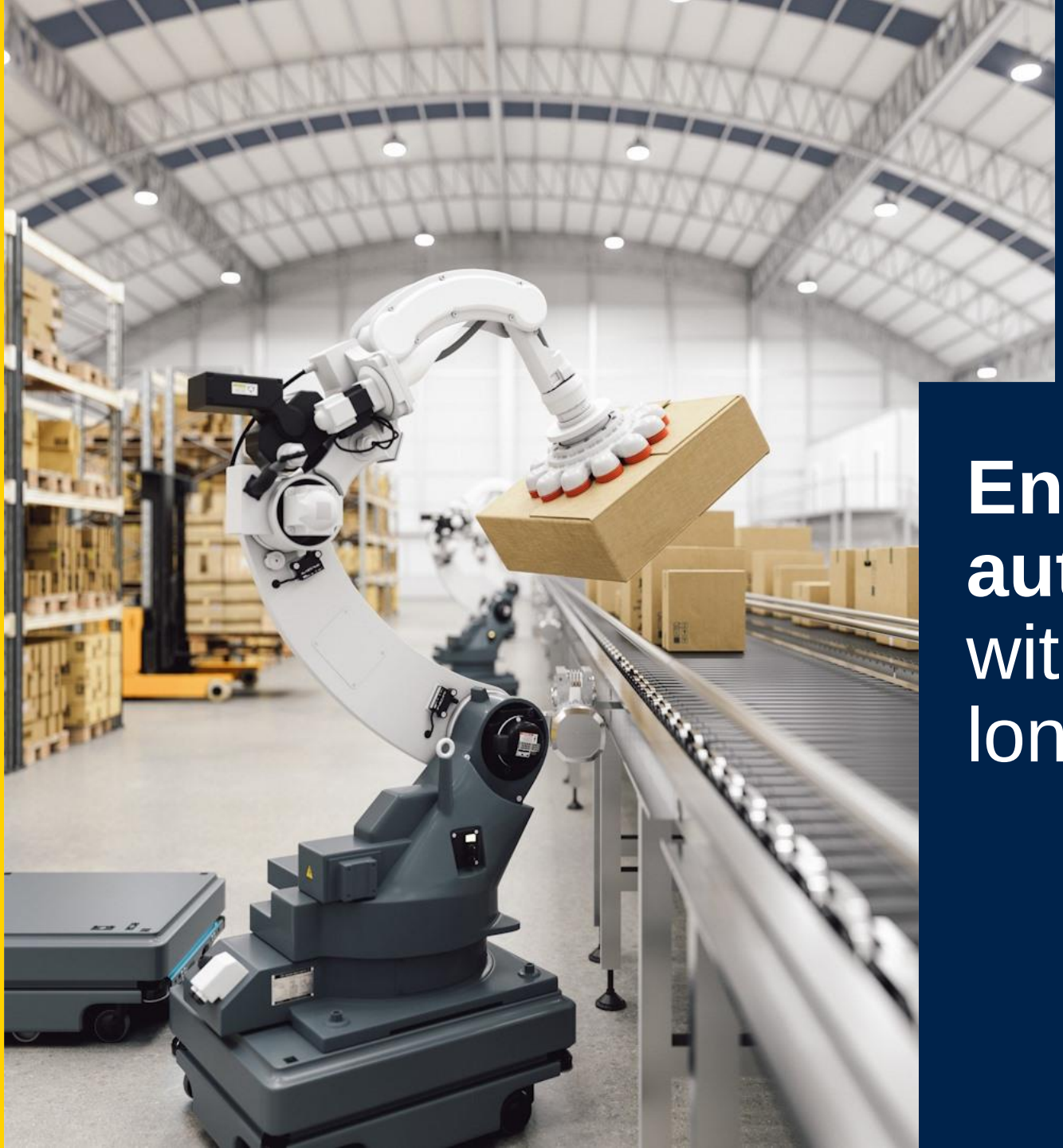

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Energy-efficient autonomous IMU with industrial product longevity

