

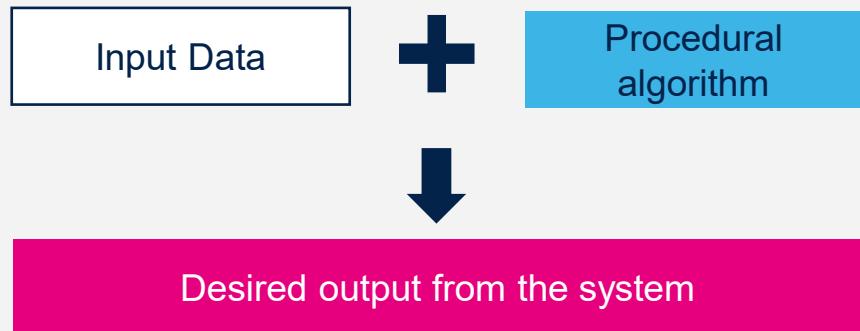
Artificial Intelligence solutions running on STM32



A new way to add environment awareness to your products

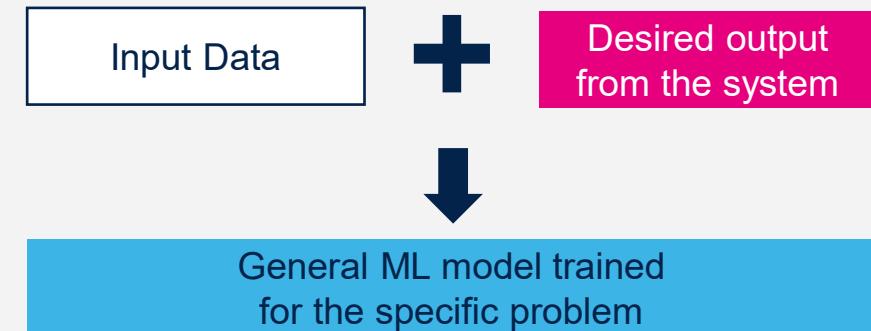
Create more robust software using Machine Learning on STM32

Standard programming
Handcrafted rules based on experience



- Requires domain expertise to code
- Need to rewrite if environment evolves

Machine Learning
Rules learnt from real-world data



- Generate code from real-world observations
- Re-learn from data if environment evolves

Artificial intelligence at the deep edge

Moving part of Artificial Intelligence closer to the data acquisition brings several benefits



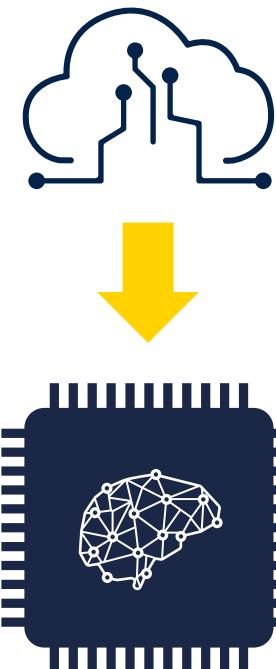
Better user experience



No latency (real-time)



More reliability



Add new functions and services with **Embedded AI**

Optimized Cloud usage



Privacy by design (GDPR compliant)



Sustainable on energy



For most companies, creating an edge AI device is a long journey with extraordinary challenges

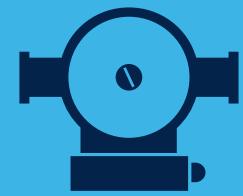
Investment, complexity and development time are often barriers to AI adoption



160 Billions machines just “want” to do a better job

The washer isn't
draining properly
because
a belt is showing
signs of wear

HOME
MAINTENANCE



The pump is about to
break down
due to
a failure on a ball
bearing

INDUSTRIAL
MAINTENANCE

An unusual noise has
been detected
and
recognized as a
window break

SECURITY



Enterprise restaurant
is full
and
your waiting time is
currently estimated
to 15mn

