A close-up, high-angle view of a microchip on a circuit board. The chip is illuminated with a bright blue light, and a glowing blue cube of data points is positioned directly below it, suggesting AI or data processing. The background shows other components and traces on the board, all in a dark blue, futuristic aesthetic.


Making AI at the tiny edge a reality & why ecosystem matters

Remi El-Ouazzane
President, Microcontrollers, Digital ICs and RF
products Group

“

What a comfortable position for reading a good book





The future of smart tech
is at the edge

Era of Cloud Connected “Intelligent Things”

Three pillars to make cars & things more intelligent, secure and connected

Edge

AI @ the edge: to more efficiently and autonomously compute and actuate



Security: to identify / authenticate / protect data within device, device2device, device2cloud



Cloud: to enable high data bandwidth to and from the AI-powered infrastructure



Cloud

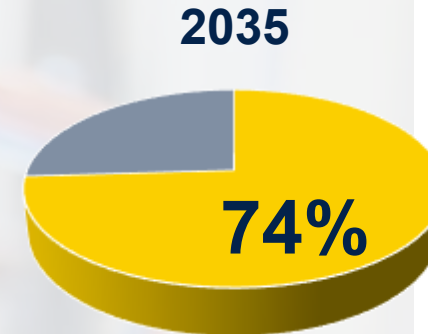
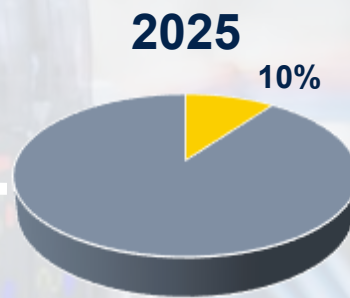
The coming decade will see a massive shift toward edge processing



Sending vast amounts of edge-generated data to the cloud is inefficient, costly, less secure, and latency-prone

79.4
zettabyte
(10^{21} byte)

of data generated by IoT devices in 2025*



% Data processed

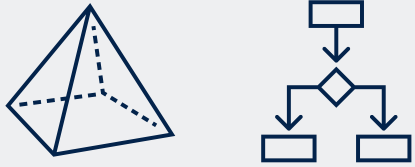
 in the cloud

 locally

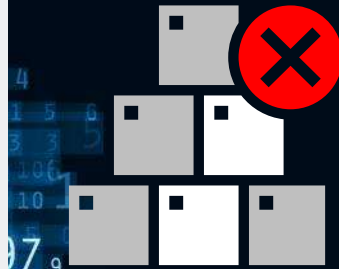
By 2035, 74% of all data will be processed locally**

The world is transitioning from rule-based to data-centric product engineering

Stochastic



Algorithms and predefined models to analyze data and make predictions or decisions



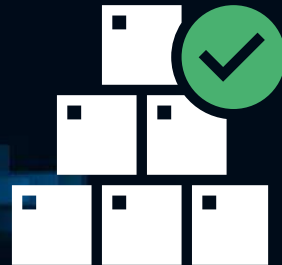
Traditional approaches have limitations:

- when dealing with **large datasets**
- when the **phenomena are too complex**

Heuristic



Machine learning algorithms to automatically learn patterns and relationships from data



AI-based data processing offers a more flexible and powerful approach to analyzing and making decisions from large data collections

The future of AI is distributed balancing power and performance across the layers

