






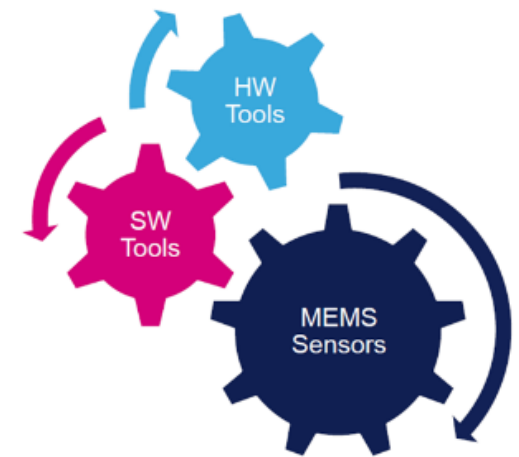
AppRtM MEMS & Sensors MEMS & Sensors update

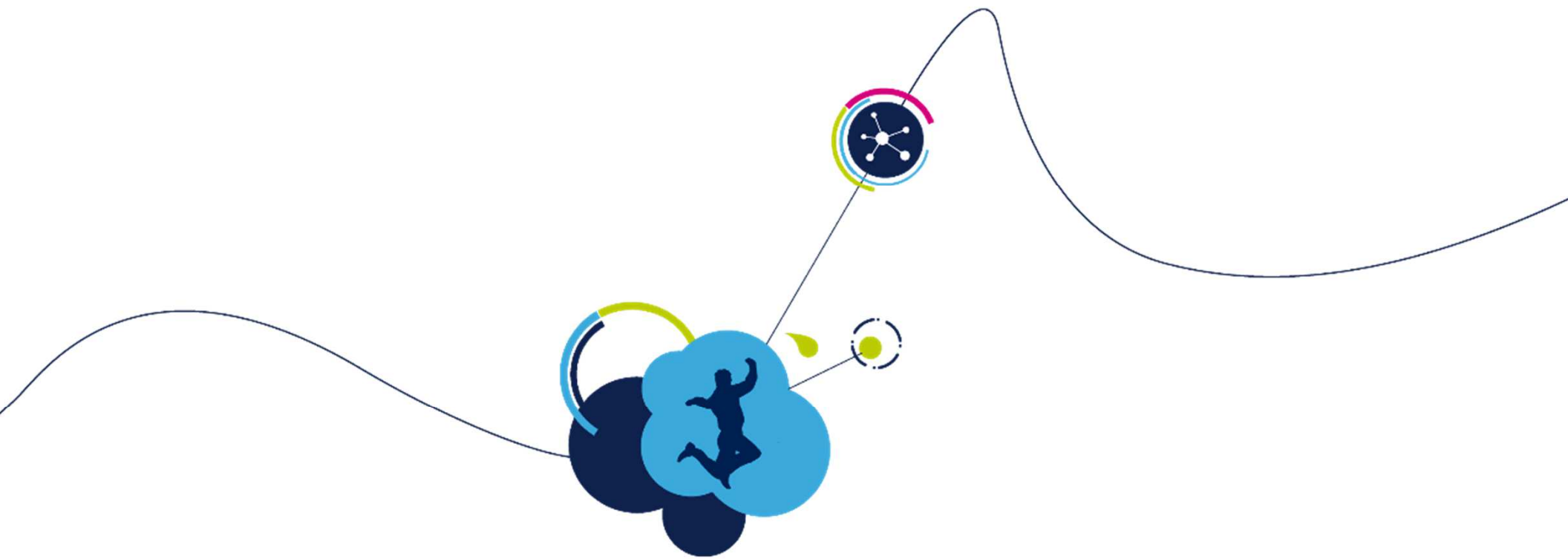
January 2020



Agenda 2

-  Update on MEMS products
-  News in MEMS Hardware Tools
-  News in MEMS Software Tools





Update on MEMS products

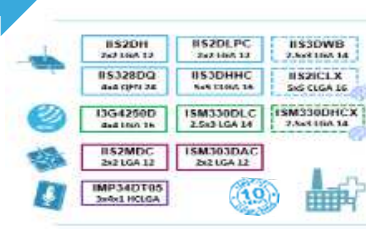




INDUSTRIAL



Key point:
AEC-Q100 certification
High performance products
>10Years Longevity



Growing dedicated offer for **Industrial** applications
minimum longevity 10 years

STWIN
Latest Industrial Sensors
IIS3DWB, ISM330DHCX...



Sensors for Consumer

Sensor

Main Application

Product Strength



High-performance and low power accelerometer



LIS2DW12 & LIS2DTW12

LIS2DH12 & LIS2DE12

In Mass Prod

LIS2DU12

MP: Q2 2020



Wearables, IoT, Tracker

LIS2DW12 & LIS2DTW12

- Ultra low power, up to 14b resolution
- Multiple Noise / Power config for high flexibility
- Embedded Temperature sensor

LIS2DH12 & LIS2DE12

- Optimize compromise for resolution, power consumption & cost

LIS2DU12

- Bigger FIFO, AAF, very low power at high ODR



High-performance and low power 6-axis IMU

LSM6DSO & LSM6DSOX

LSM6DSR & LSM6DSRX

In Mass Prod



Wearables, IoT, Tracker

LSM6DSOX & LSM6DSRX

- Ultra low power with increased Accuracy,
- Improved Noise & temperature behavior
- More embedded digital features (Fifo, Algo, FSM, **MLC**)



Sensors



for Consumer

Sensor

Main Application

Product Strength



Altimeter / Pressure sensor

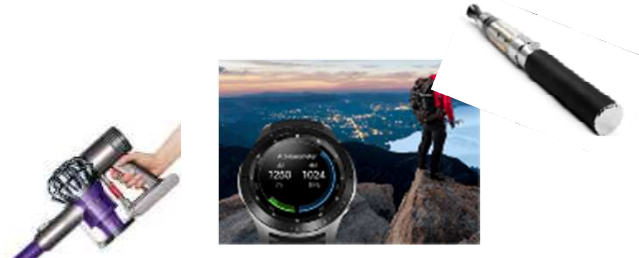
LPS22HH

In Mass Prod

Water Proof Pressure sensor

LPS33W / LPS27HHW

In Mass Prod



Wearables, Drone, Vacuum Cleaner
Weather station, e-cigarettes

LPS22HH

- Low power @ high resolution & accuracy
- Size and superior robustness. Unique package technology (full molded)

LPS33W

- IPx8-Water resistant

LPS27HHW

- 10Bar Water resistant



Microphone

MP34DT05-A, MP34DT06J & MP23ABS1

In Mass Prod

MP23DB01HP & MP23DB02MM

MP: Q1 2020

Temperature sensor (Analog & Digital)

STML20 / STTS751

In Mass Prod

STTS22H

In Mass Prod



Asset tracking, IoT, Remote Control, Hand free
kit/eCall, Voice Assistant

MP34DT05-A, MP34DT06J & MP23ABS1

- High performance (SNR, AoP)
- MP23DB01HP & MP23DB02MM**
- Multimode for lower power consumption
- Improved performances (SNR, Sensitivity)

STML20 & STTS751

Standard products with competitive features

STTS22H

- Improved accuracy ($\pm 0.5^{\circ}\text{C}$)
- Fast response time
- 10Y longevity



Sensors for



Industrial 10y

Sensor

Main Application

Product Strength



General purpose Accelerometer

IIS2DH IIS2DLPC

In Mass Prod



- **3-axis, Digital, Low power Accelerometer**
- Embedded digital features Interrupts, FIFO,...



6-axis IMU with MLC

ISM330DHCX

In Mass Prod



Positioning and Navigation, Dynamic Stabilization, Robotics, Vibration Monitoring

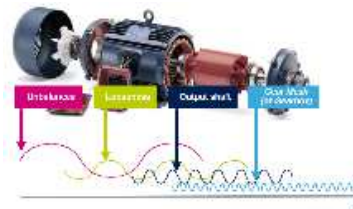
- **Machine Learning Core** and FSM
- High Accuracy and stability (BI : 3°/hr)
- Axel with wide BW (3kHz) and low noise
- Extended Top: -40°C +105°C



Wide Bandwidth
3-axis digital axel

IIS3DWB

MP: Q1 2020



Vibration Monitoring

- **Ultra Wide and Flat Bandwidth (>5Khz)**
- 3-axis Digital
- Low Noise (90 $\mu\text{g}/\sqrt{\text{Hz}}$) ; Low power (1.1mA)
- Extended Top: **-40°C +105°C**



3-axis Inclinometer

IIS3DHHC

In Mass Prod

2-axis Inclinometer with MLC

IIS2ICLX

MP: Q1 2020



Precision Inclinometer
Structure monitoring
Antenna & platform leveling

IIS3DHHC

- 3-axis inclinometer
- IIS2ICLX**
- High resolution & Accuracy over temp & time
- Machine Learning Core and FSM
- Extended Top: **-40°C +105°C**

AppRtM: MEMS & Sensors, January 2020



life.augmented



Sensors for



Automotive

Sensor

Main Application

Product Strength



AEC-Q100 6-axis IMU

ASM330LHH

In Mass Prod



AEC-Q100 6-axis IMU with **MLC**

ASM330LHHX

MP: Q4 2020



Accurate Navigation, Dead
Rekoning and Positioning

- **High Accuracy and stability over temperature and time**
- ARW: 0.21 deg/ \sqrt{h} ; Bias Instability (BI): 3°/hr
- Extended Top: **-40°C +105°C**

ASM330LHHX

- with **Machine Learning Core**



AEC-Q100 Ultra low power
3-axis digital axel

AIS2DW12

In Mass Prod



Passive Key entry (Key Fob)