An intelligent & versatile IMU that does all by itself

Condition monitoring	Robotics	Safety helmets	Appliances
			
Unique 3-axis accelerometer with low noise and wide bandwidth	3D orientation tracking with sensor fusion low power (SFLP) + vibration sensing	Proper helmet wearing, 3D orientation, shock events, free fall, man down	Vibration measurements and compensation, water leak detection, anomaly detection, tilt measurement

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ISM330BX for condition monitoring

Machine learning

Data analysis

Local processing + connectivity

Set parameters, triggers, and trends

Attach sensors + collect data

Predictive maintenance

Condition monitoring

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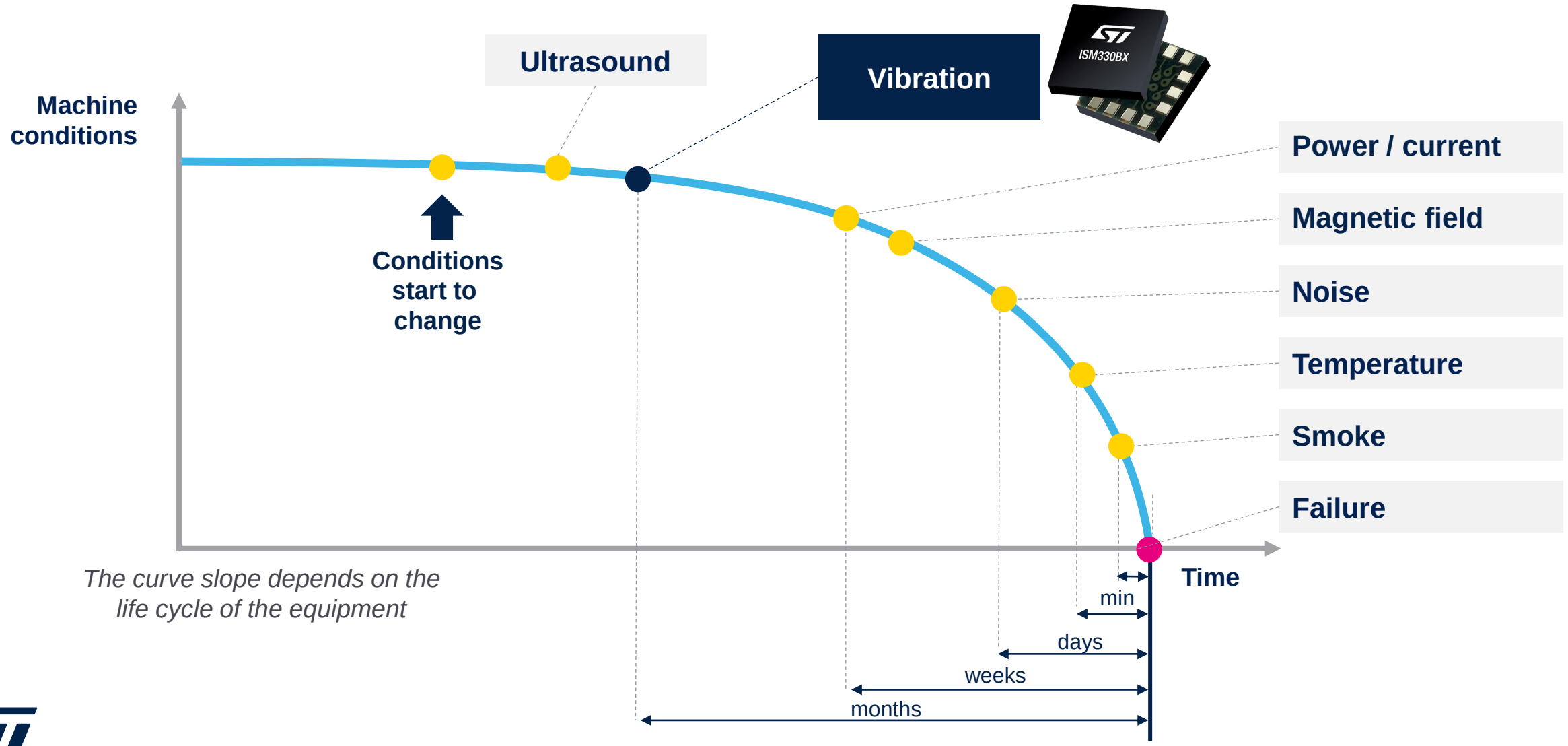
ISM33BX for condition monitoring