Cloud

Data server / On premises

GPU | *Thousands of kW*

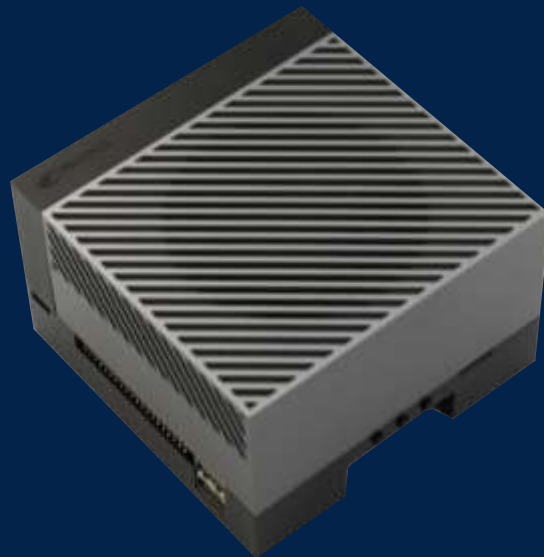


Thousands

Edge

Near the consumer

MPU | *5 to 100 W*

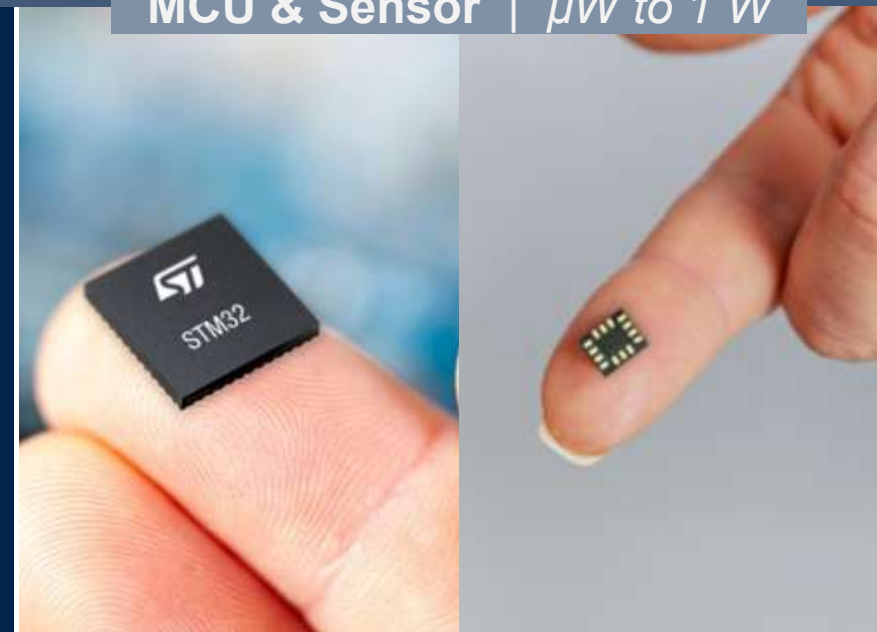


Millions

Tiny edge

Near the sensor

MCU & Sensor | *μ W to 1 W*



100's Billions

From control to intelligence

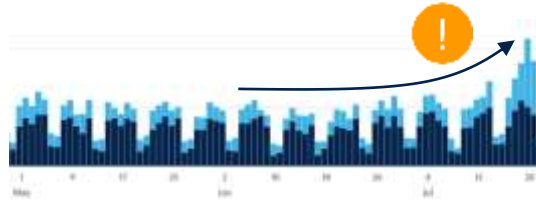
How tiny edge AI is transforming devices right now