PEOPLE
COUNTING

Start today with deep edge AI

“ If only
I had solutions to overcome
AI design challenges

That's where we come in

Whatever your company's profile,
you will find an AI solution suited to your needs

COMPANY'S PROFILE



Embedded developers

- No dataset available
- No dedicated AI Team



Team with AI expertise

- Dataset available
- AI Team

Anomaly detection



USE CASES



Deep Learning



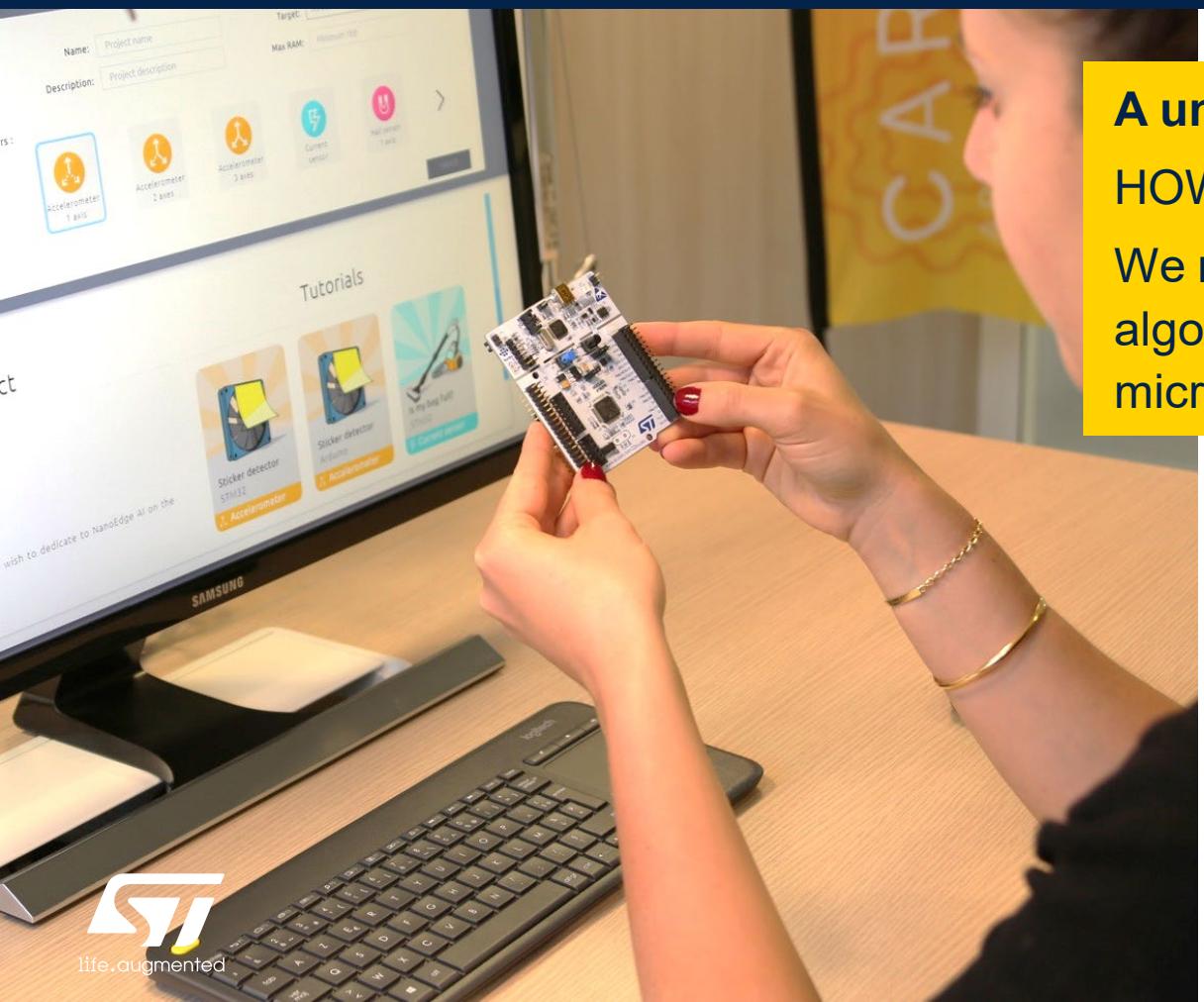
Engineering Services



For embedded developers

NanoEdge™ AI Studio, an automated ML design solution

NANOEDGE AI
STUDIO 



A unique solution thought from scratch

HOW DID WE DO IT?

We re-wrote, from the algebra, ML and signal processing algorithms so that they can LEARN and INFERENCE inside a microcontroller

- Patented technology
- Designed for embedded developers
- Ultra memory efficient (Flash and RAM)
- Unsupervised learning in the device
- Superior security
- Small footprint, any STM32 Cortex M
- Close to 100% accuracy and confidence

For teams with AI expertise

STM32Cube.AI helps you accelerate your embedded development



Easily evaluate, convert and deploy Machine Learning and Deep Neural Networks on STM32

An AI extension integrated with STM32Cube MCU development environment to OPTIMIZE and TUNE models, directly on target

- Develop and train your model with major AI frameworks