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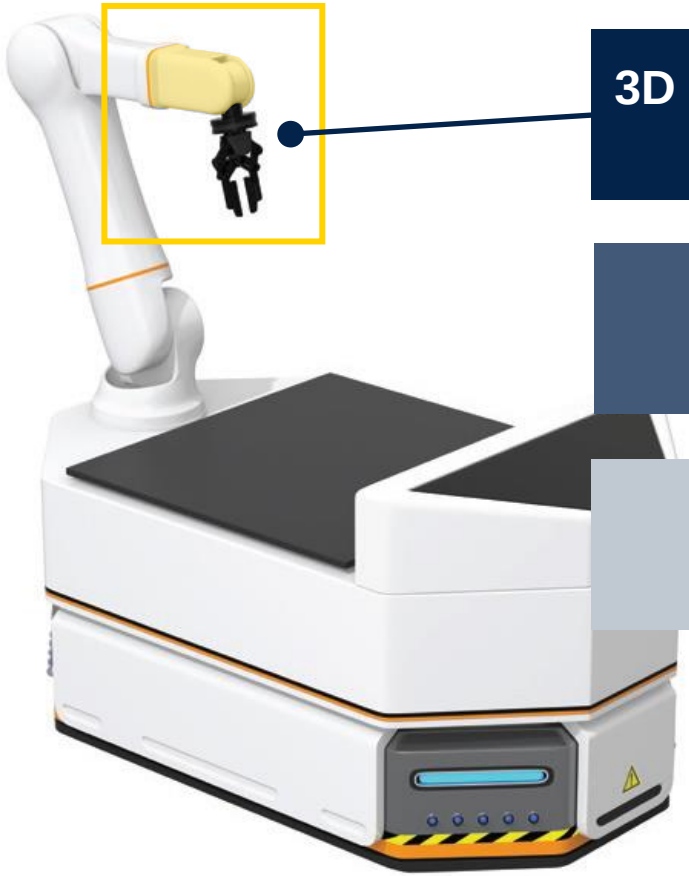
ISM330BX for robots
The self-sufficient IMU!



3D orientation tracking with embedded sensor fusion low power (SFLP)

Condition monitoring through vibration sensing

Touch sense with Qvar

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ISM330BX for appliances you just need it!

- **Drum balancing / vibration compensation**
- **Anomaly detection / failure detection**
- **Water leak detection with Qvar**

