

tinyML[®] Foundation

Enabling Ultra-low Power Machine Learning at the Edge

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www.tinyML.org

Integrating TinyML into Schneider Electric's connected products

TinyML Summit 2024

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Life Is On

Schneider
Electric



**Our purpose is to empower all to
make the most of our energy and resources
bridging progress and sustainability for all.
At Schneider, we call this Life Is On.**

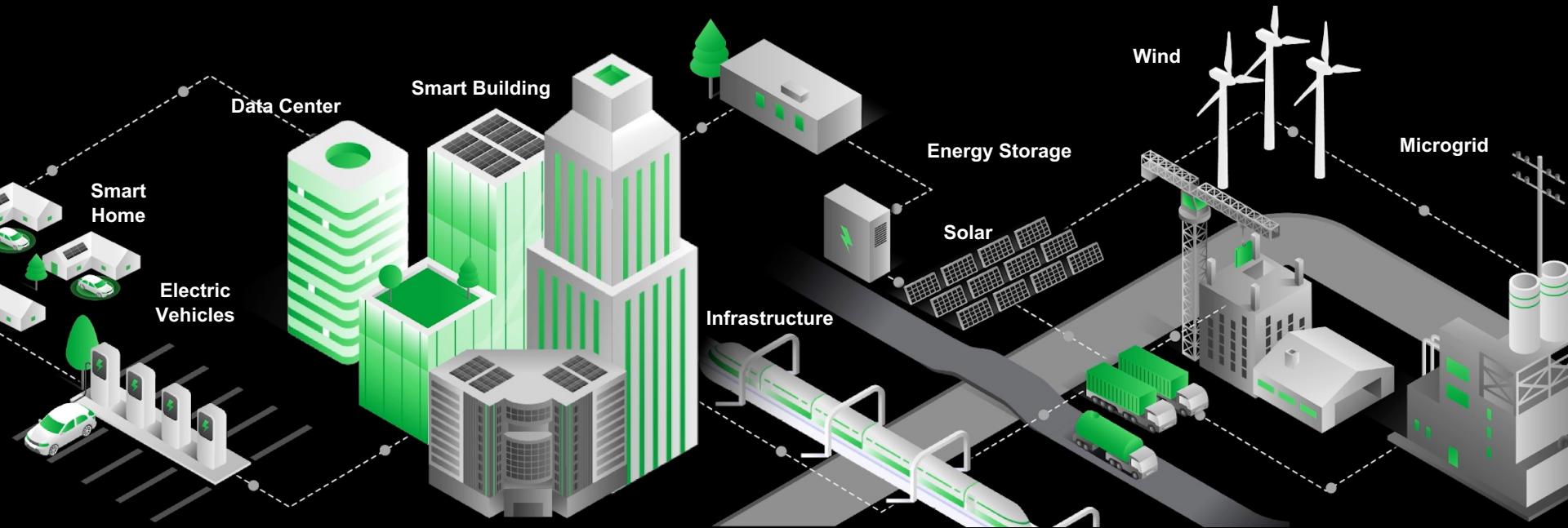
**Our mission is to be your digital partner for
Sustainability and Efficiency.**

Schneider Electric

Leading global provider of energy management and industrial automation hardware, solutions, software, and services



Where are our products?



DIGITAL + **ELECTRIC** = **SUSTAINABLE**
for Efficiency for Decarbonization Smart & Green

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MORE EMBEDDED AI = **MORE EFFICIENCY** = **GREATER SUSTAINABILITY**

Intelligent products enhancing protection and services

Advanced features for all kinds of buildings



Smart buildings

- Balance space & energy
- Auto-adapt to conditions

More **Comfort,**
Efficiency, Sustainability



Industrial sites

- Detect problems before they occur
- Automatic alarm and reaction

More
Safety & Reliability

AI embedded in our products = AI on Microcontrollers

Success story

Challenge:

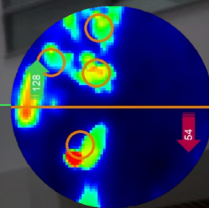
Understanding building occupancy across various areas while respecting privacy, in real-time, accurately, and cost-effectively.

Solution:

- Implementation of People Counting sensors utilizing thermal images and fully embedded algorithm, prioritizing privacy by design.
- Integration of an AI-based deep learning model for real-time and precise counting.
- Utilization of a general-purpose microcontroller for embedded AI at no additional cost.

Benefits:

- Unlocking people counting features in building management systems, optimizing space utilization and automating HVAC and lighting for energy efficiency.
- Enhancing comfort for building users and facilitates energy savings, contributing to greater sustainability.