- Ultra low power (0.67 μ A @3V @1.6Hz)
- Superioir robustness to mechanical shock and drops
- Package with wettable flanks



AEC-Q100 High Performance
3-axis digital axel

AIS2IH

MP: Q3 2020



Anti-theft, Tbox, Navigation

- Multiple Resolution / Power configurations for high flexibility
- Package with wettable flanks
- Extended Top: **-40°C +115°C**





Sensors with AI ready

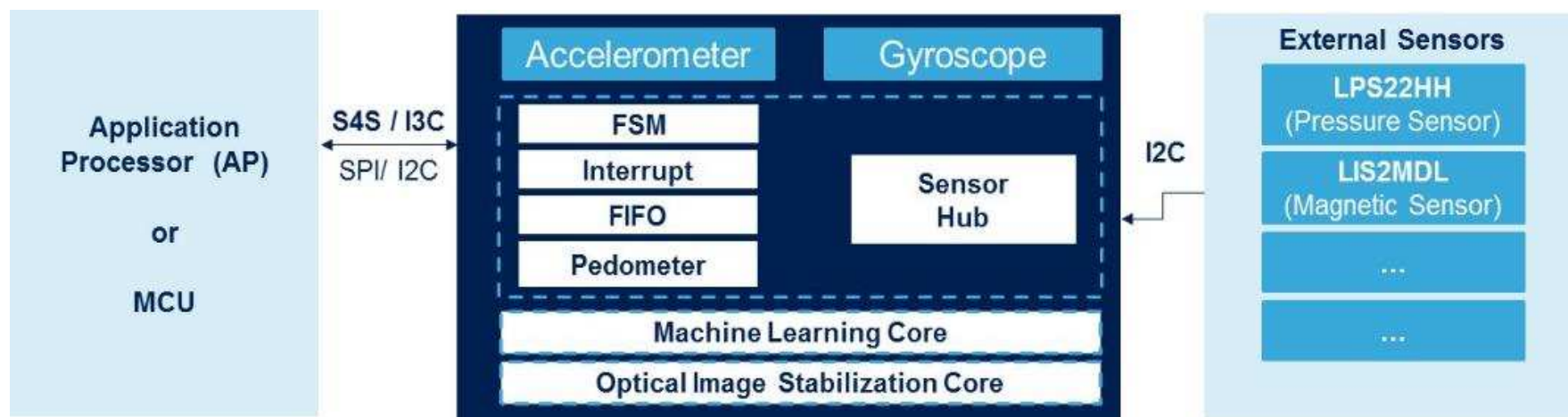
MLC: From Low Power Sensor to Low Power System

9

ST introduced a new feature called MLC (Machine Learning Core) called “**X**”-factor

Energy saving by **10 to 1000 time** when running **Machine Learning Core** (vs. AP)

Already **4** products which embed **MLC**: LSM6DSOX, LSM6DSRX, ISM330DHCX, IIS2ICLX



Status on Sensors Products 2019

What we did

10

Q1	Q2	Q3	Q4
IIS2DLPC AXL 14b, ULP	LIS2DTW12 AXL 14b, ULP, Temp sensor	LIS25BA Audio AXL	STTS22H Temperature sensor high accuracy
LSM6DSO/ LSM6DSOX Prog sensor algos FSM/MLC	AIS2DW12 AXL 12b, AEC-Q100	LSM6DSRX Ultra high stability 6- axis IMU with MLC	ISM330DHCX Industrial 6-axis IMU
LPS33W High perf Pressure Water Proof	LSM6DSR Ultra high stability 6- axis IMU		



Status on Sensors Products 2020

11

Key messages

20Q1

IIS3DWB Vibration sensor 5KHz
BW, 105°C, Low noise

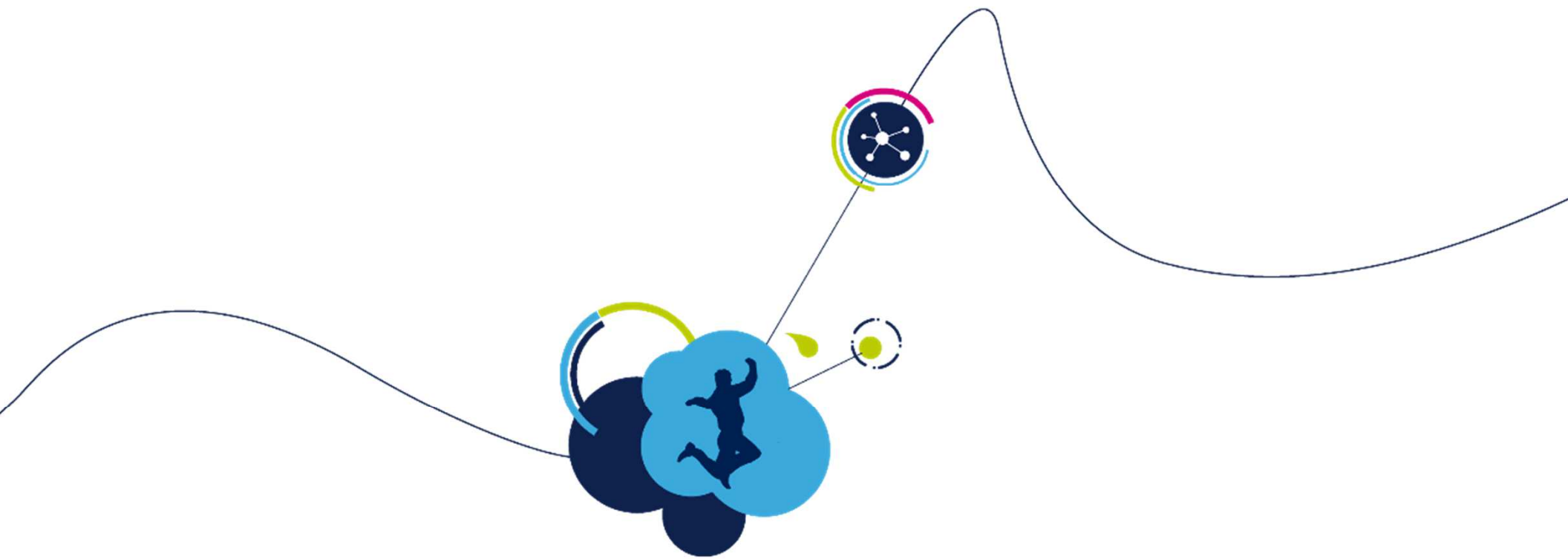
IIS2ICLX Inclinator
2 axis 0.5°, 15µg/vHz +105°C

LPS27HHW Pressure Sensor
High perf Water Proof

MP23DBxx Microphone
Digital bottom

- 3 product lines **Consumer**, Industrial & **Automotive**
 - Regular products introduction with improved performances
- WW demand is increasing, enter your orders, LT is
 - >20W for Consumer & Industrial, higher for Pressure sensor
 - 26W for Automotive
- SensorTile.BOX to be installed by each of us on our mobile





News in MEMS Hardware tools



Sensors Evaluation boards

13

STM32Nucleo expansion
X-NUCLEO-IKS01A3

STM32CubeMX
Easy debugging

CONSUMER

Profi MEMS tool
STEVAL-MKI109V3

Evaluate All ST
sensors through
DIL24 adapter

AUTOMOTIVE

INDUSTRIAL

CONSUMER

BlueTile
STEVAL-BCN002V1B

Focus on BLE
communication

CONSUMER

SensorTile.Box
STEVAL-MKSBOX1V1

Play with ST
Sensors

CONSUMER



STM32Nucleo expansion
X-NUCLEO-IKS02A1

NEW

STM32CubeMX
Easy debugging

INDUSTRIAL

STWIN: Wireless
Industrial Node
STEVAL-STWINKT1

NEW

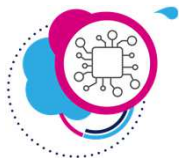
50mm

Vibrometer
IIS3DWB

50mm

INDUSTRIAL

MP: Q1 2020



- Compact casing, IP54-compliant
57 x 38 x 20 mm (L x W x H)
- 500 mA-h Li-Po battery
- 8 GB μ SD card as mass memory
extendable to 64 GB
- Compatible with “ST BLE Sensor” app
Available on Google Play and App Store

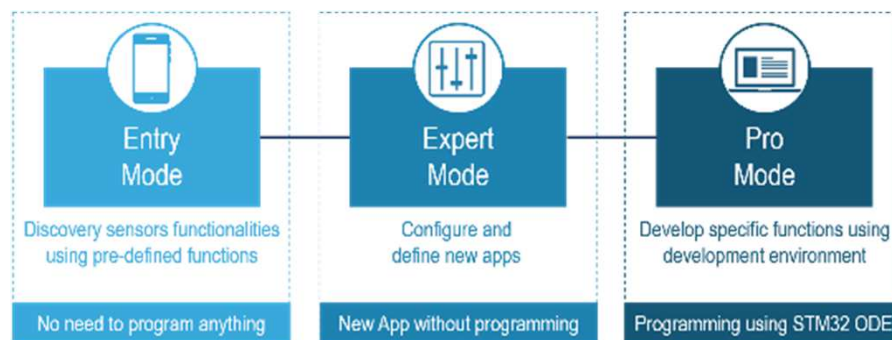


July 22, 2019

SensorTile.box

STEVAL-MKSBOX1V1

14



www.st.com/sensortilebox

AppRtM: MEMS & Sensors, January 2020





STWIN SensorTile kit

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Key features:

- Multi-sensing wireless platform implementing vibration monitoring and ultrasound detection
- Built around STWIN core system board with processing, sensing, connectivity and expansion capabilities
- **Micro SD Card slot** for standalone data logging applications
- **Wireless BLE4.2** (on-board) and **Wi-Fi** (with STEVAL-STWINWV1 expansion board), and wired **RS485** and **USB OTG** connectivity

Industrial IoT sensors:

- ***IIS3DWB** - ultra-wide bandwidth MEMS vibrometer up to 5 kHz
- **ISM330DHCX** - 3D accelerometer + 3D Gyro iNEMO inertial measurement unit with machine learning core
- **IIS2DH** - ultra-low-power high performance MEMS motion sensor
- **IIS2MDC** - ultra-low-power 3-axis magnetometer
- **LPS22HH** - digital absolute pressure sensor
- **HTS221** - relative humidity and temperature sensor
- **STTS751** - low-voltage digital local temperature sensor
- **IMP34DT05** - industrial grade digital MEMS microphone
- **MP23ABS1** - wideband analog MEMS microphone

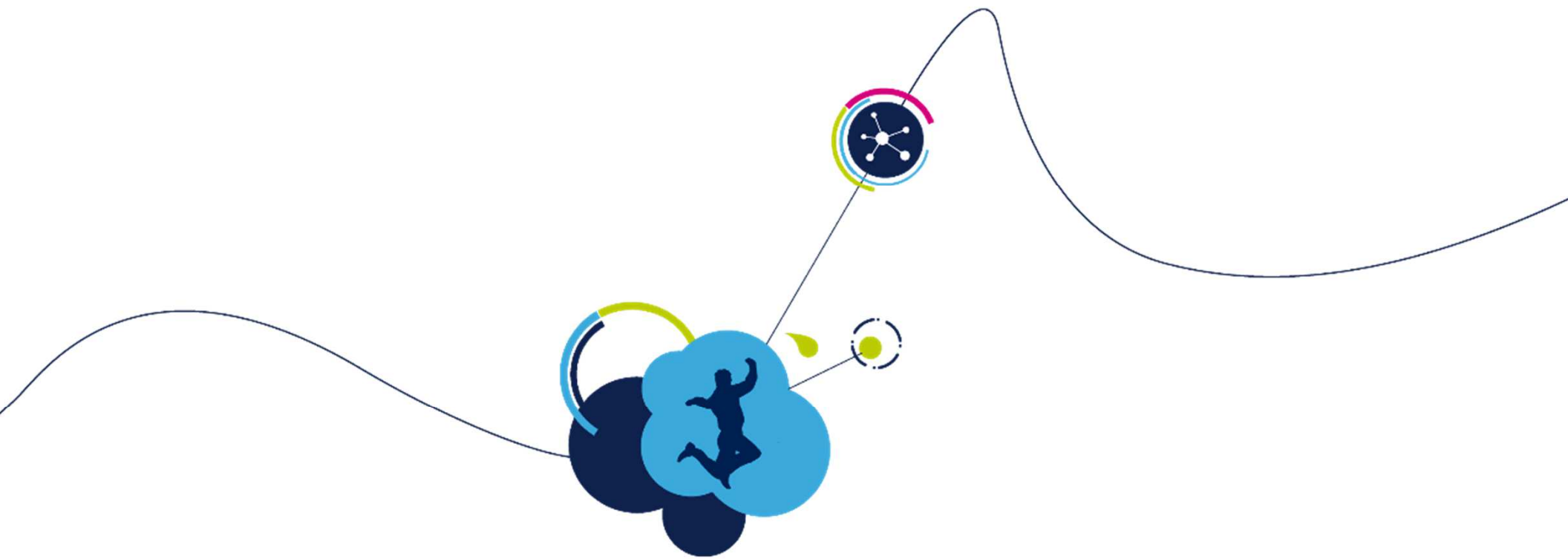
* MP: end of Jan 2020



November 25, 2019

AppRtM: MEMS & Sensors, January 2020





Introduction to new Industrial MEMS expansion board X-NUCLEO-IKS02A1



NEW

X-NUCLEO-IKS02A1

with Industrial products

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Motion MEMS and microphone MEMS expansion board for STM32 Nucleo (industrial)

- This is the NEW motion MEMS and microphone MEMS sensor evaluation board system with INDUSTRIAL products

Key products on board:

ISM330DHCX MEMS – 6-axis IMU - Accelerometer / Gyroscope

IIS2DLPC MEMS 3D Accelerometer

IIS2MDC MEMS 3D Magnetometer

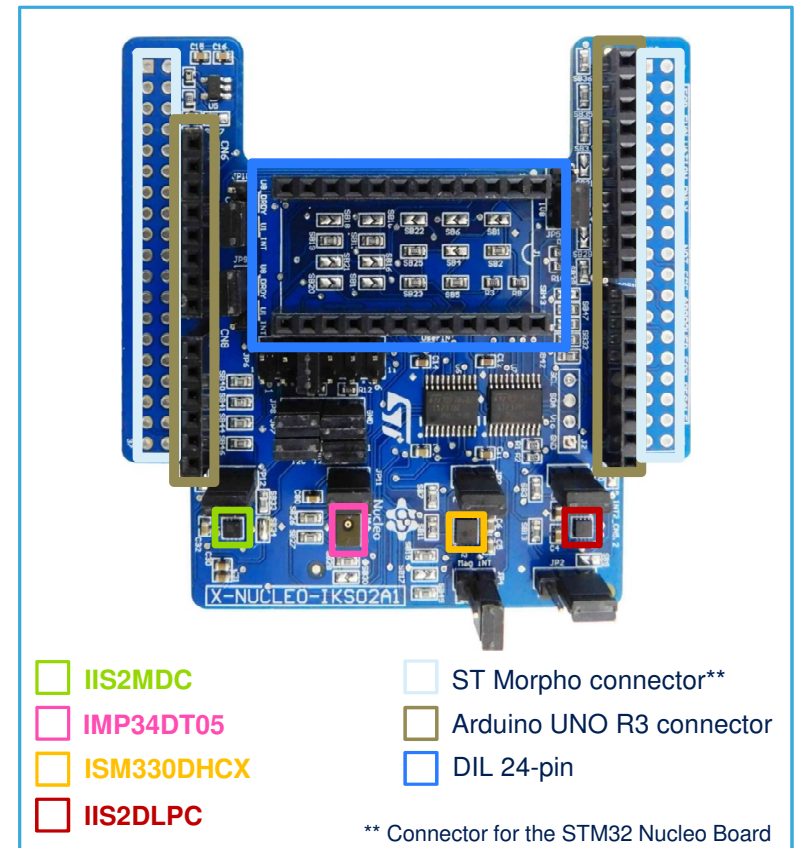
IMP34DT05 MEMS Microphone

DIL 24-pin Socket available for additional MEMS adapters and other sensors

I²C, SPI support



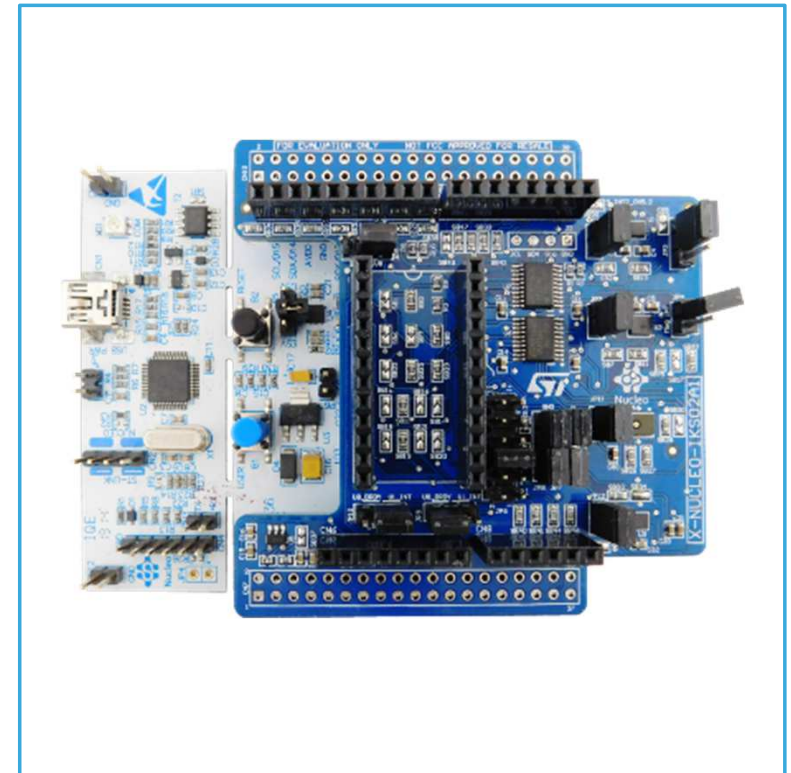
For further information visit
[X-NUCLEO-IKS02A1](https://www.st.com/en/evaluation-tools/x-nucleo-iks02a1.html)