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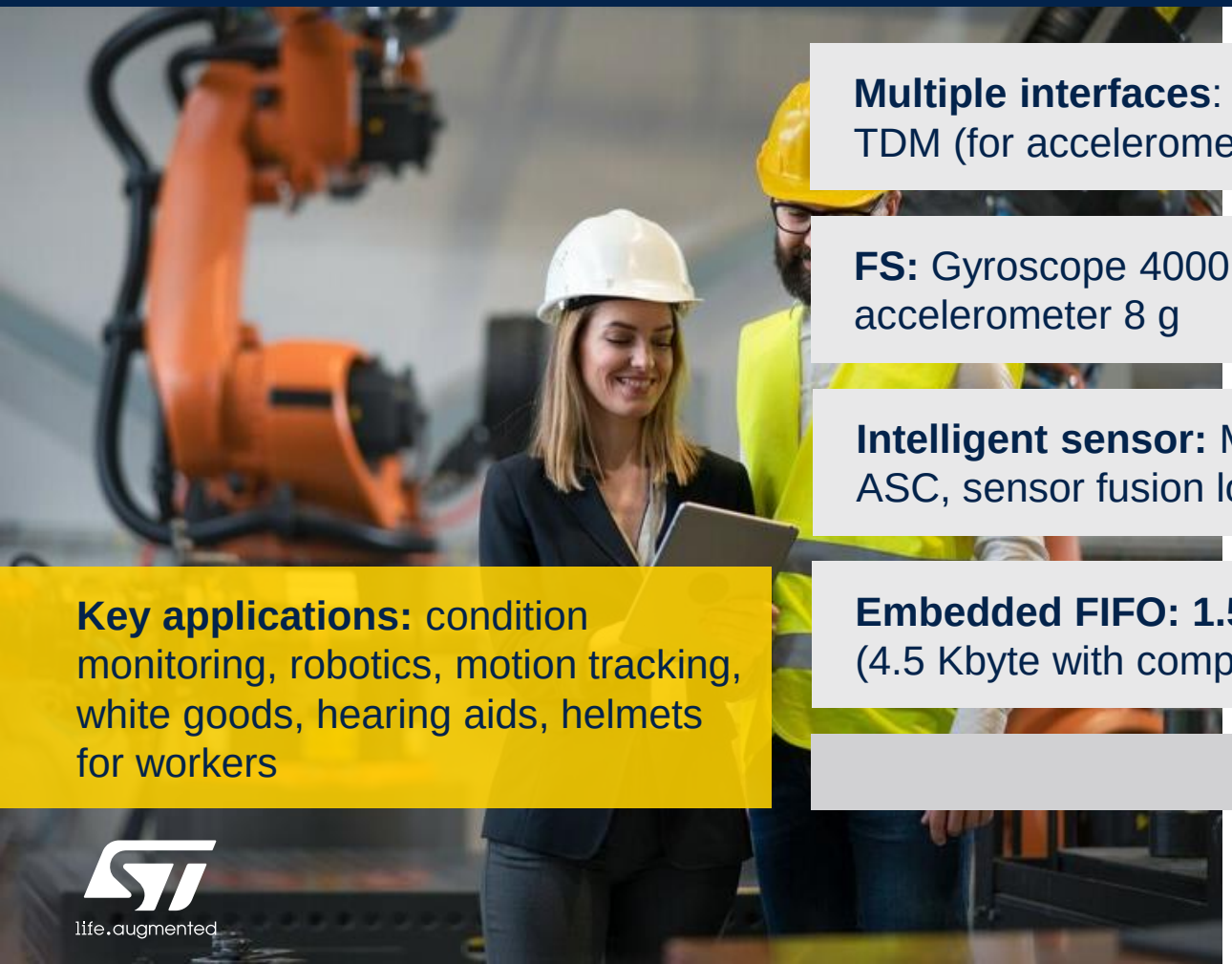
ISM330BX

3rd generation IMU with wide bandwidth, low-noise 3-axis accelerometer



Multiple interfaces: SPI, I3C v1.1, TDM (for accelerometer only)

FS: Gyroscope 4000 dps, accelerometer 8 g

Intelligent sensor: MLC & FSM 2.0, ASC, sensor fusion low power (SFLP)

Embedded FIFO: 1.5 Kbyte (4.5 Kbyte with compression)

Accelerometer: up to 2 kHz bandwidth on 3 axis with flat frequency response

Low noise accelerometer: 70 µg/√Hz SPI – 30 µg/√Hz TDM

Low noise gyroscope: 4.5 mdps/√Hz

Low power consumption: 0.19 mA axel HP; 0.6 mA combo HP

Package: LGA 2.5 x 3 x 0.71 14L

Key applications: condition monitoring, robotics, motion tracking, white goods, hearing aids, helmets for workers

