Presentation Will Begin Shortly

4:00

JUNE SESSIONS		
DATE	TIME	SESSION
THURS, JUNE 5TH	10 AM CT	Real-World AI/ML Applications on a Wi-Fi Wireless MCU
TUES, JUNE 17TH	10 AM CT	Bringing Bluetooth 6.0 Channel Sounding to Market

Exploring AI/ML Applications on the Ultra-Low Power SiWx917 Wi-Fi 6 Solution

2025 tech talks WEBINAR SERIES

Wi-Fi CERTIFIED

Rui Pu - Product Manager, Software & Tools
Kalevi Ratschunas - Marketing Manager Wi-Fi

Wi-Fi

Designed from the ground up for IoT - SiWx917 Wi-Fi 6 SoC

Bluetooth® matter

Wi Fi 6 CERTIFIED

DIFFERENTIATED FEATURES

Ultra-Low Power

- Increases Battery life and Recharging Interval

IoT-Optimized Wireless Performance

- 2.4GHz: Long-range, low-power, effective wall penetration, high-throughput
- Wi-Fi, Bluetooth LE, and Matter in single package

Edge Computing + System Integration

- **AI/ML accelerator enablement available in June in SiSDK 25Q2 release**
- Application MCU and Wireless Processor with Networking off loads
- Rich Peripherals, High GPIO count, and Large Memory

DEVICE SPECIFICATIONS

Wide Range of Memory configurations

- 672 kB on-die SRAM with configurable split between Cortex-M4 and Network Wireless processor
- In-package 8MB Flash/PSRAM, 16MB External Flash/PSRAM,
- Single-Chip Matter over Wi-Fi Solution

Multiprotocol Co-Existence

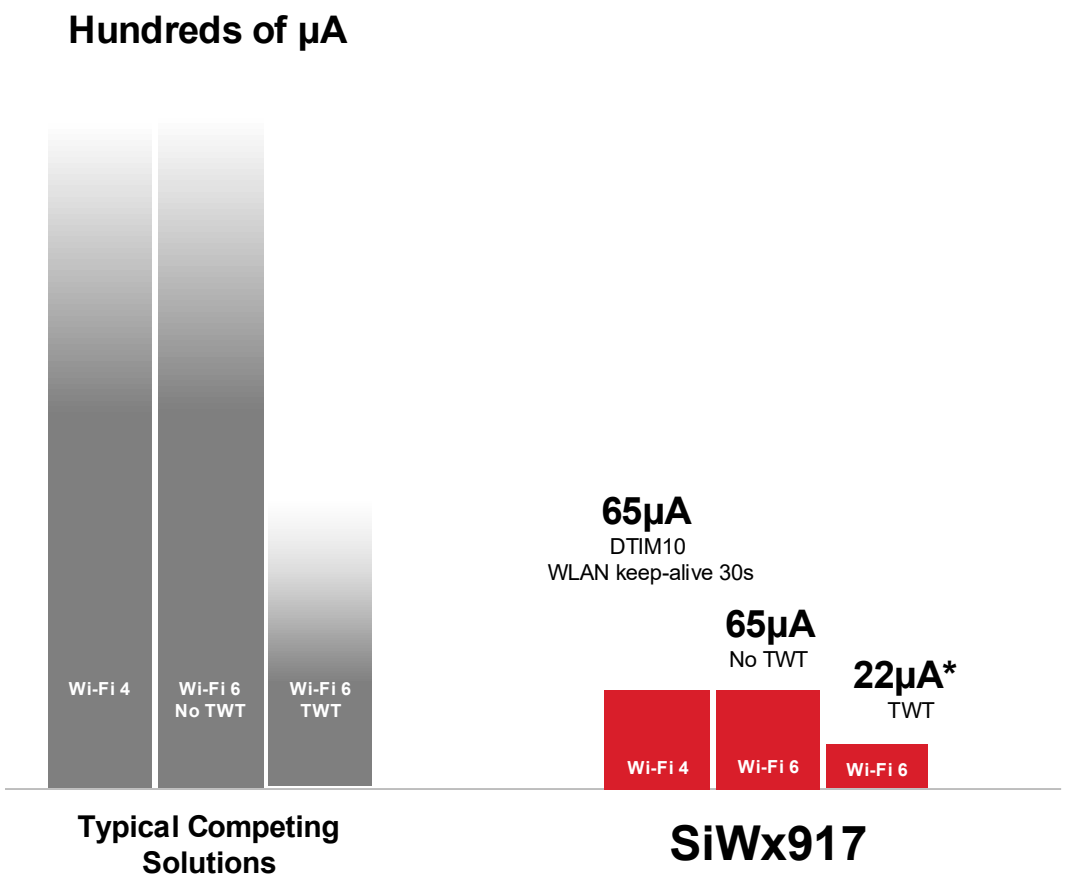
- High-performance Wi-Fi 6 and Bluetooth Low Energy 5.4