Key features

18

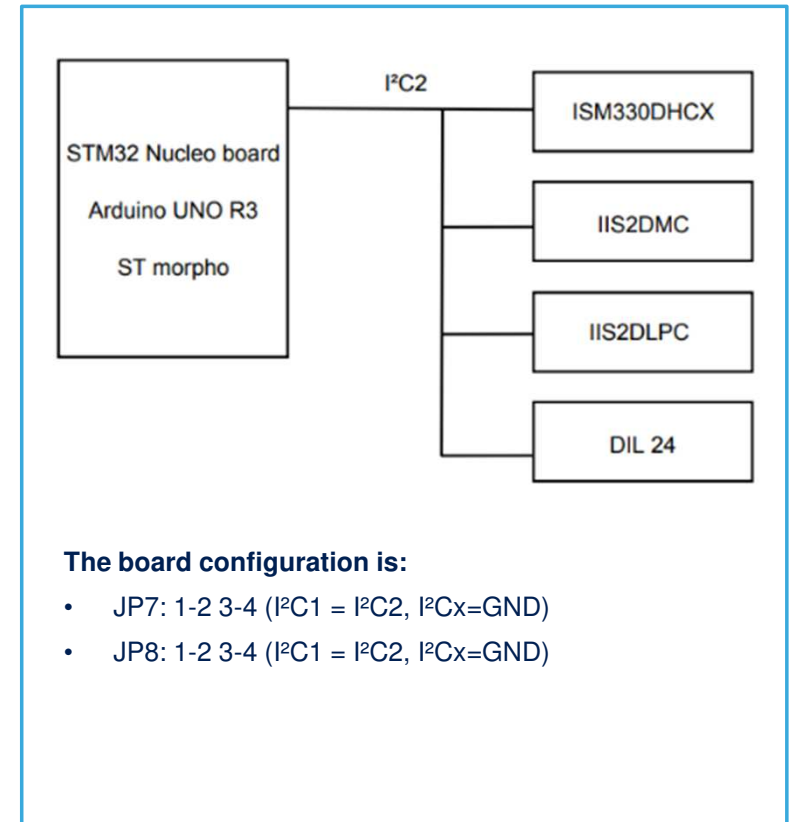
- Sensor I²C address selection
- I²C Sensor Hub features support for ISM330DHCX (I²C master for the other sensors)
- Each sensor has separate power supply lines allowing power consumption measurements
- Sensor disconnection possibility (disconnects the I²C bus as well as the power supply)
- Interrupt signals from motion sensors
- DIL24 socket (compatible with STEVAL-MKI***V* MEMS adapter boards)
- Several I²C bus connection modes available



I²C bus connection modes

19

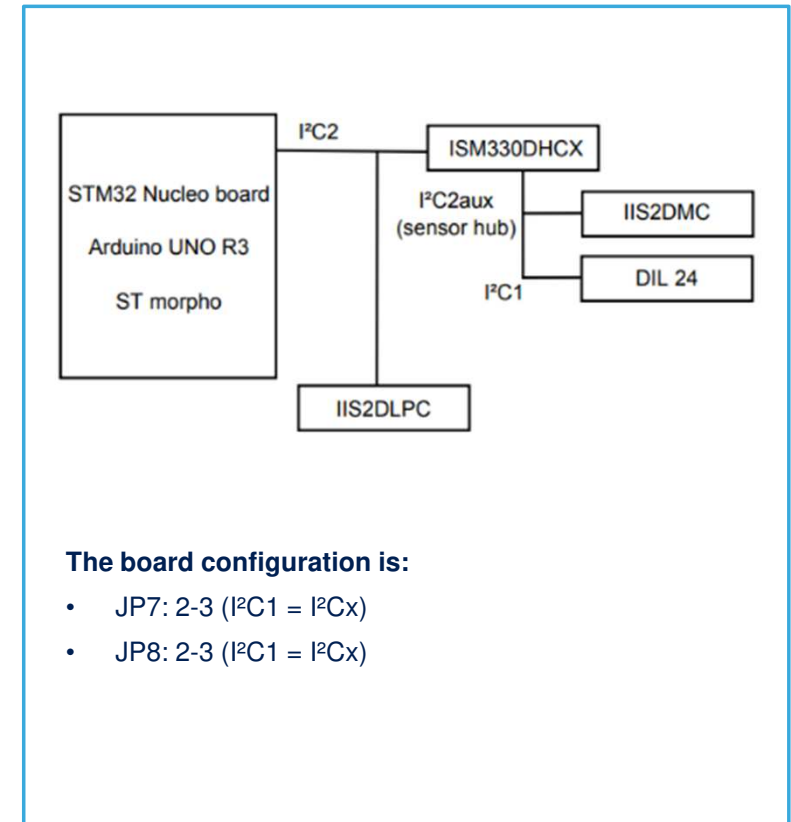
1. All sensor sensors are connected on a single I²C bus (default)
2. IIS2MDC and DIL 24 connected to I²C sensor hub of ISM330DHCX
3. Only IIS2MDC connected to I²C sensor hub of ISM330DHCX
4. Only DIL 24 connected to I²C sensor hub of ISM330DHCX
5. IIS2MDC connected to I²C sensor hub of DIL 24



I²C bus connection modes

20

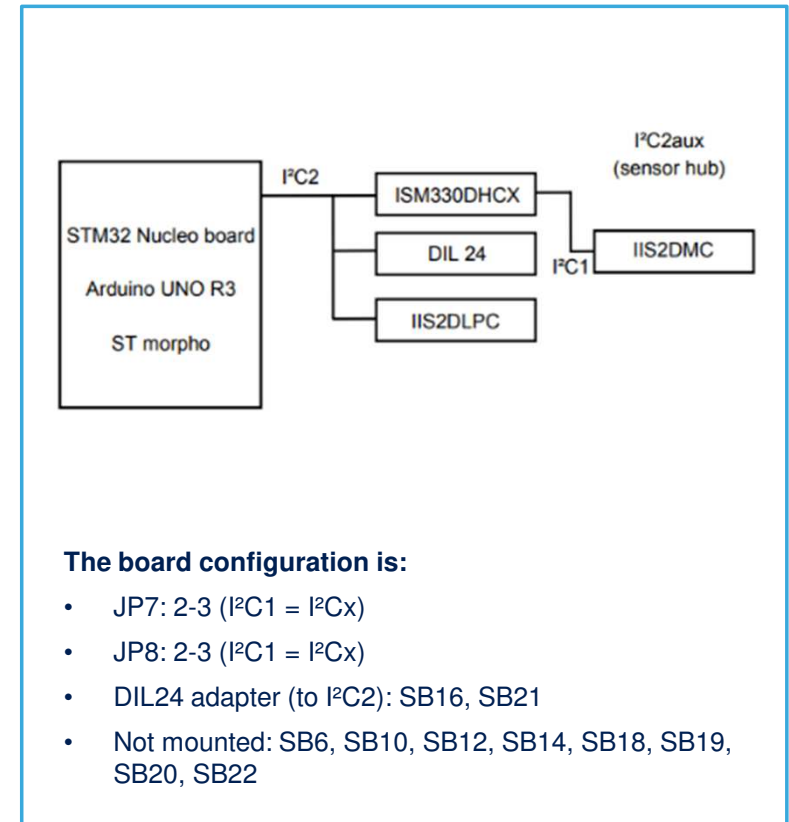
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4. Only DIL 24 connected to I²C sensor hub of ISM330DHCX
5. IIS2MDC connected to I²C sensor hub of DIL 24



I²C bus connection modes

21

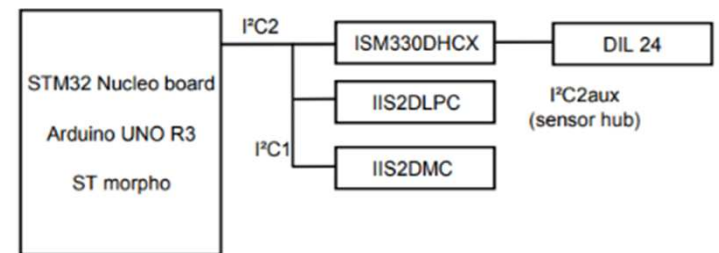
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5. IIS2MDC connected to I²C sensor hub of DIL 24



I²C bus connection modes

22

1. All sensor sensors are connected on a single I²C bus (default)
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The board configuration is:

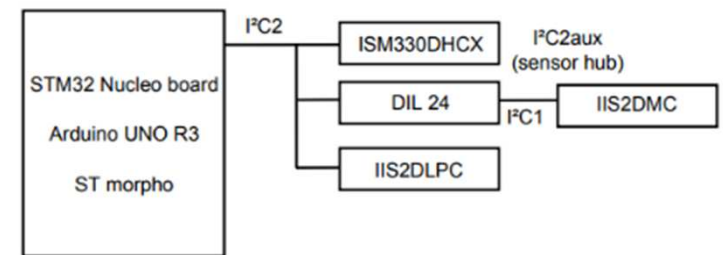
- JP7: 1-2 (I²C1 = I²Cx)
- JP8: 1-2 (I²C1 = I²Cx)
- DIL24 adapter (to I²Cx): SB14, SB20
- Not mounted: SB6, SB10, SB12, SB16, SB18, SB19, SB21, SB22



I²C bus connection modes

23

1. All sensor sensors are connected on a single I²C bus (default)
2. IIS2MDC and DIL 24 connected to I²C sensor hub of ISM330DHCX
3. Only IIS2MDC connected to I²C sensor hub of ISM330DHCX
4. Only DIL 24 connected to I²C sensor hub of ISM330DHCX
5. IIS2MDC connected to I²C sensor hub of DIL 24



The board configuration is:

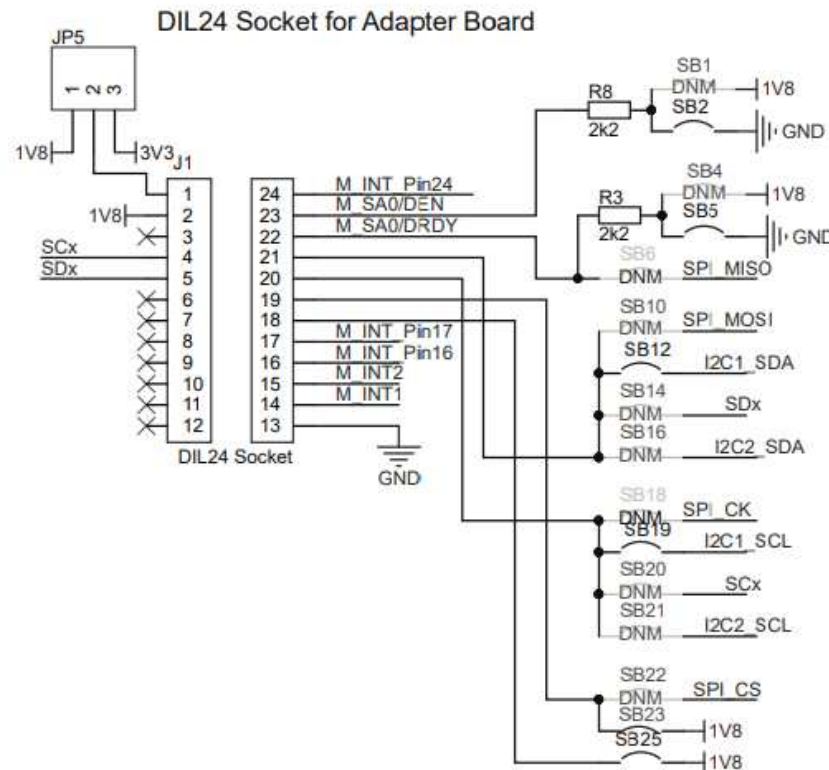
- JP7: 2-3 (I²C1 = I²Cx)
- JP8: 2-3 (I²C1 = I²Cx)
- DIL24 adapter (to I²C2): SB16, SB21
- Not mounted: SB6, SB10, SB12, SB16, SB18, SB19, SB20, SB22



SPI interface option

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- SPI interface on DIL24 socket can be enabled by solder bridges



How to run a demo

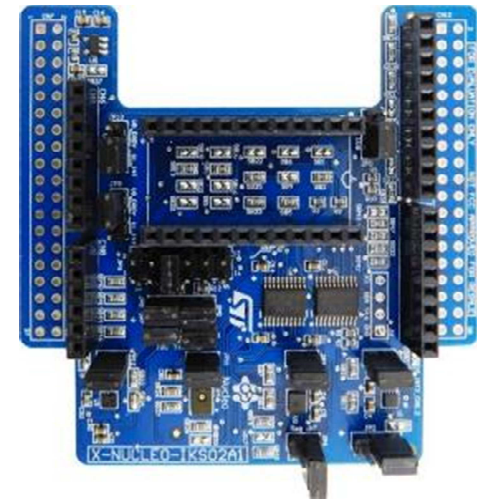
Hardware prerequisites

25

- **X-NUCLEO-IKS02A1**: Motion MEMS and microphone MEMS expansion board
- **STM32 Nucleo**: development board (NUCLEO-F401RE or NUCLEO-L053R8 or NUCLEO-L152RE or NUCLEO-L476RG)
- Windows 10/8/7 - Laptop/PC
- USB type A to mini-B USB cable



NUCLEO-F401RE
NUCLEO-L053R8
NUCLEO-L152RE
or
NUCLEO-L476RG



X-NUCLEO-IKS02A1



Mini USB Cable

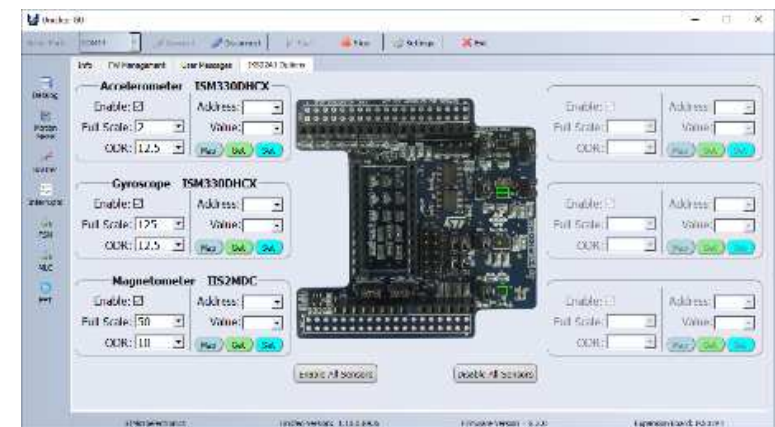


How to run a demo

Software prerequisites

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- **STSW-LINK008**: ST-LINK/V2-1 USB driver
- **STSW-LINK007**: ST-LINK/V2-1 firmware upgrade
- **X-CUBE-MEMS1**: MEMS & Sensors SW package
 - Copy the .zip file content into a folder on your PC
 - The package contains source code examples and demonstration applications
- **Unicleo-GUI**: GUI for MEMS & Sensors



Unicleo-GUI



Run a demo 27

1 Go to www.st.com



Product Catalog
English
Login

Get Software

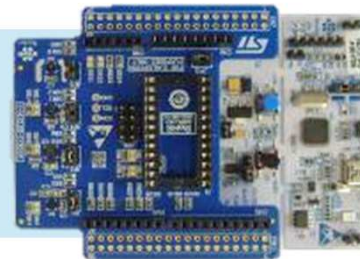
2 Search for "X-CUBE-MEMS1"

3 Download & Unpack
X-CUBE-MEMS1 package

X-CUBE-MEMS1 package structure

_htmresc	← Templates for CubeMX
CubeMX	← Documentation
Documentation	← Low Level drivers
Drivers	← SW libraries
Middlewares	← Source code examples + binaries
Projects	← Link to Unicleo-GUI product page
Utilities	
en.DM00367782.pdf	
package.xml	
Release_Notes.html	
STMicroelectronics.X-CUBE-MEMS1.pdsc	

4 Drag & Drop
DataLogExtended.bin
on Nucleo drive



5 Run the **Unicleo-GUI**
...sensor register control,
raw data, magnetometer calibration ...

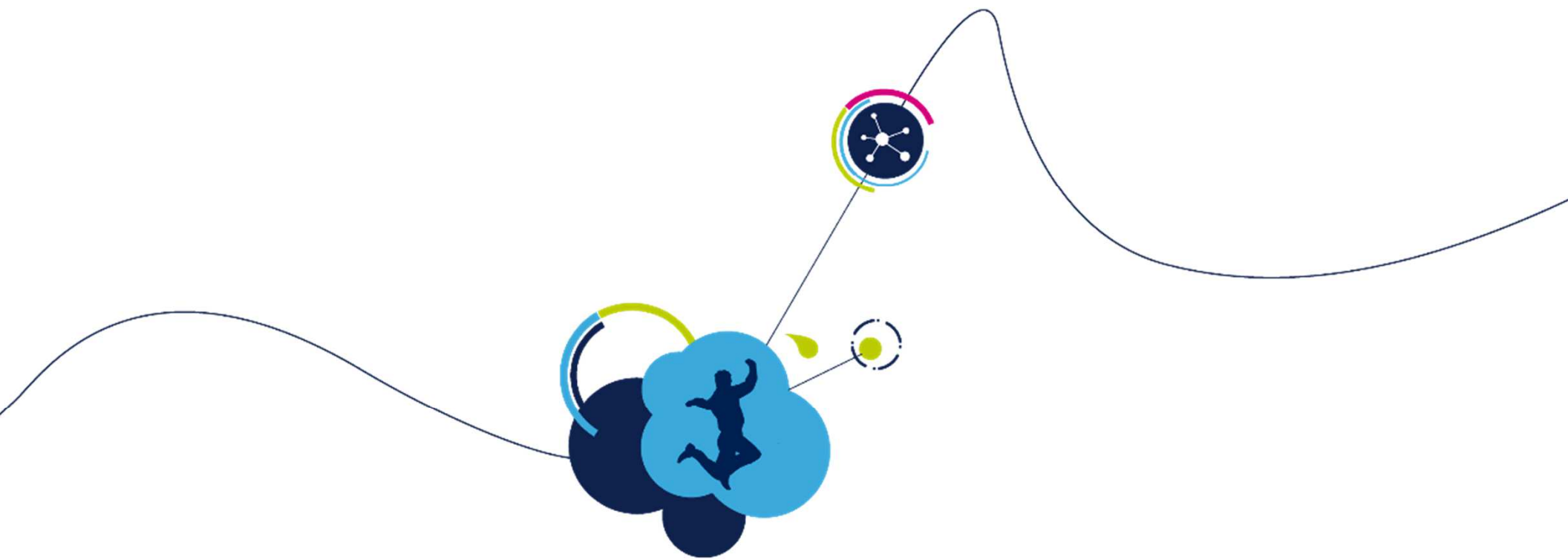


DataLogExtended binary file location:

STM32CubeExpansion_MEMS1_V7.0.0\Projects\STM32F401RE-
Nucleo\Examples\IKS02A1\DataLogExtended\Binary\

AppRtM: MEMS & Sensors, January 2020





News in MEMS Software tools



Sensors Software

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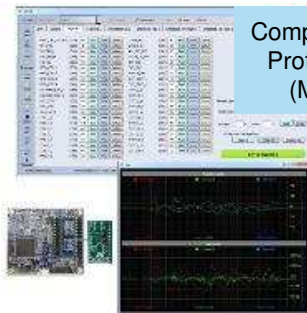
PC software Unicleo-GUI



Companion GUI
for X-NUCLEO,
SensorTile.box, ...