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ISM330BX is part of longevity program

10 years longevity commitment

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ST focuses on markets requiring long life cycles

Protecting the investments of our customers that need state-of-the-art sensors but have long development, certification or field life cycles

LONGEVITY 10 YEARS COMMITMENT

10-year longevity from product introduction date

Design and manufacturing for higher robustness

Calibration & testing for higher accuracy & quality

Higher endurance to shock and vibration

Extended temperature range

ST's longevity program

ISM330BX moves the intelligence at the edge

MCU computing

Sensor + MCU

Intelligence in the MCU

MCU standalone or hosted in the sensor package

Standard
MCU runs the algorithms

Runs any kind of software
provided it matches the MCU specs

In-sensor AI computing

Sensor with MLC / FSM

Machine Learning Core
Finite State Machine

MLC: reconfigurable processing unit integrated in the sensor ASIC

Optimized
Reconfigured through register setting

Constrained
Runs the same model / mapping (MLC, FSM)

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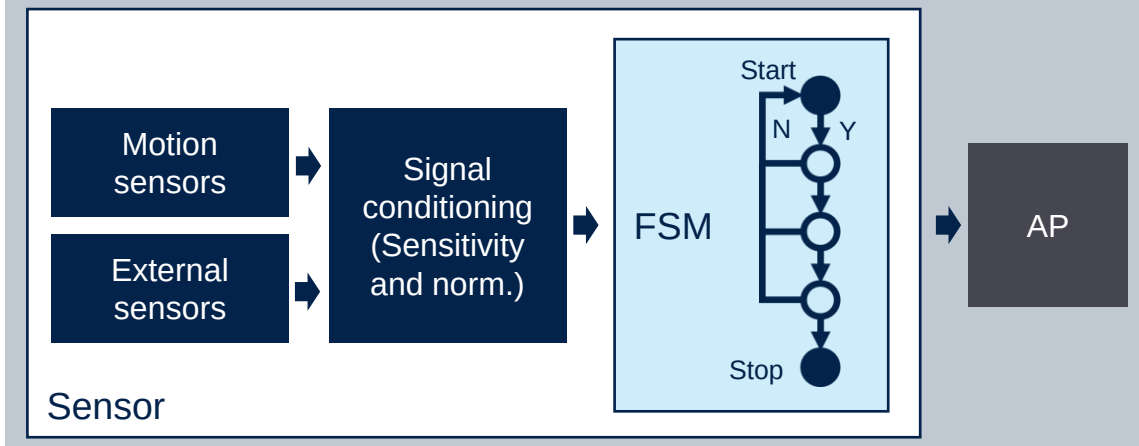
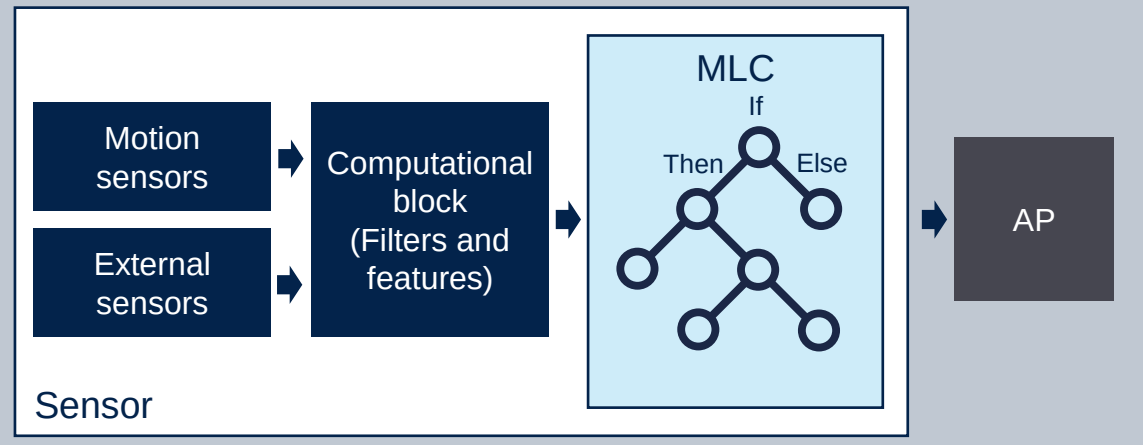
Edge processing with MLC and FSM