Robust Security

- A High Level of Security for the Device, Wi-Fi Protocol, and Networking

SiWx917: Lowest Wi-Fi Power – Longest IoT Battery Life

Wi-Fi Standby Current Consumption

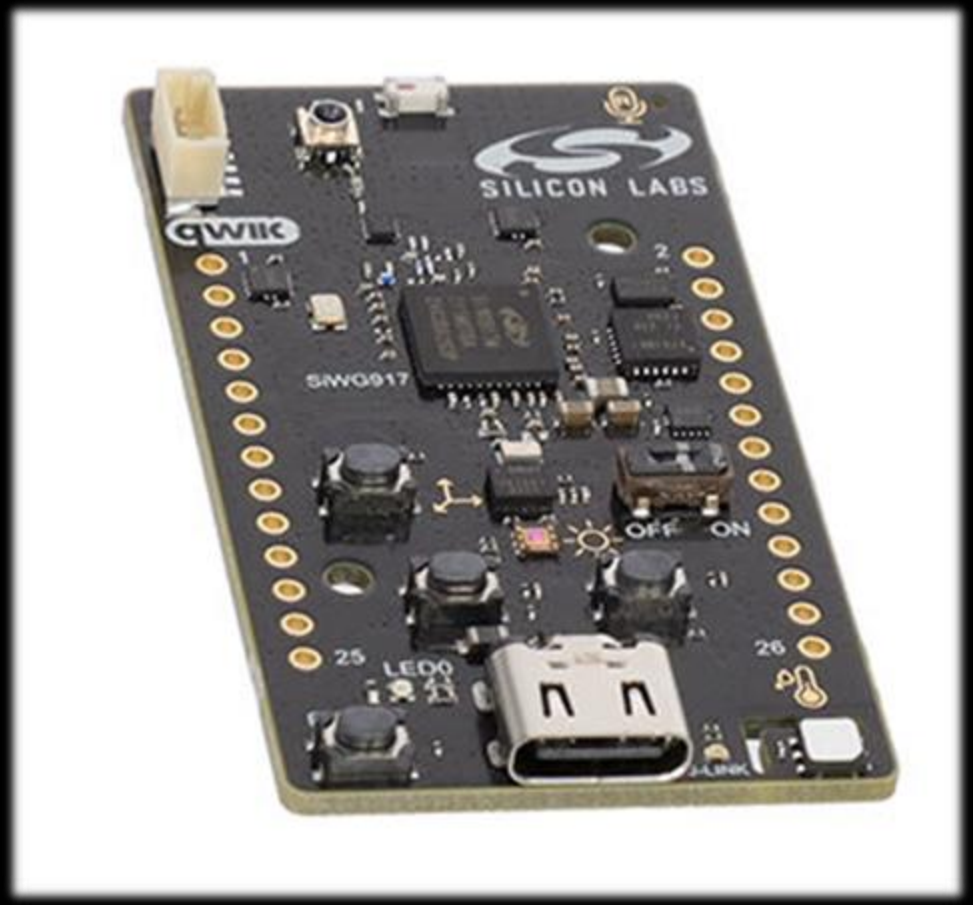


** Wi-Fi 6 TWT with auto-config feature enabled. TWT Rx latency 60s with 8ms wakeup duration. WLAN keep-alive every 60s. No TCP keepalive. 352kB SRAM retention. Does not include application MCU operation.*

SiWG917 SoC Battery Life Estimation

How the SiWG917 SoC battery life of up to 2 years was estimated:

- *Average current consumption for wireless and application **37µA at 3.3V***
- *Associated standby low-power mode*
- *SiWG917 SoC as TCP client maintains socket connection*
- *60 secs TCP keep-alive used.*
- *WLAN keep-alive 30 secs. 352kB NWP SRAM retention*
- *TWT Auto Config feature enabled. TWT Rx latency 60 secs with 8ms wakeup duration*
- *Arm Cortex-M4 in sleep mode (PS4). 320kB SRAM retention*
- *Measurements are taken in optimal conditions (RF chamber)*
- *Battery capacity 1000mAh (example AAA rechargeable battery)*