Logos for various AI frameworks: TensorFlow Lite (orange T), Keras (red K), scikit-learn (blue and orange circle), ONNX (grey diamond), MATLAB (blue and orange logo), and PyTorch (orange circle with red outline).

- Best ML performance on STM32 (MLPerf™ Tiny benchmarks)
- Validate performance directly on target
- Small footprint (runs on any STM32 built around Cortex M33, M4 and M7)





Making deep edge AI accessible now

NANOEDGE AI
STUDIO 

All STM32 are compatible with NanoEdge™ ecosystem

STM32
Cube.AI 

STM32 compatible with STM32Cube.AI ecosystem



MPU



High Perf
MCUs



Mainstream
MCUs



Ultra-low Power
MCUs



Wireless
MCUs

Arm® Cortex® core

-M0

-M0+

-M3

-M33

-M4

-M7

dual -A7& -M4

STM32F2

398 CoreMark
120 MHz

STM32F0
106 CoreMark
48 MHz

STM32G0
142 CoreMark
64 MHz

STM32F1
177 CoreMark
72 MHz

STM32L0
75 CoreMark
32 MHz

STM32L1
93 CoreMark
32 MHz

STM32L5
424 CoreMark
110 MHz

STM32U5
651 CoreMark
160 MHz

STM32L4
273 CoreMark
80 MHz

STM32L4+
409 CoreMark
120 MHz

STM32WL
161 CoreMark
48 MHz

STM32WB
216 CoreMark
64 MHz

STM32MP1

4158 CoreMark
800 MHz Cortex -A7
209 MHz Cortex -M4

STM32F4

608 CoreMark
180 MHz

STM32H7

3224 CoreMark
240 MHz Cortex -M4
480 MHz Cortex -M7

STM32F7

1082 CoreMark
216 MHz

STM32F3

245 CoreMark
72 MHz

STM32G4

550 CoreMark
170 MHz

STMicroelectronics is now offering the ultimate AI solution framework

Stay focused on
your expertise,
we bring you
everything else



Your Industry Expertise



- ✓ Lead with true innovation
- ✓ Improved time to market
- ✓ Optimize cost
- ✓ Minimize risks