Core Data in industry application

The usual data signals we deal with

- ~ Current
- ~ Voltage
- ↕ Vibration
- 🌡️ Temperature
- 🔊 Sound



Challenges of Industrial Embedded AI

Industrial constraints



Harsh environment

- Thermal stress
- Mechanical hazards
- Environmental constraints



Remoteness

- Limited power supply
- Limited connectivity
- Durability / Reliability

Design constraints



Cost of carefully selected components:

- General purpose or Industrial grade hardware
- Optimized BoM



Optimized firmware

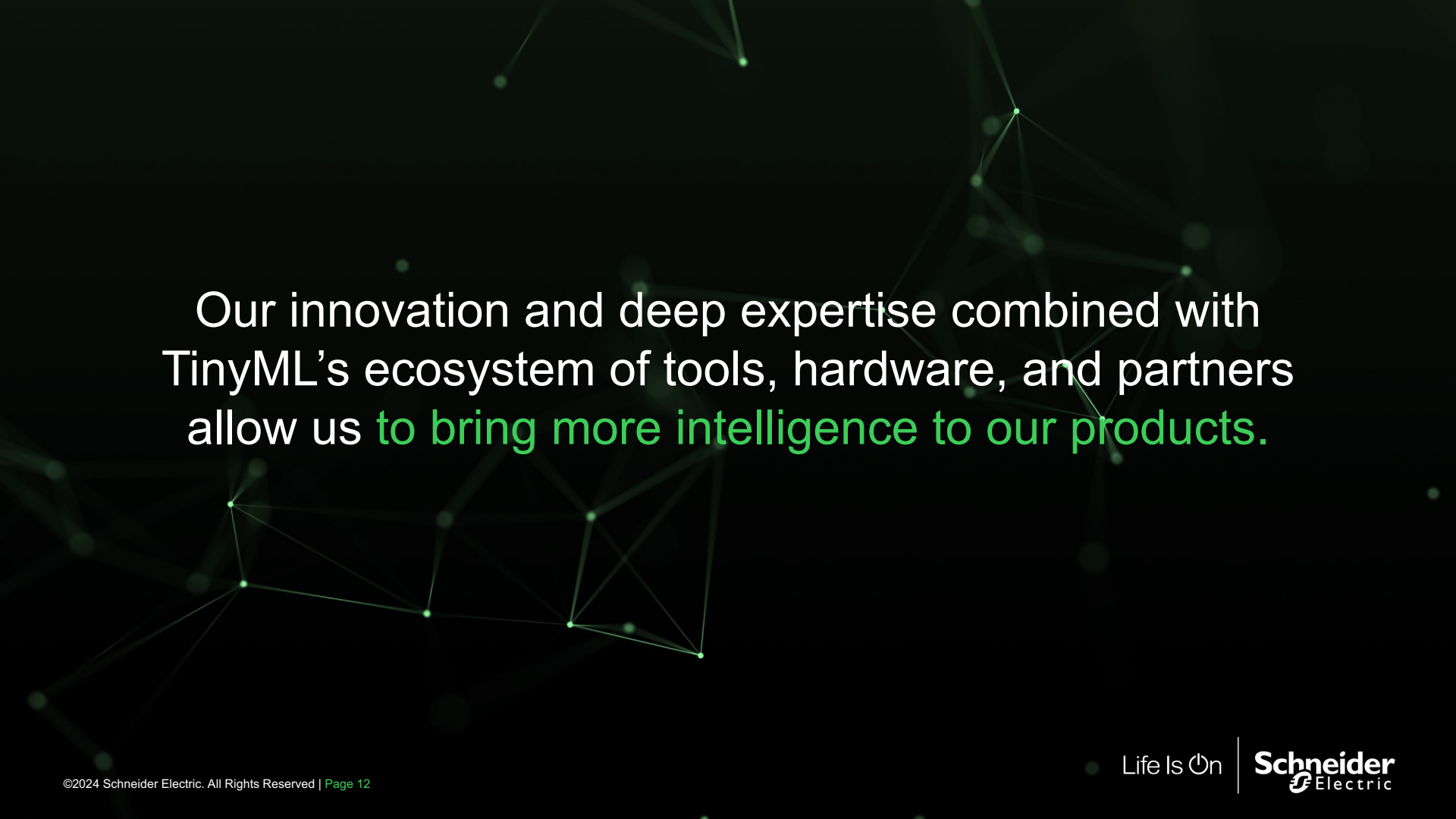
- Low level code
- ↳ Data Science & AI
("high level" code)
- ↳ Device Firmware
("low level" code)

Frugal AI design



Limited Processing Power & Memory

- Model design driven by application constraints
- Limited set of AI Layers or features which can be used



Our innovation and deep expertise combined with TinyML's ecosystem of tools, hardware, and partners allow us to bring more intelligence to our products.

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