- **On-board sensors**: Temperature Sensor (Si7021), Humidity Sensor (Si7021), 6-axis inertial sensor (ICM-20689), 2 x Digital Microphones (ICS-43434), Ambient Light Sensor (VEML6035)
- **Probe points** for power measurements
- **Qwiic Connector:** For compatibility with Sparkfun's expansion hardware (Sensors, Cameral, LCD, etc)
- USB Port: Board Power, Serial Communication
- **On-board Debugger**: SWD, VCOM

NEW:
Development Kit for AI/ML SiWG917 Wi-Fi, BLE and Sensors

- Arm Cortex-M4F 180Mhz
- 8MB flash, 8 MB on-board PSRAM and 320kB SRAM
- Matrix Vector Processor for AI/ML

  Co-processor for offloading matrix math operations

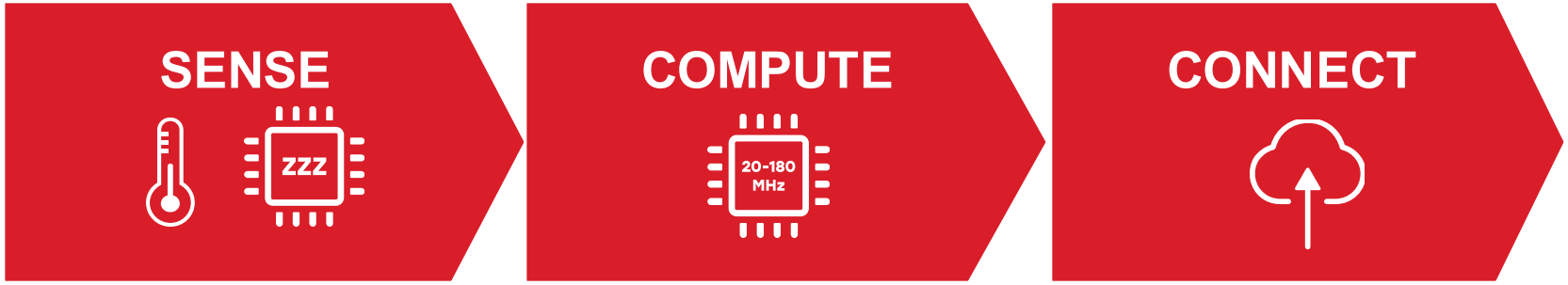
  Delivers faster ML inference with lower power consumption

  Performs Real and Complex Matrix and Vector operations, providing computing efficiency
- Wide variety of AI/ML applications

  Key-word detection demo

  Accelerometer based demos
- TensorFlow Lite support Available in June
- OPN: SiWx917-DK2605A

SiWx917 Ultra-Low-Power Sensor Processing



Receive & Store Sensor Data in the ULP Mode

- Receive through ULP peripherals
- Store in ULP SRAM
- Cortex-M4 sleeps
- PS1 power state is supported for ADC-based sensors, PS2 for other sensors.

Process Sensor Data in Cortex-M4 High efficiency Mode

- Cortex-M4
- High efficiency computing
  - PS2 at 20MHz (32uA/MHz)
- High-performance computing
  - PS4 at 180MHz (65uA/MHz)
- SW controlled Power manager
- Fast wake-up time

