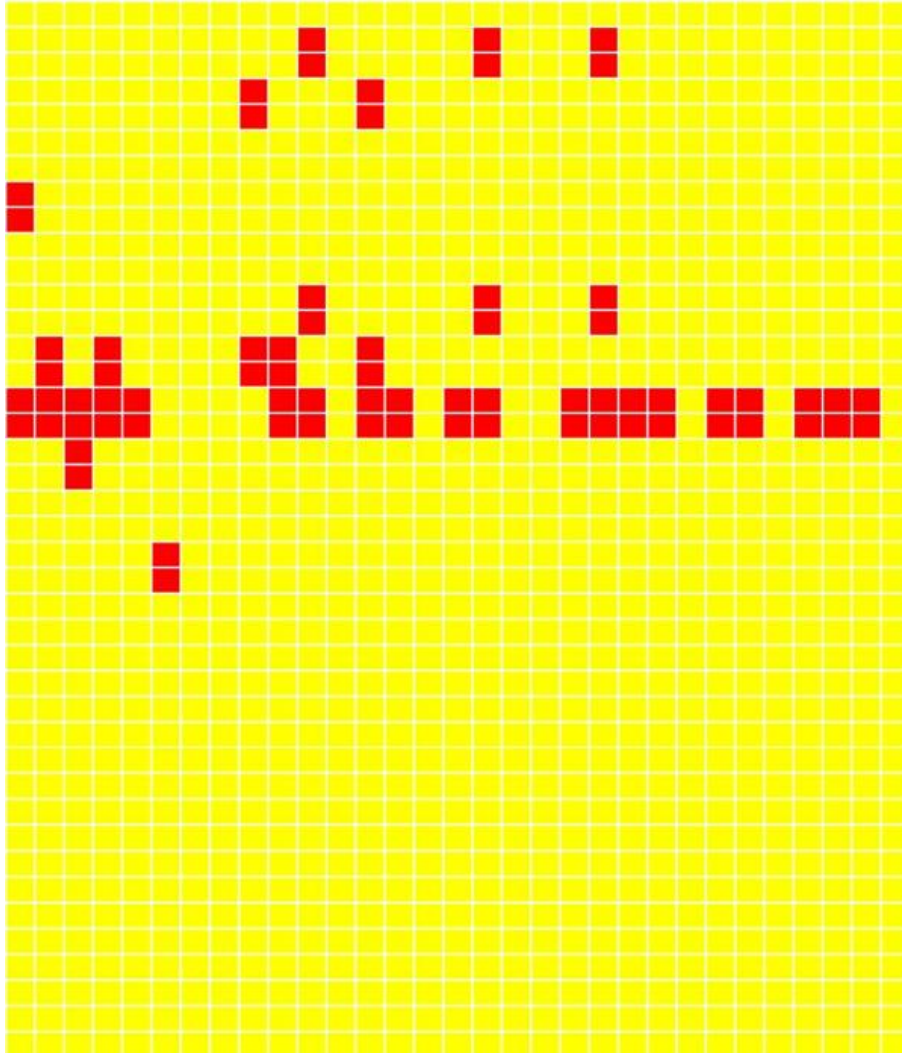
- **MicroAI operates in two phases, the model building phase and the inference phase.**
- **Model Building Phase:** multivariant stochastic analysis is performed recursively on the time series data to create the model(s). The training can be performed on the MCU
- **Inference Phase:** self correction is applied to the time series data to localize the model's prediction to complete the one step ahead calculation.