AI Design Services



Proven methodology to
accelerate ML
innovation process



Certified
partner
ecosystem

AI Software and ecosystem



NANOEDGE AI
STUDIO



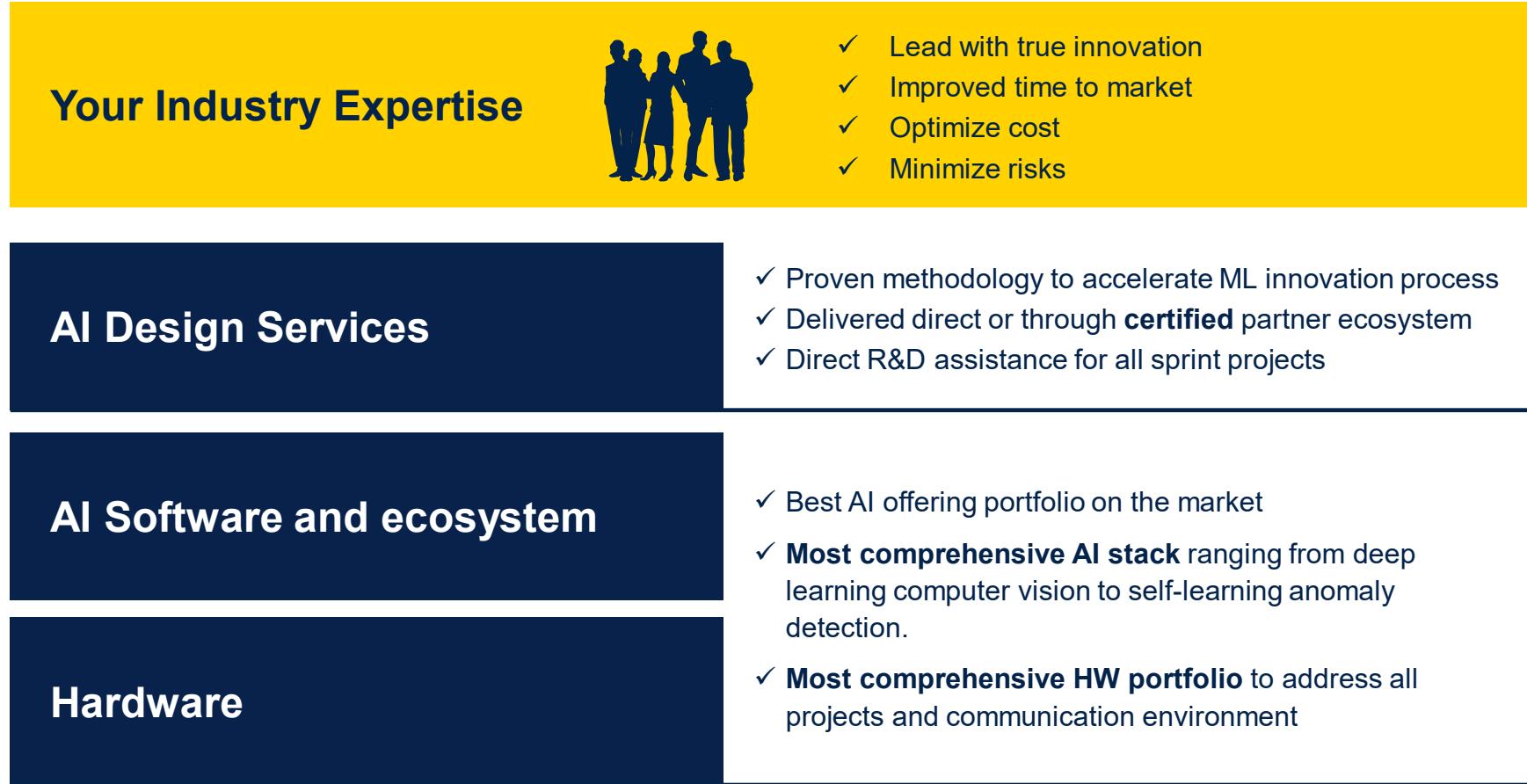
Function
Packs

Hardware



STMicroelectronics is now offering the ultimate AI solution framework

Stay focused on your expertise, we bring you everything else





Releasing your creativity



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For more information,
contact us at edge.ai@st.com



Our technology starts with You



Find out more at www.st.com/STM32CubeAI

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