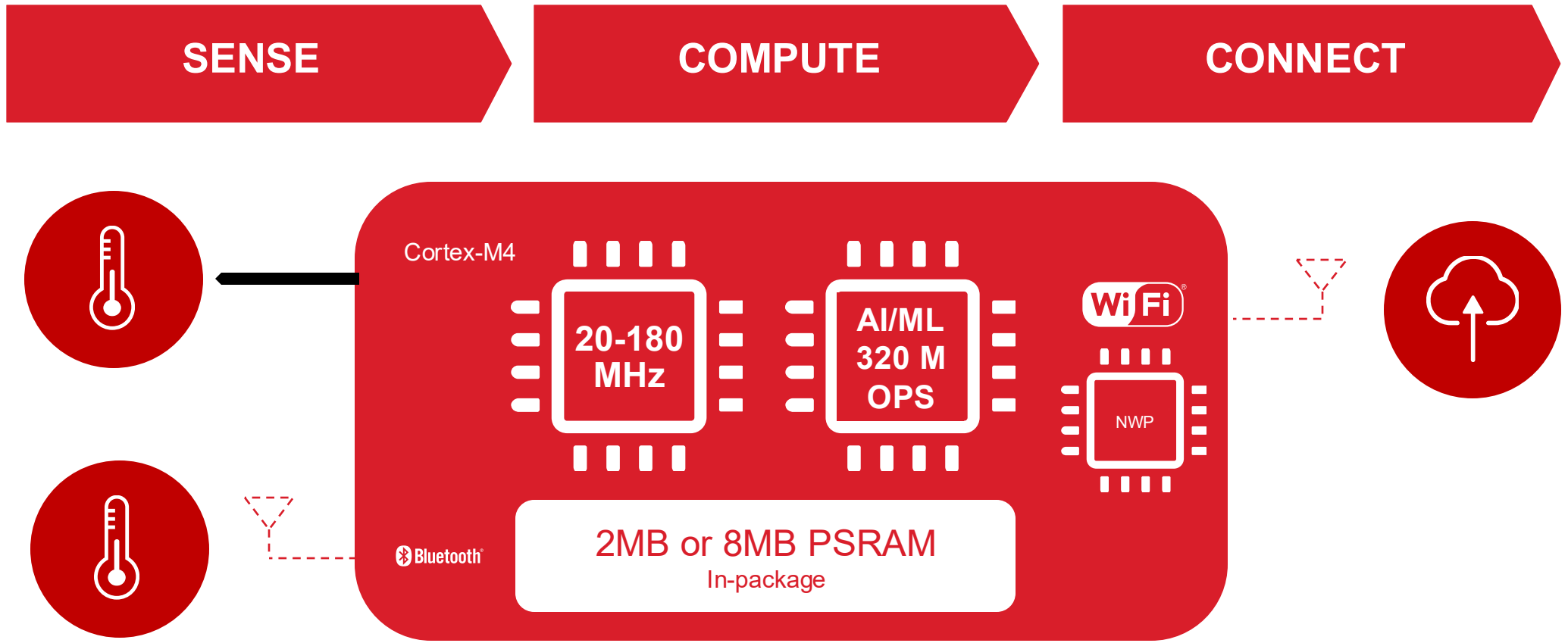
Enter High-performance Mode to Send Data to Cloud

- Maintain Wi-Fi Cloud connection
- Network Wireless Processor maintains TCP connection