Finite state machine



- FSM is composed of a finite number of user-defined states and transitions between them
- FSM can be in just one of the states and move to another one only if the transition condition is met
- Each state can be composed of command or a next/reset condition

Machine learning core



- The MLC runs predictive models based on a decision-tree logic: a series of configurable nodes characterized by an “if-then-else” condition
- Decision tree is “built” offline through analysis of data sets
- It uses sensor data to compute a set of statistical parameters to identify patterns matching with user-defined classes

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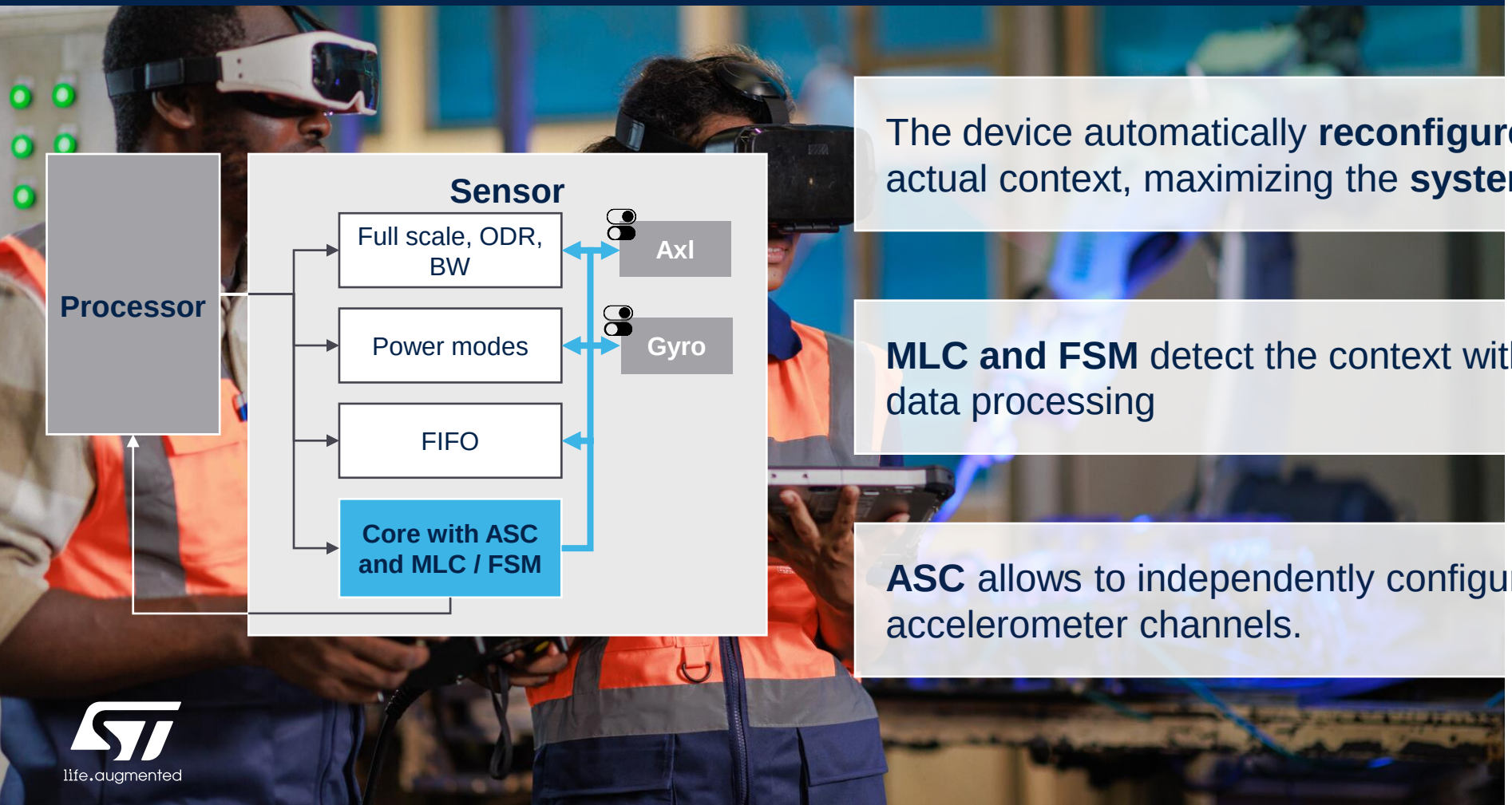
Adaptive self configuration (ASC)