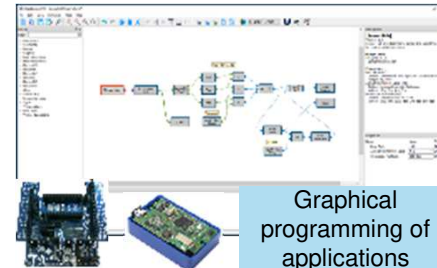


PC software UNICO GUI



Companion GUI for
Profi MEMS tool
(MLC, FSM)

PC software Algobuilder



Graphical
programming of
applications

Phone App ST BLE Sensor



Display, program
and sensor data
push to Clouds

Embedded software X-CUBE-MEMS1, Libraries, Function packs

Application	Applications
Workflows	Accelerometer Gyroscope Magnetometer Pressure Temperature Humidity Proximity Light Sound Microphone Image Camera Video Audio Speech Text Image Video Audio Speech Text
Hardware Abstraction	STM32CubeMX STM32CubeIDE STM32CubeMonitor STM32CubeProgrammer STM32CubeToolbox STM32CubeToolbox STM32CubeToolbox STM32CubeToolbox
Hardware	STM32CubeMX STM32CubeIDE STM32CubeMonitor STM32CubeProgrammer STM32CubeToolbox STM32CubeToolbox STM32CubeToolbox STM32CubeToolbox



Function packs support
combination of stacked
X-NUCLEOs or IoT nodes

Low level drivers & Examples (incl. MLC/FSM) github.com/STMicroelectronics/

STMems_Standard_C_drivers

Platform-independent drivers source code for
and environmental sensors, based on C stan

C BSD-3-Clause 155 142

STMems_Android_Sensor_HAL_IIO

This repository contains ST Android sensor Hardware &
MEMS Linux IIO drivers

C++ Apache-2.0 8 16 0 0

STMems_Machine_Learning_Core

C++ BSD-3-Clause 3 5 0 0

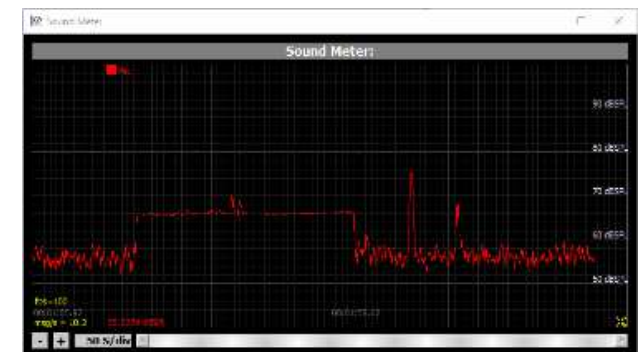
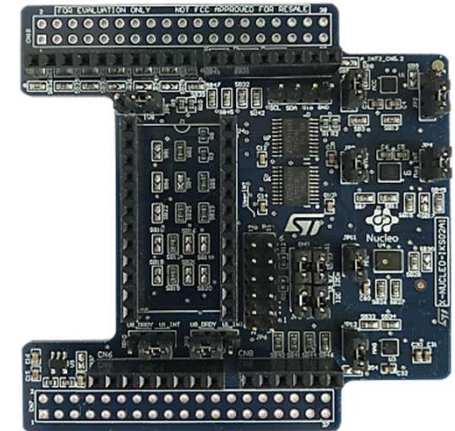
Regularly
updated



X-CUBE-MEMS1

News in v7.0.0 (October 2019)

- Added support for **X-NUCLEO-IKS02A1**
 - Industrial sensors: ISM330DHCX, IIS2MDC, IIS2DLPC, IMP34DT05
 - Support for STM32CubeMX
 - New application for audio processing: **MicrophoneFFT**, **SoundMeter**
 - Application for Motion MEMS Sensors:
 - Accelerometer Calibration
 - Sensor Fusion
 - eCompass
 - Magnetometer Calibration
 - Tilt Sensing
- Added support for AIS2DW12, LSM6DSR, STTS22H, LSM6DSRX, LIS3MDL, A3G4250D, AIS328DW, AIS3624DQ, H3LIS331DL
- Updated libraries for Activity Recognition, Activity Recognition for Wrist, Pedometer for mobile, Pedometer for Wrist
- Added automatic control of INT1 (on DIL24 socket) pin to avoid sensor start with I3C interface



Preview

X-CUBE-MEMS1

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Release notes v7.1.0 (February 2020)

- Application generated in STM32CubeMX
 - Possibility to generate application in STM32CubeMX **for any supported MCU and sensor/s**
 - Application are pre-prepared for
 - X-NUCLEO-IKS01A2
 - X-NUCLEO-IKS01A3
 - Custom board (composed from supported sensors)
- **SW4STM32 projects replaced by STM32CubeIDE projects**
- **Selected libraries available for Cortex-M7**
- DatalogExtended updated to achieve higher communication speed

Available for following libraries:

Cortex	M0 M0+	M3	M4	M7
Accelerometer Calibration		X	X	X
Carry Position		X	X	X
eCompass	X	X	X	X
Sensor Fusion	X	X	X	X
Gyroscope Calibration	X	X	X	X
Gesture Recognition		X	X	X
Intensity Detection	X	X	X	X
Magnetometer Calibration	X	X	X	X
Tilt Sensing	X	X	X	X
Vertical Context		X	X	X



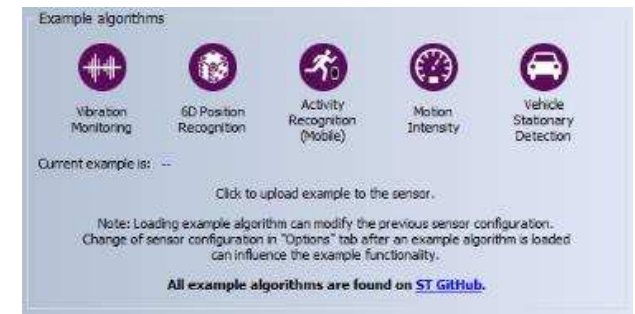


Unicleo-GUI

32

News in v1.10.0 (October 2019)

- **Added FFT analysis for accelerometer** data with several options (overlapping, windows, lin/log axis) - available for DatalogExtended firmware
- Added support for LSM6DSRX
- FSM and MLC example configurations updated according to GitHub repository ([FSM](#) and [MLC](#))
- Datalog format modified to be compatible with Unico (MLC tool)
- Added support for FP-SNS-ALLMEMS2 and FP-SNS-MOTENVWB1 firmware
- Minor bug fixes and improvements



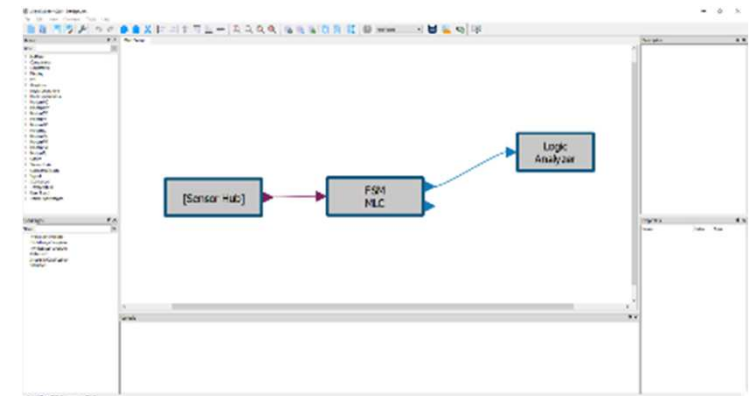


AlgoBuilder

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News in v2.4.0 (October 2019)

- Added support for **Finite State Machine and Machine Learning Core (SensorTile.box)**
- Added **support for SD Card on SensorTile.box**
- Introduced list of capabilities for all targets
- Preparation for future custom Firmware Templates
- Programming using ST-Link and DFU mode now use **STM32CubeProgrammer** instead of ST-Link Utility and DfuSe Demo Utility
- Remove support for IAR EWARM 7.xx
- Added examples for FSM/MLC and SD Card function blocks



Preview

X-CUBE-ALGOBUILDER

Release notes v1.0.0 (February 2020)

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- **X-CUBE-ALGOBUILDER** is **CubeMX** plugin (Additional Software package for CubeMX) that increases portfolio of STM32 and MEMS sensors which can be used directly with AlgoBuilder.