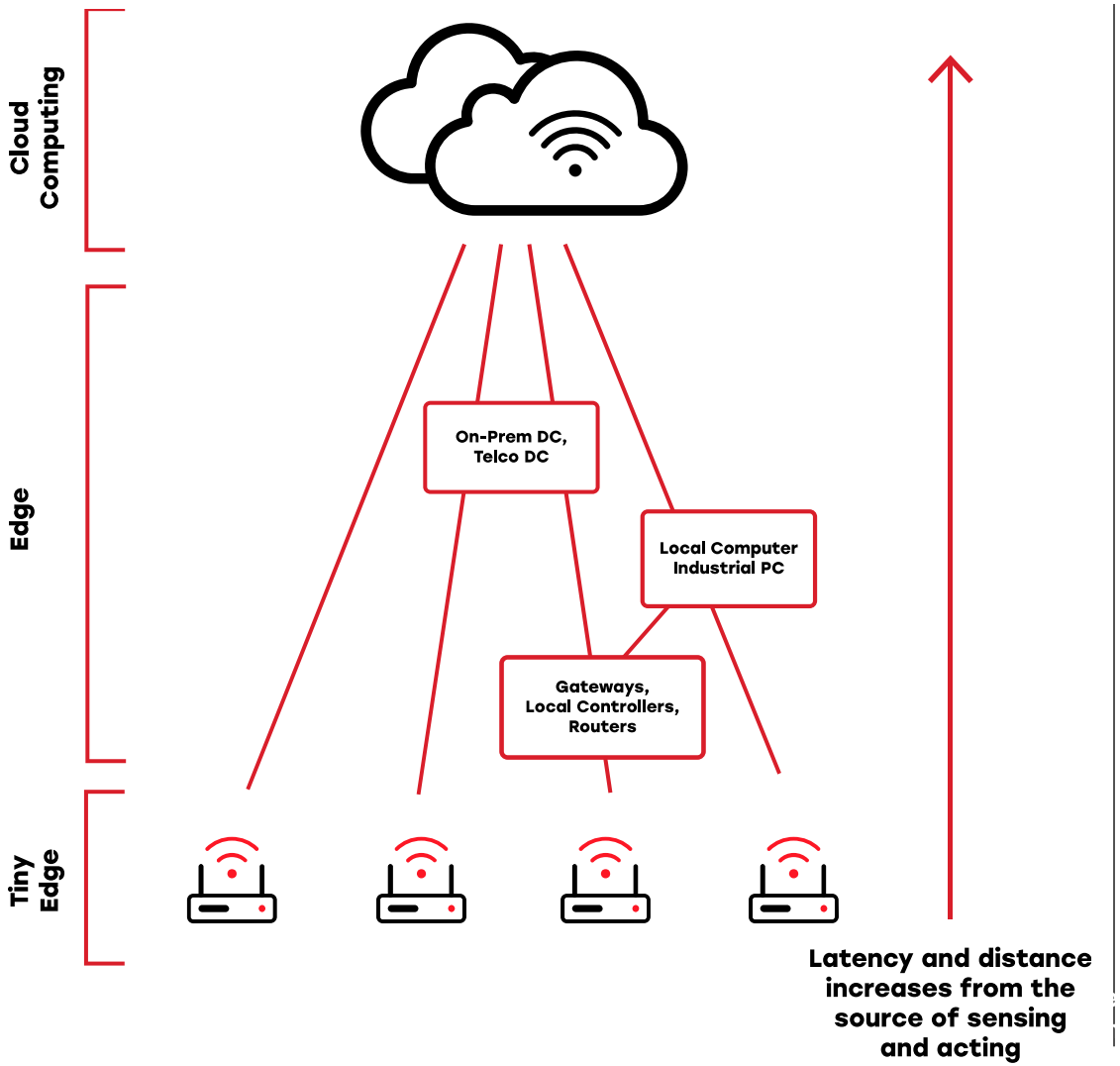
BENEFITS

- **Minimize Power and Extend Battery Life**
- **Offload MCU**
- **Compute Locally at Low-power**

SiWx917 Ultra-Low-Power Sensor Processing



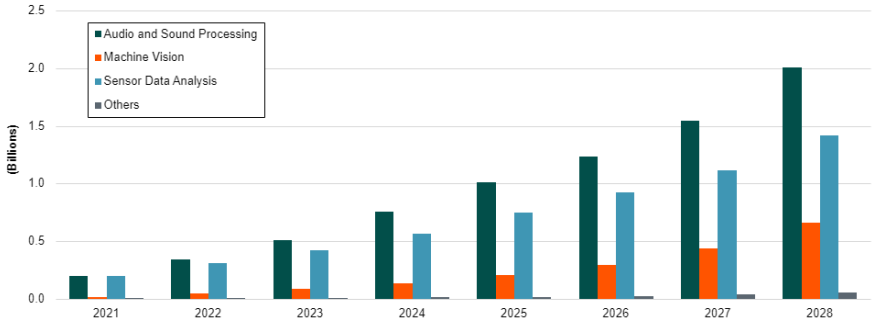
Artificial Intelligence(AI) and Machine Learning(ML) at the Tiny Edge



Key Benefits

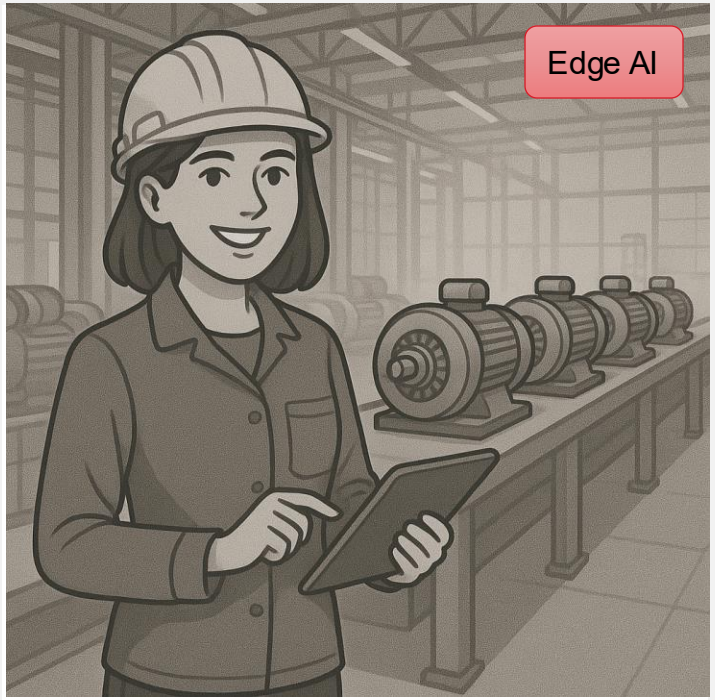
- Low Latency
- Privacy, IP Protection, Security
- Bandwidth Constraints
- Offline Mode Operation
- Cost Reduction