Reactive






The control era
1980's

Proactive



The connected era
2000's

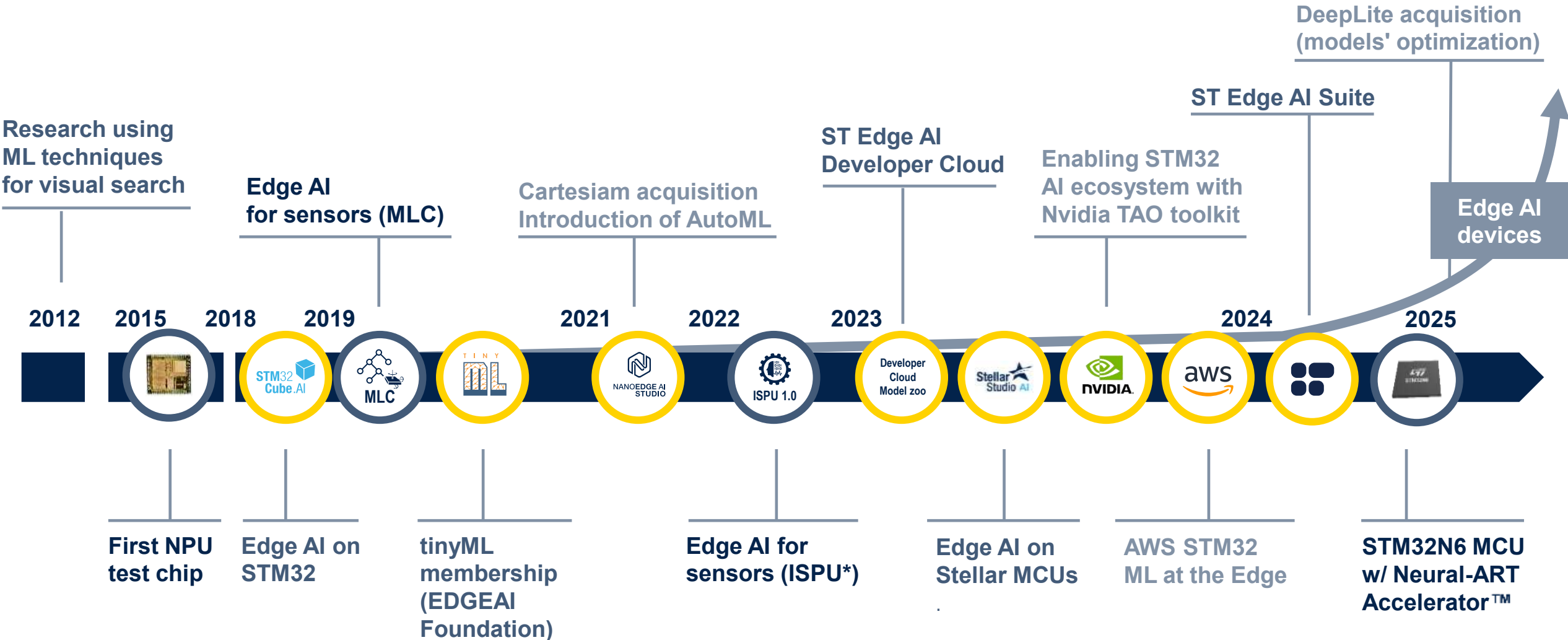
Preventive

-  Suboptimal engine speed
-  Bearing is aging
-  Motor slow down to prevent damage



The intelligence era
Present

ST is leading tiny edge AI with 10+ years of research, development, and deployment



*Intelligent sensor processing unit



Opening a new range of embedded applications

Upgrade existing devices with AI-based services



Arc fault
detection



Predictive
maintenance



Battery
management

Reduce BOM by shifting from MPU to MCU



People
detection



Sound
analysis



Speech
recognition

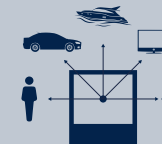
Offer advanced services without cloud costs



Object
classification



Pose &
gesture
estimation



Object
segmentation

A few KOPS

Tens of TOPS

Building a comprehensive ecosystem to make tiny edge AI a reality

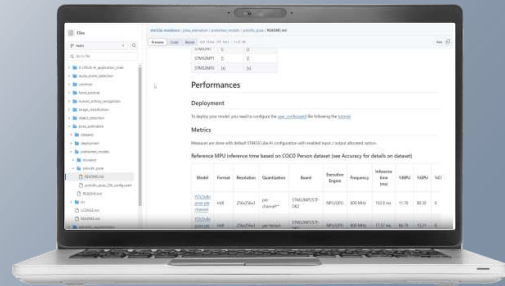
Bringing together technology, tools, community, and partnerships to **simplify and speed up edge AI development**

Hardware



Broad range of device
Ultralow power
Embedded AI accelerators

Software tools



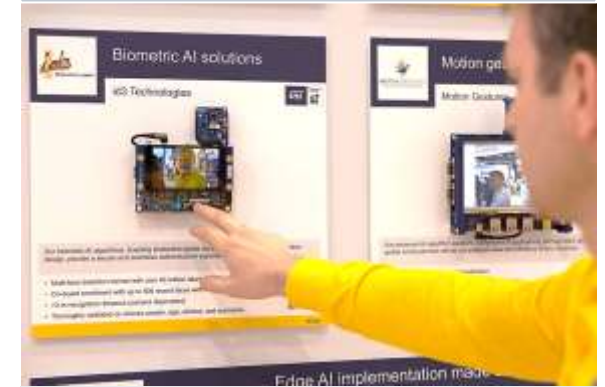
Comprehensive toolchain
Find, train, optimize
Benchmark & deploy