Preview

X-CUBE-ALGOBUILDER

Release notes v1.0.0 (February 2020)

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- Generation of firmware template for AlgoBuilder
- Support for X-NUCLEO-IKS01A2, X-NUCLEO-IKS01A3 and Custom board
- Includes DSP library required for FFT calculation
- Support for Cortex-M3 and Cortex-M4 MCUs
- Sensor drivers and expansion (X-NUCLEO) boards drivers are loaded from X-CUBE-MEMS1 package
- Possibility to generate firmware template for IAR, Keil, CubeIDE
- Smooth interoperability with CubeFW, CubeMX and CubeIDE



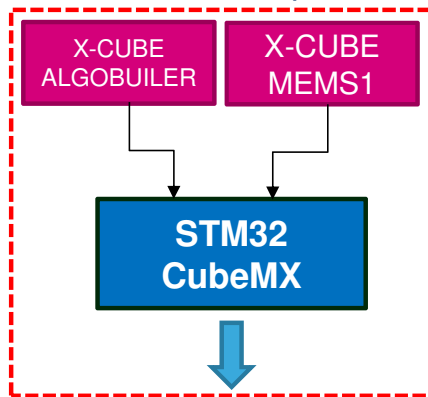
Preview

AlgoBuilder

36

with X-CUBE-ALGOBUILDER v1.0.0

1a. Create template

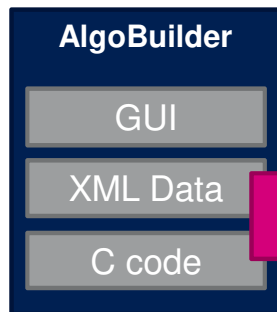


Pre-Prepared Templates

1b. Select template



NUCLEO-F401RE + IKS01A2/3
NUCLEO-L476RG + IKS01A2/3
SensorTile
SensorTile.box



2. Make your design

Conversion Engine

Firmware Project

Compiler



3. AlgoBuilder compiles your design through external compiler

4. Uploads to your development board



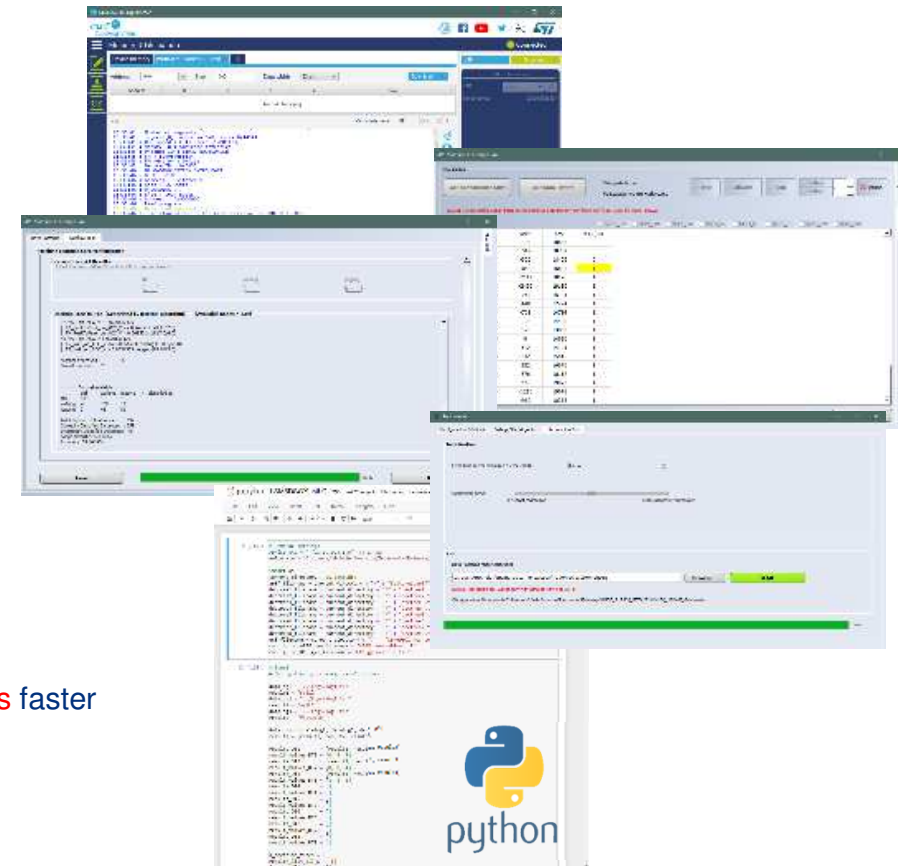
5. Display sensor data in Unicleo-GUI



Unico GUI

News and preview

- Moving from **DfuSe** to **STM32CubeProgrammer**
 - binary files available from version **9.2.0.0**
- Data injection tool to evaluate MLC results using a defined configuration and a selected data pattern
 - Available for **ST internal** debugging only! (**9.2.3.0**)
- Decision tree automatically generated by the tool
 - Available for **internal** evaluation only! (**9.4.5.0**)
- Python script calling Unico in background
 - The whole MLC configuration is managed by the script
 - No user interaction with the GUI
 - Allows processing very large amount of data
 - Compatible with Unico from version **9.4.5.0**, Improvements **ongoing**
- Pedometer Regression Tool
 - Improvement available from version **9.4.6.0**
 - Optimized pedometer regression tool to speedup execution - **10 times** faster
- MLC Features computation (ARFF)
 - Improvement available from version **9.5.0.0**
 - Optimized features computation (for ARFF generation) - **2 / 3 times** faster



FP-SNS-ALLMEMS1

News in v4.0.0 (September 2019)

38

- Added support for STEVAL-MKS1BOX1 kit
- Added support for X-NUCLEO-IKS01A3 expansion board
- Added another MotionXX libraries:
 - MotionID motion Intensity recognition middleware
 - MotionPE user current pose recognition middleware
 - MotionSD user working mode recognition middleware
 - MotionVC vertical movement recognition middleware
 - MotionTL tilt angles evaluation of the user device middleware



SensorTile.box - Default Firmware

Release notes v3.3.0 (January 2020)

39

- Added the **possibility to upload MLC/FSM programs**
- Added In-Vehicle Baby Alarm example app
- Connection requires a PIN ('123456')
- Bug fixes



It is possible to restore the default firmware
of the SensorTile.box with
STSW-MKSBOX1 BL



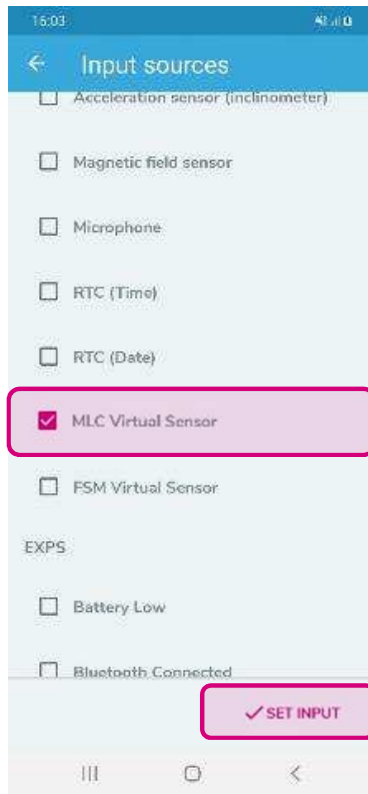
SensorTile.box - Default Firmware

MLC Example (with v3.3.0)

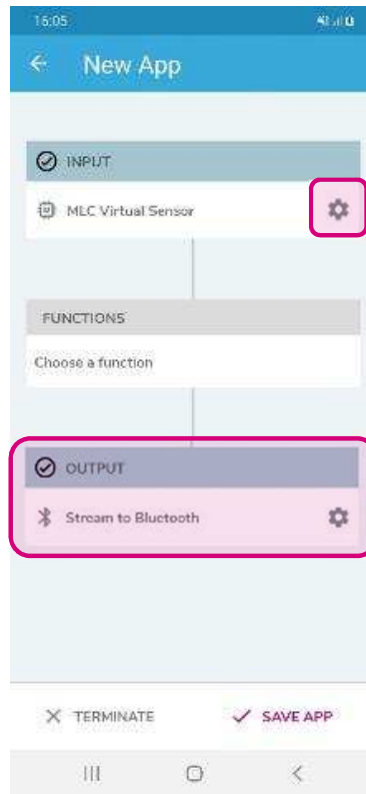
40

Go to Expert view and touch select Input

Select "MLC Virtual Sensor"



Select output and touch gearbox button on MLC input



Select .ucf file to be used; label outputs



Upload the program and see results

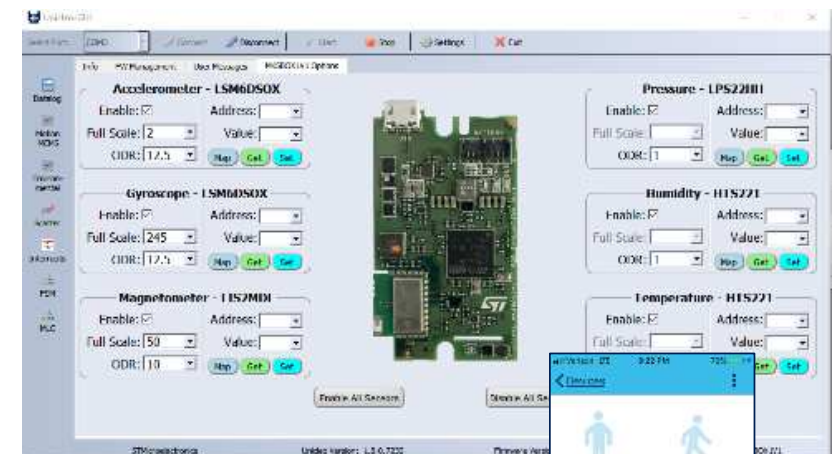


FP-SNS-STBOX1

41

SW function pack for SensorTile.box

- Applications
 - **SDDataLog** save to SD card at max speed w/RTOS
 - **BLEensors** stream to ST BLE Sensor app
 - **BLELowPower** stream to ST BLE Sensor app w/RTOS
 - **BLEMLC** Machine Learning Core demo
 - **BLEFOTA** Firmware Over-The-Air-Update
- Examples
 - **Bootloader** at 0x0800 000 with BLEFOTA at 0x0800 4000
 - **DataLogExtended** stream to Unicleo GUI via USB Virtual COM port

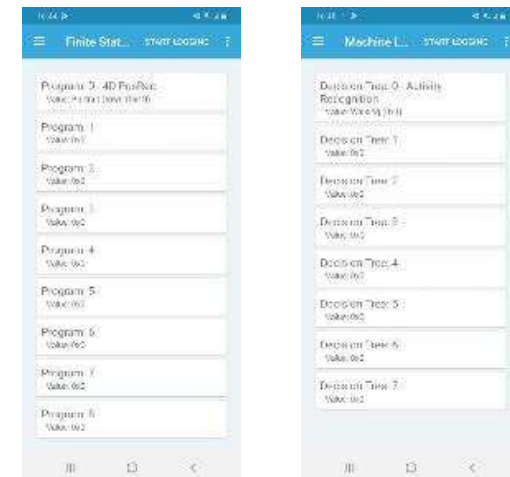


FP-SNS-STBOX1

News in v1.1.0 (December 2019)

42

- Updated drivers (components and SensorTile.box)
- Removed Vibration monitor program for Machine Learning Core (BLEMLC application)
- **Introduced the capability to program the Finite State Machine (BLEMLC application)**
- Introduced the new Bluetooth characteristics for displaying the output of MLC and FSM (BLEMLC application)
- Improved the USB-D recognition



Low level drivers & Examples (MLC/FSM)

43

Github updates

Low Level Drivers (STMems Standard C drivers):

- Added driver for LIS25BA
- Added Sensor hub FIFO example with LSM6DSOX and LPS22HH
- Code modifications and bug fixes



MLC (STMems Machine Learning Core):

- Added Configuration example for LSM6DSOX
 - **shows all the steps of the Machine Learning Core (MLC) configuration**, from data logging to the device configuration
 - face_up, face_down, shaking
 - These steps are applicable even for other ST devices embedding the MLC feature



Takeaway: Why Choose ST ?