>4B Devices deployed with TinyML in 2028



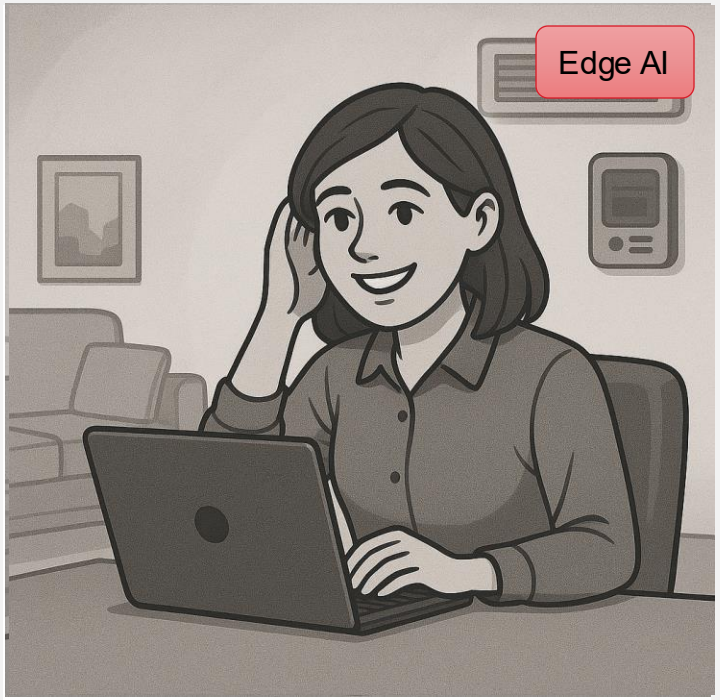
Source: ABI Research, Artificial Intelligence and Machine Learning, 2 QTR 2024

Amy’s Day - Transformed by Edge AI



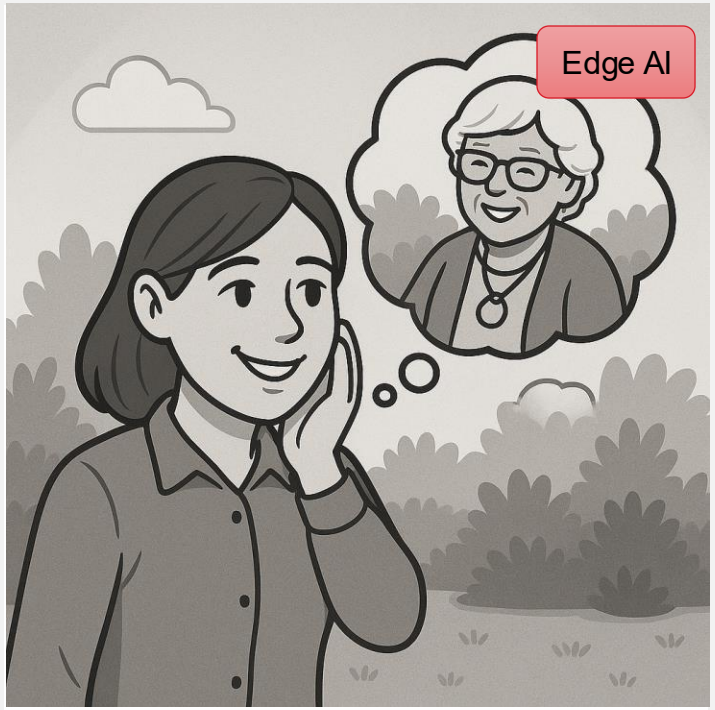
9:00 FACTORY

- ✓ Detect anomalies in real time
- ✓ Increased accuracy
- ✓ Works reliably



18:00 HOME

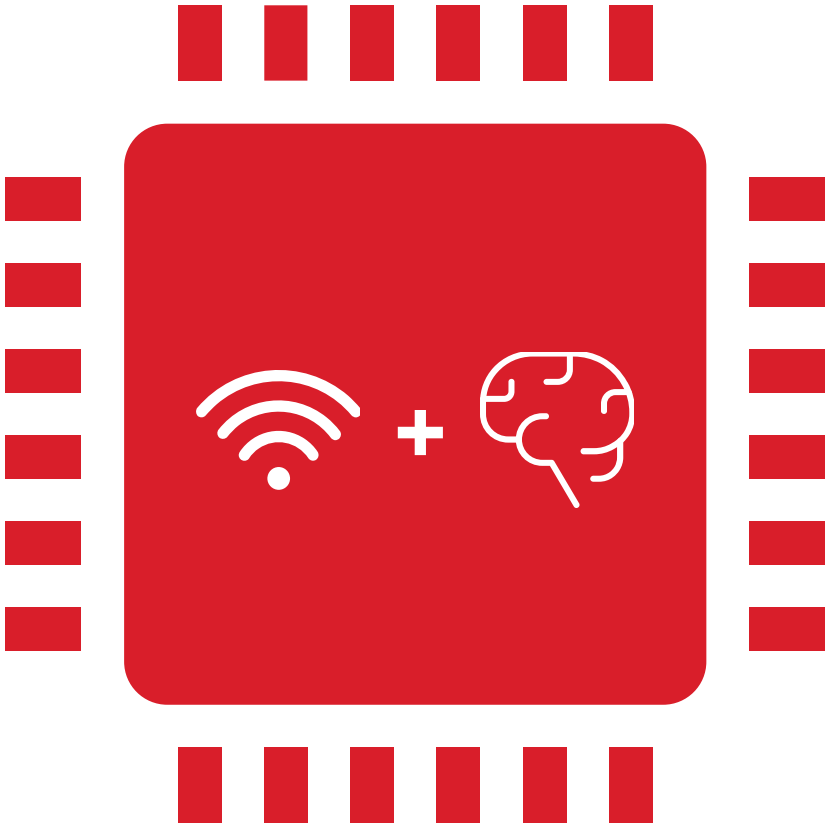
- ✓ Keep data private and secure
- ✓ Devices respond instantly
- ✓ Operate perfectly even offline