# MicroAI™ & Edge-Native Process



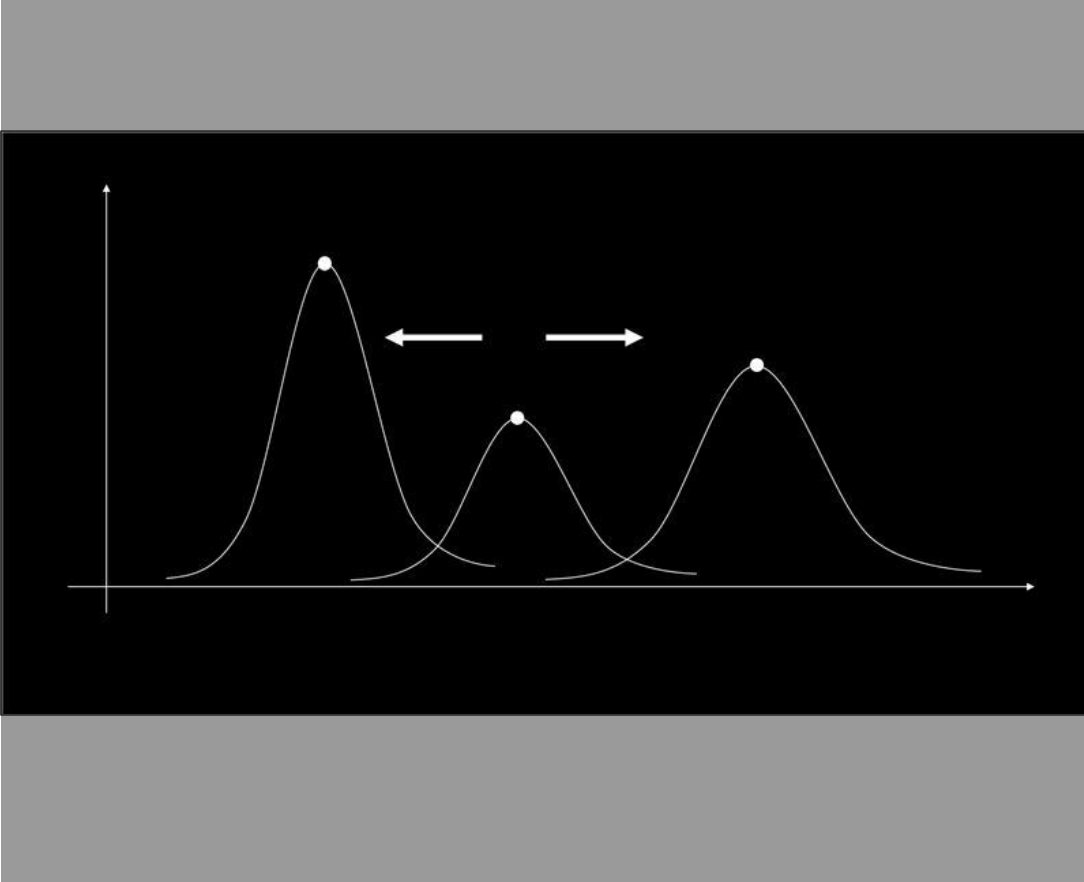
- **MicroAI predicts values for each channel one step ahead based off the results of all channels.**
- **It then uses the predicted value to calculate acceptable bounds.**
- **Any data channel whose values are outside of the bounds are referred to as abnormal data.**