Always perfectly fits the context



The device automatically **reconfigures itself**, based on the actual context, maximizing the **system efficiency**.

MLC and FSM detect the context without the need of additional data processing

ASC allows to independently configure gyroscope and accelerometer channels.

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3D orientation

Track and monitor orientation in 3D space

Detect and track device orientation with the **embedded low power sensor fusion** algorithm with **30 µA**

Plug-and-play solution that provided **6x game rotation vector** (accelerometer + gyroscope) & **gyroscope-bias calibration**

The rotation vector is available in **quaternion format**, and it can be stored in the **embedded FIFO**

Static accuracy(1): 0.5, 1.5, 1.5 deg
Low dynamic accuracy(1): 0.7, 0.5, 0.5 deg
Calibration time(2): 0.8 s
Orientation stabilization time: 0.7 s
Extra power: 30 µA @ 120 MHz

(1) Heading (5 min), pitch and roll
(2) Time required to reach steady state

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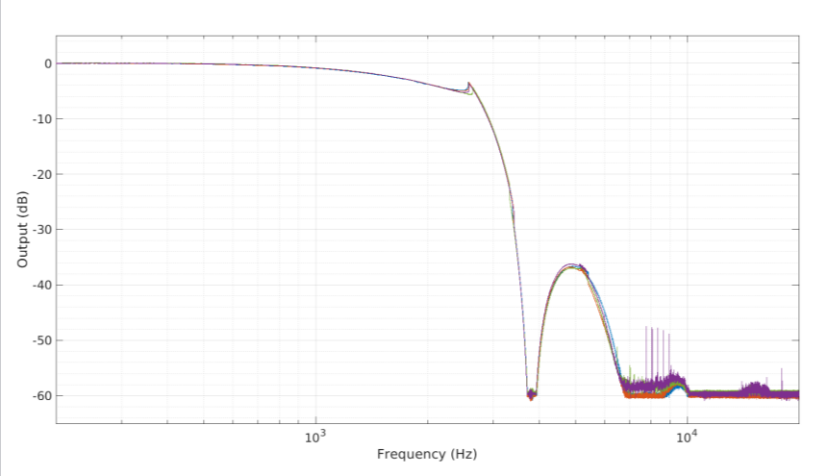
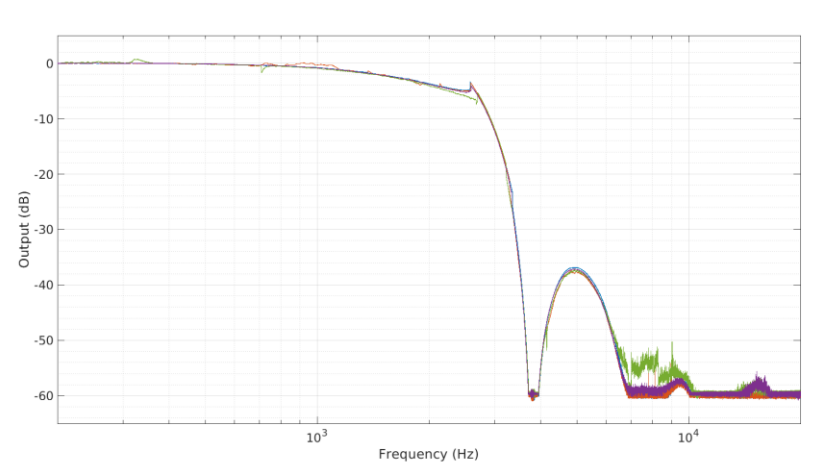
ISM330BX offers a unique accelerometer
Wide, flat, repeatable frequency response