20:00 FAMILY CALL

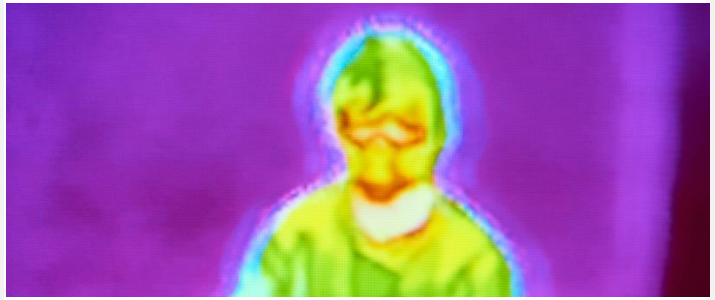
- ✓ Instant, reliable alerts
- ✓ Reduces false positives
- ✓ Improves battery life

When Should you Use Edge AI?



- Why moving from rule-based logic to AI?
  - Not adaptable, fragile with noisy, variable or edge-case inputs.
  - Labor-intensive, hard to maintain and scale.
- What problems can you solve?
  - Spotting abnormal sensor patterns (e.g., vibration, motion).
  - Detect wake-words or acoustic events
  - Locally classifying images, gestures or activities.
- When does local AI make sense?
  - When decisions need to be fast, private or offline
  - When traditional logic can’t handle variability
  - When you want to trigger cloud AI only selectively
- Data considerations:
  - Are sensors onboard? (accelerometers, microphones, etc.)
  - Are you capable of capturing meaningful and consistent data?
  - Will the model fit within compute and memory budgets