# MicroAI™ Edge-Native Process



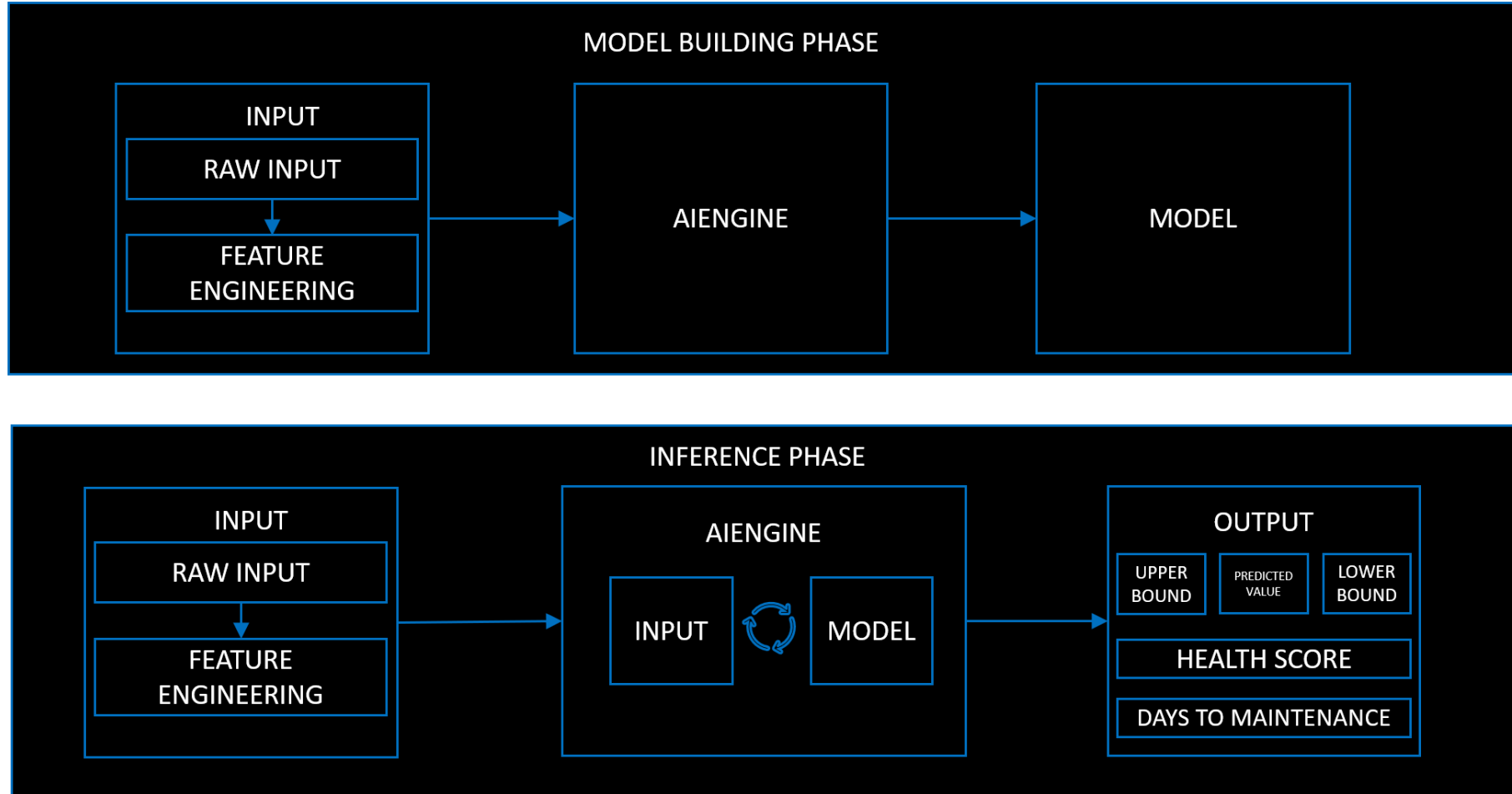
- Red Entries in the table are data points deemed abnormal by MicroAI
- The higher ratio of abnormal entries in a row the harsher the deduction in health score.
- Continued exposure with 0 abnormal entries in a row will result in the health score increasing slowly.

# MicroAI™ & Edge-Native Process



- Days to Maintenance follows Health Score but is scaled to the monitored devices nominal maintenance window.
- If the data channels have a low amount of abnormal data throughout a device's nominal maintenance interval, this suggests that maintenance is occurring too frequently and is creating unnecessary costs
- The predicted maintenance date shifts based on the density of abnormal behavior.

# MicroAI™ & Edge-Native Process





# MicroAI™ Use Cases

## Manufacturing Equipment

Predictive Maintenance

Processing data from industrial equipment (Robotic arm/welders) to identify signs of failure to reduce unexpected downtime

## Utility Infrastructure

Asset Performance Management

Increased awareness of utility assets health and utilization (infrastructure, energy, water) – Prognostics of asset remaining life

## Automotive

Localization of Data Processing

Drastically reducing the amount of data transmitted from vehicle by processing locally within ECU/TCU on-board

## Connected Hardware/Device

Embedded Security + APM

By embedding MicroAI™ into connected assets, Device OEMs gain insight to performance and security of assets

## Telecommunications

Asset Performance Management

Network optimization for mobile network operators by receiving alerts if trend analysis detects asset health decline

## Medical Devices

Localization of Data Processing

Improving data security and privacy of health data by keeping data local to device for analysis

## Oil & Gas

Compressor Predictive Maintenance

Processing data from industrial equipment to identify signs of failure to reduce unexpected downtime

## Smart Home Device

Localization of Voice Recognition

Enabling voice training and voice authentication directly on the local environment to reduce data transmission



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# Thank You!

Q&A