Developer community



Global knowledge sharing
Resource accessibility
Extensive support network

Strategic partnerships



Partner network
Ready-to-use solutions
Flexible ad-hoc services

ST is pioneering tiny edge AI with advanced hardware solutions

AI MCUs

MCUs with AI HW acceleration

up to 0.6 TOPS / 0.3 W



Computer vision & real-time multi-modal

GP & automotive MCUs

Full MCU portfolio from entry-level to high-performance

down to 8 mW



Time series real-time edge AI

AI sensors

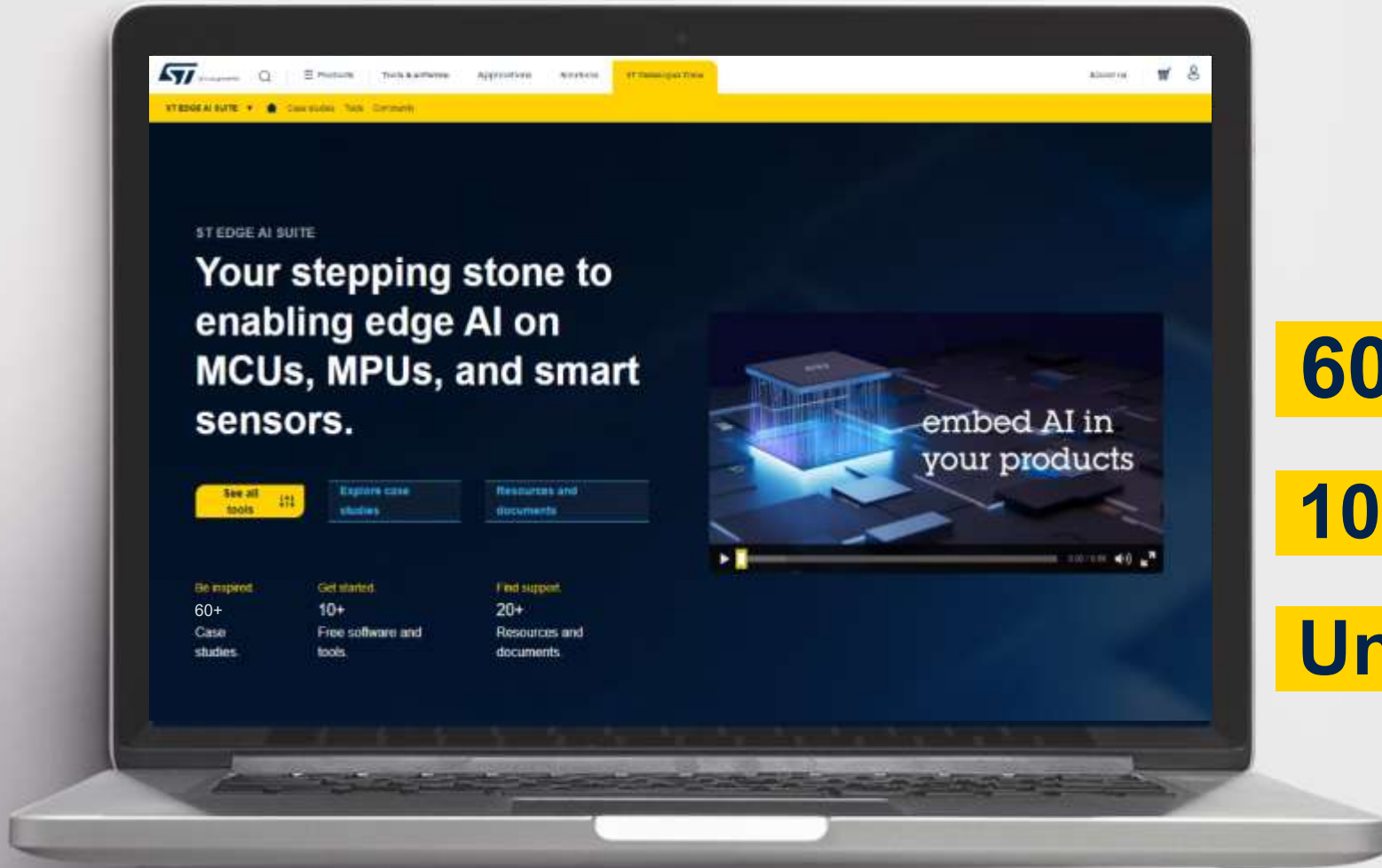
Inertial MEMS sensors with AI HW acceleration

less than 1 mW



Always-on event detection & classification

Bringing solutions to engineers and data scientists at every stage of their development