Our Strengths



Paving the Future with Unique Assets and Focused Market Leadership



Promotional tools: Sample Kits

Consumer

STEVAL-MKIT01 V1

LSM6DSL, LIS2DW12, LIS2MDL, LPS22HB



Industrial

STEVAL-MKIT02V1

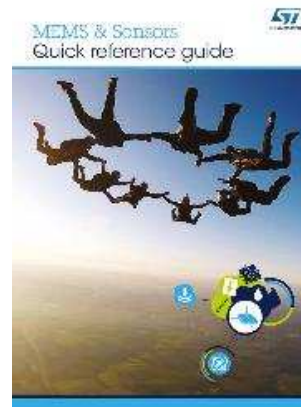
IIS2MDC, IIS2DH, ISM330DLC, IIS3DHHC



Environmental

STEVAL-MKIT03V1

STTS751, LPS22HH, LPS33HW, HTS221



NEW



MEMS and Sensors
Quick Reference Guide

Download now



NEW

Brochure for sensors

BRMOTIONMEMS0120





TOP SELLING MEMS Products

- **Consumer AXL:** LIS2DE12 / LIS2DH12 / LIS2DW12 / **LIS2DTW12** / **LIS25BA**
- **Consumer High-g: AXL (up to 400g):** H3LIS100DL / H3LIS200DL / H3LIS331DL
- **Industrial:** IIS328DQ / I3G4250D / IIS2DH / IIS2DLPC / IIS3DHHC / **IIS3DWB** / **IIS2ICLX**
- **Automotive AXL:** AIS328DQ / AIS3624DQ / **AIS2DW12** / **AIS2IH**

- **Consumer Magnetometer and 6-Axis e-Compass:** LSM303AGR / LSM303AH / LIS2MDL
- **Industrial Magnetometer, e-Compass:** ISM303DAC / IIS2MDC

- **Consumer 6-axis IMU (A+G):** LSM6DSL / LSM6DSO / **LSM6DSOX** / **LSM6DSR** / **LSM6DSRX**
- **Industrial 6-axis IMU:** ISM330DLC / **ISM330DHCX**
- **Automotive Gyro and 6-axis IMU:** A3G4250D / **ASM330LHH**

- **Environmental sensors:** LPS22HH / LPS33HW / HTS221 / STML20 / STTS751 / **LPS33W** / **LPS27HHW** / **STTS22H**
- **Microphones:** MP23ABS1 / MP34DT05-A / MP34DT06J / **MP23DB01HP** / **MP23DB02MM**
- **Industrial Environmental sensors:** **IMP34DT05** / **STTS22H**



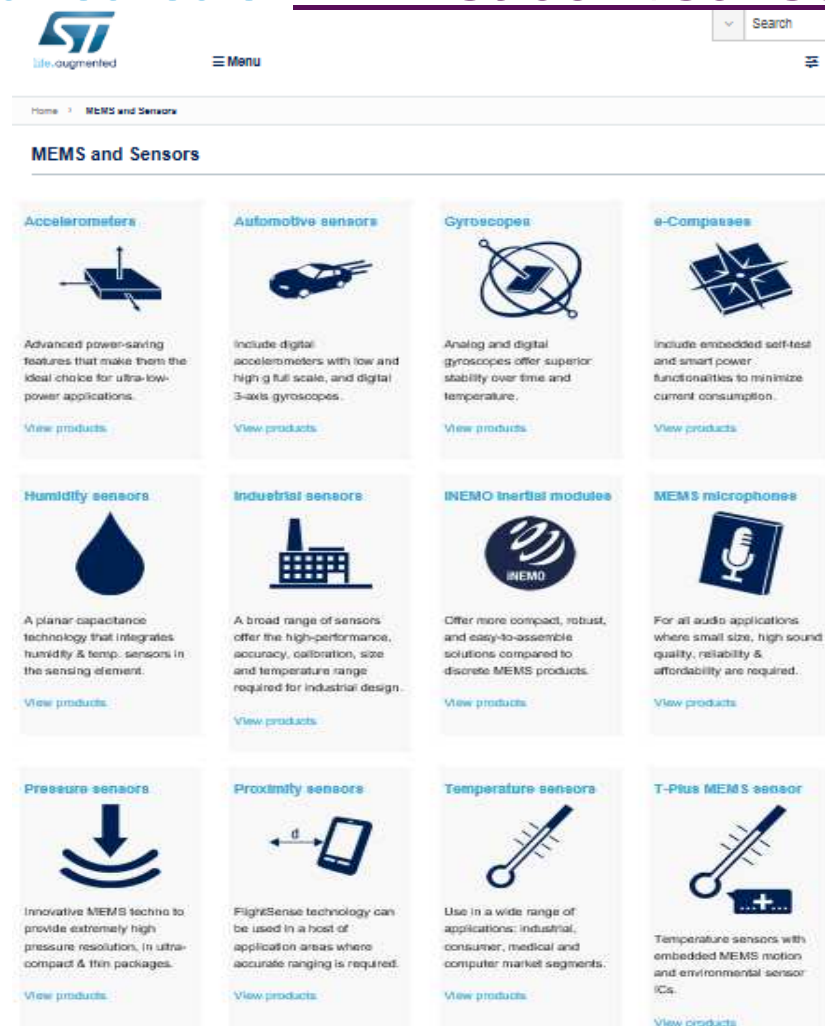
In Mass Prod / **New Product in Mass Prod** / **Sample available for alpha customers**

AppRtM: MEMS & Sensors, January 2020





For more information on sensors: www.st.com/sensors



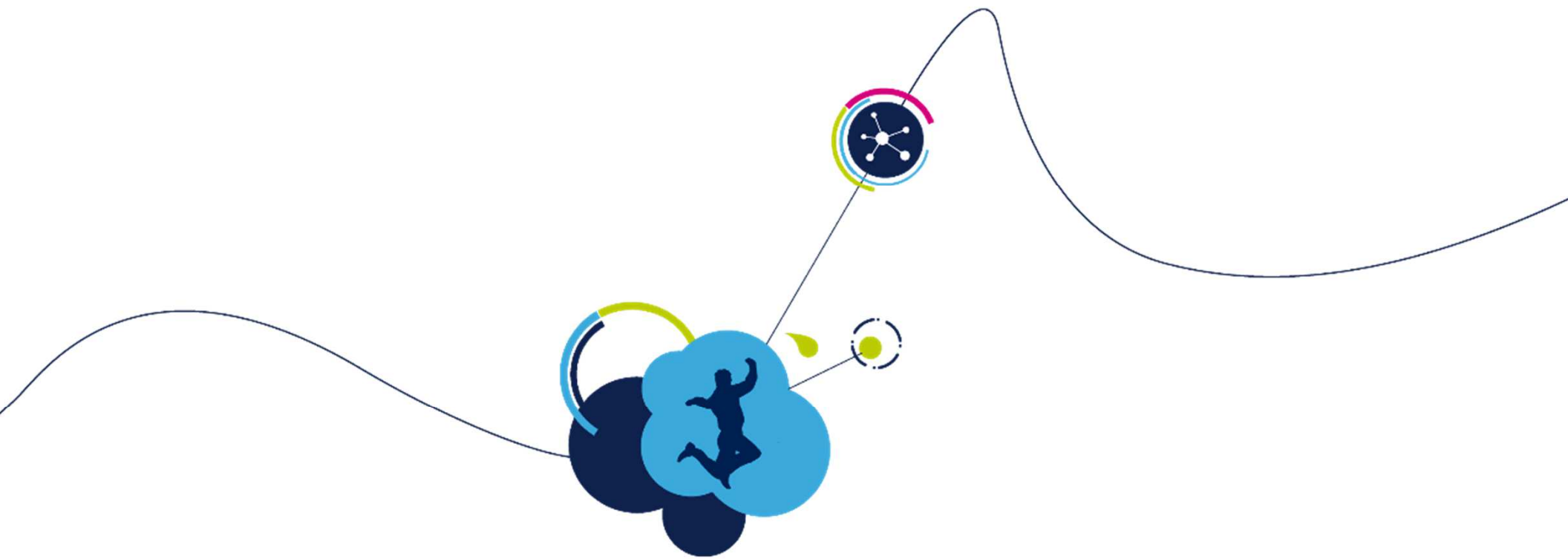
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Thank you!