Machine Learning Applications Supported by Silicon Labs



VISION

Low-resolution

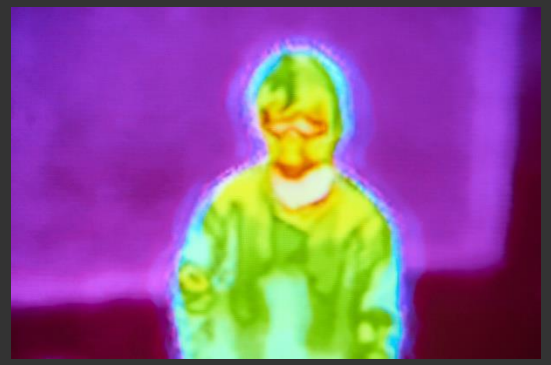
AUDIO

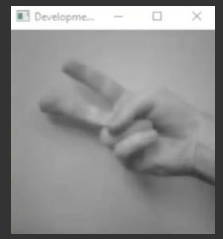
Voice commands
Audio pattern matching

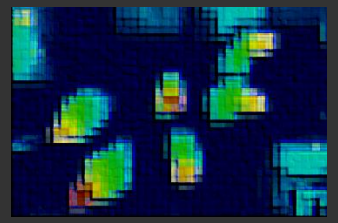
SENSOR

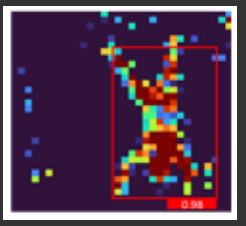
Vision

Low-resolution vision



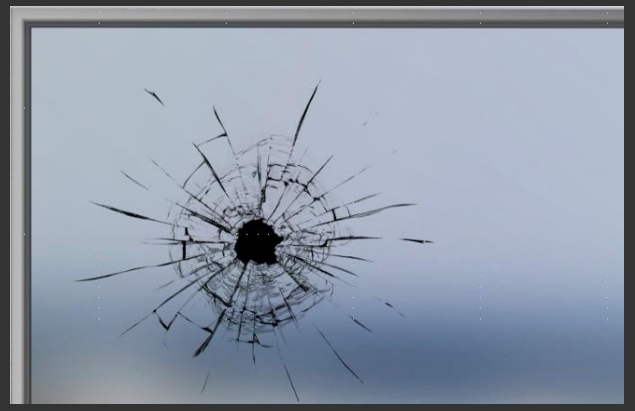






Audio

Voice commands
Audio pattern matching

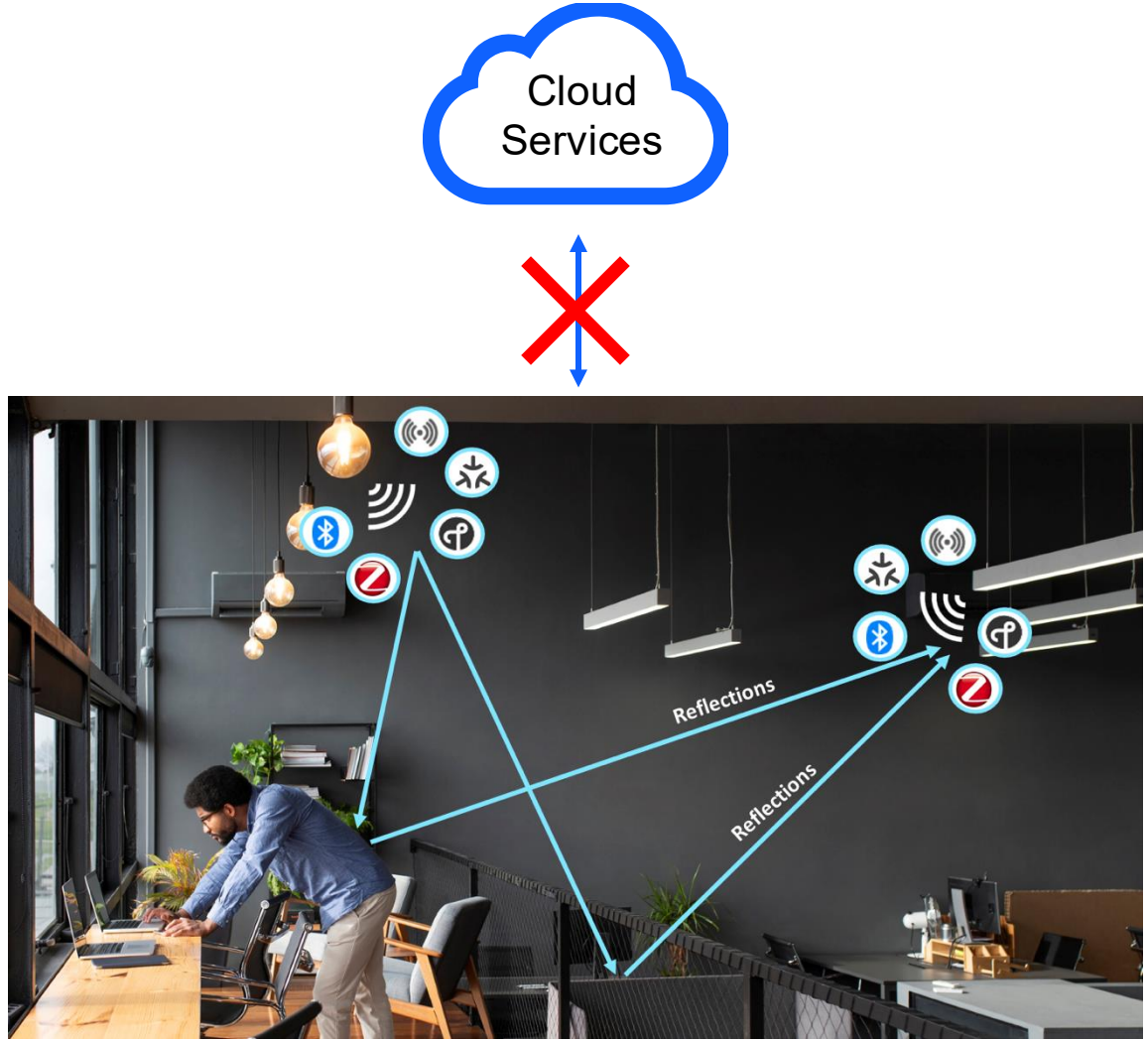


Sensor

Sensing with Channel State Information

Sensing with Wi-Fi 802.11bf

- CSI based sensing is an optional feature in 802.11ax available but ONLY with Wi-Fi (802.11.bf)
- Superior to simple RSSI based solutions



SILICON LABS

Q&A

SILICON LABS

Thank you

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