 **ST Edge AI Suite**

60+ case studies

10+ free software tools

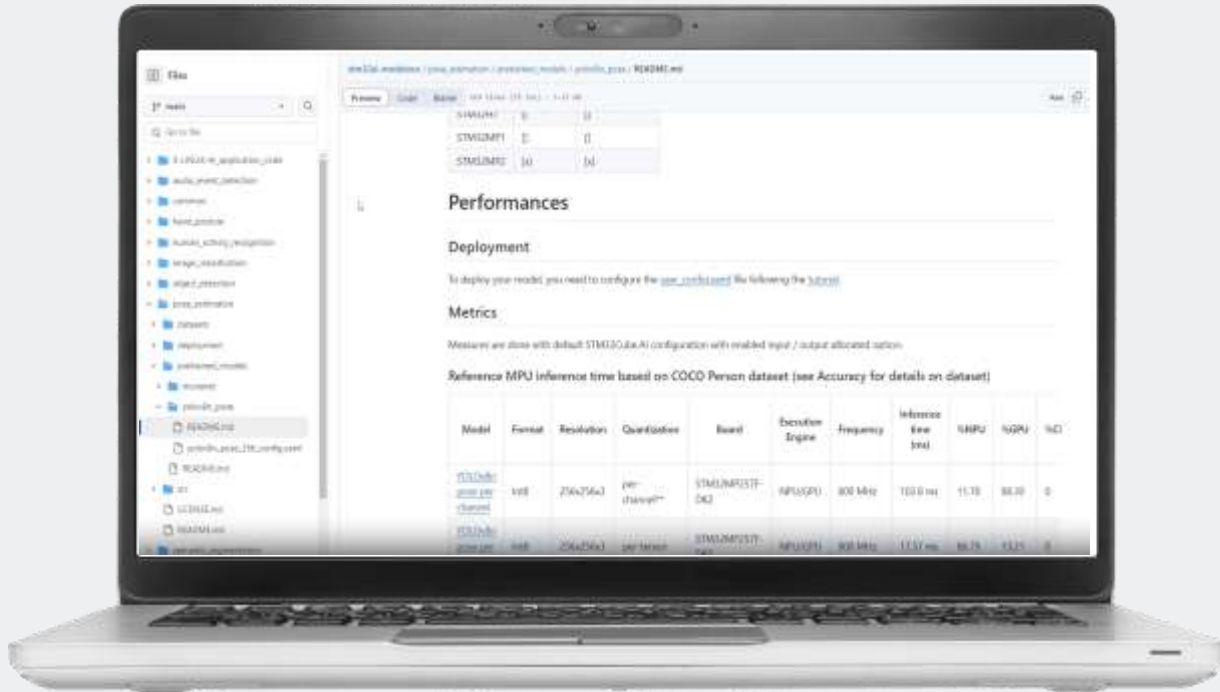
Unified AI core technology



st.com/st-edge-ai-suite

Building the largest MCU AI Model Zoo to accelerate edge AI time-to-market

Unmatched collection of optimized models for edge AI applications



140+ ready-made models for vision, audio, sensing

Highly optimized models for STM32 microcontrollers

Deep integration with ST Edge AI toolchain to accelerate product design



* Formerly known as TensorFlow Lite

Building a strong ecosystem with an expanding range of partners



20+ industrial partners with proven edge AI expertise




Strategic partnership with AI industry leaders



AR-Glasses
10 hours
on a single-charge

Meta-Bounds AR Glasses

 **Meta-Bounds 莫界**

Panasonic



Virtual sensor

Tire pressure
measured through the
e-motor current
consumption

~15-40%
Energy saving per
washing cycle



**Predictive
maintenance**

Multiple sensors and
learning on device

 **Oxytronic**



**Electrical arc
detection**

Improved accuracy to
avoid false detection



**Computer vision
on MCU**

Cost-effective, compact,
& low-power solution

 **AUTOTRAK**
MORE THAN JUST TRACKING



Virtual sensor

Measuring motor
internal temperature
based on external data

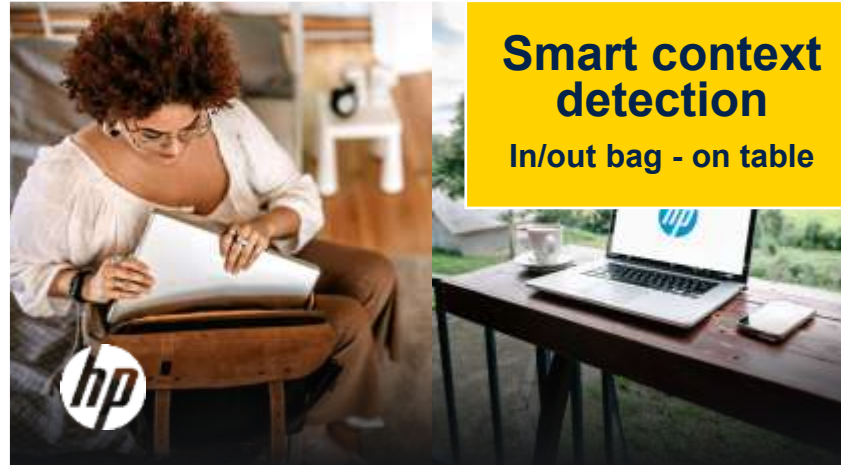
 **HPE GROUP**




**Smart context
detection**

In/out bag - on table

 **hp**





 **SOXAI**

8 days
battery life
Monitors vital data








Meta-Bounds AR Glasses



**ST is currently
supporting
160,000+
tiny edge AI
projects yearly**



ST leading the race to 1 billion AI-accelerated MCUs



Making edge AI a first-class tool to solve real customer problems

Building a complete ecosystem to deliver end-to-end edge AI solutions

Driving tiny edge AI innovation

building on the 10+ years of experience on edge AI with 160K ongoing projects today



Our technology starts with You



Find out more at www.st.com/ai

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