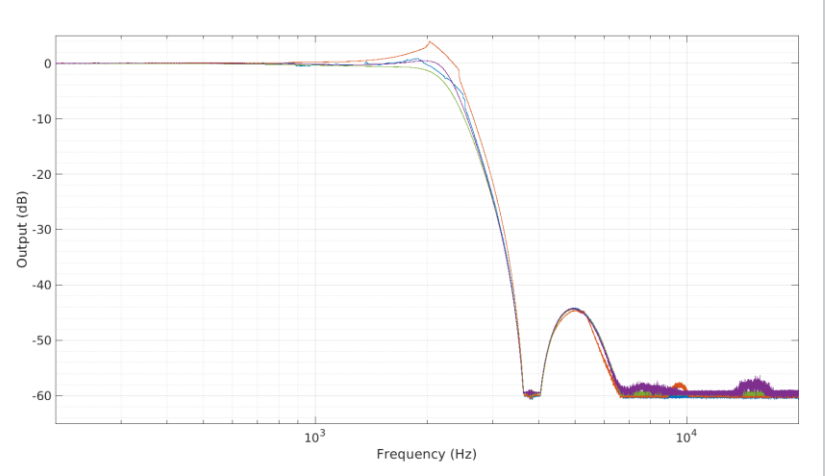
ISM330BX accelerometer: frequency response



X



Y



Z

Perfect to fulfill ISO-10816 vibration severity standards

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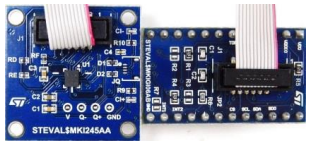
MEMS ecosystem for ISM330BX

Hardware

Evaluate

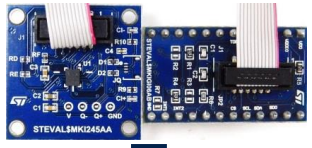
STEVAL-MKI245KA

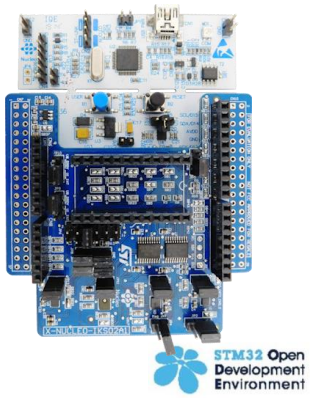


STEVAL-MKI109V3

Develop

STEVAL-MKI245KA

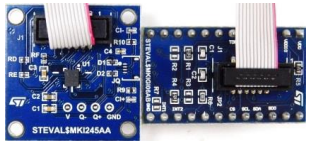




X-NUCLEO-IKS02A1

Prototype

STEVAL-MKI245KA



STEVAL-STWINBX1
STEVAL-MKBOXPRO

Software

Desktop software solution

MEMS Studio

Mobile application

STBLESensor

Ready-to-go application examples

GitHub

X-CUBE-MEMS1
FP-SNS-STBOX1
FP-SNS-DATALOG2

Easy, affordable and rapid prototyping tools

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Our technology starts with You

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