

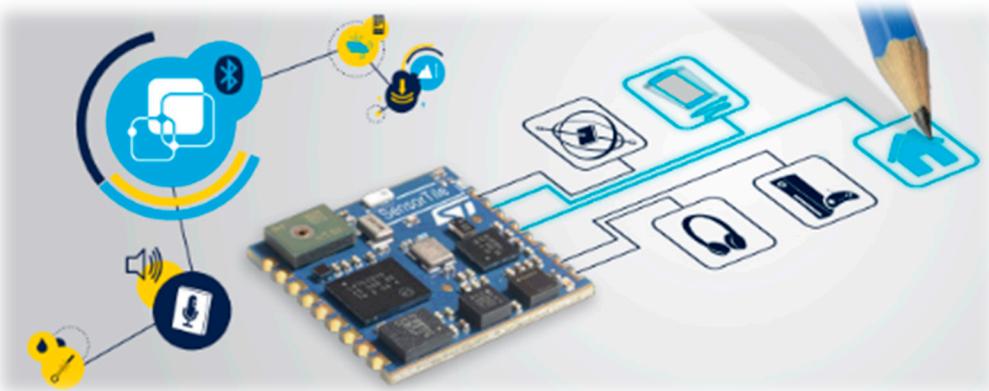


[www.st.com/sensortile](http://www.st.com/sensortile)

# SensorTile Integrated Development Platform

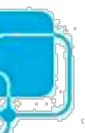
## Sensing, Processing and BLE Connectivity

Francesco Doddo



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# Agenda



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[www.st.com/sensortile](http://www.st.com/sensortile)

- Introduction to SensorTile Kit: STEVAL-STLKT01V1
- SensorTile
  - Hardware Architecture overview
  - Rapid Prototyping with STM32 Open Development Environment(ODE)
  - Firmware and Software overview
- Out of the box SensorTile
  - FP-SNS-ALLMEMS1 firmware package
  - Bluetooth Smart sensor data-logger
  - Sensor Fusion and context awareness algorithms
  - Firmware Over The Air (OTA) upgrade using Bluetooth Smart
  - Voice over BLE and Automatic Speech Recognition (ASR)
  - Cloud Connectivity through IBM Watson
  - Build a network of SensorTiles connected to the cloud with STM32ODE
- One SDK fits all IoT design needs
- Q&A



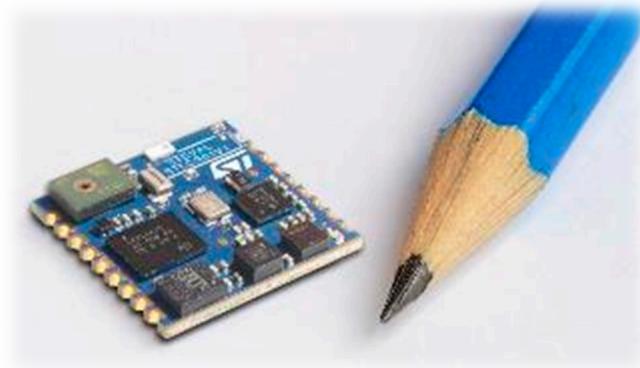
[www.st.com/sensortile](http://www.st.com/sensortile)

# SensorTile

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## IoT design lab on the tip of a pencil

**Sensing, Tracking and Monitoring Embedded Processing Unit**



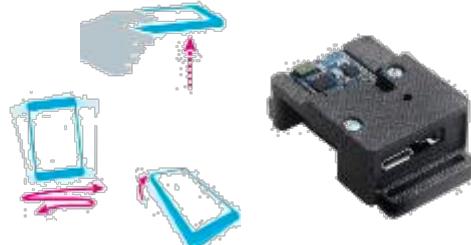
Software development



Motion



Field Test



Audio



Augmented living



# SensorTile Core System

## Sensing, processing and BLE connectivity



Sensors



Low-Power MCU



Ultra Low Power  
Connectivity



Motion MEMS



Environmental sensors



MEMS microphone



Low-power brain



Sensor fusion



Bluetooth Smart



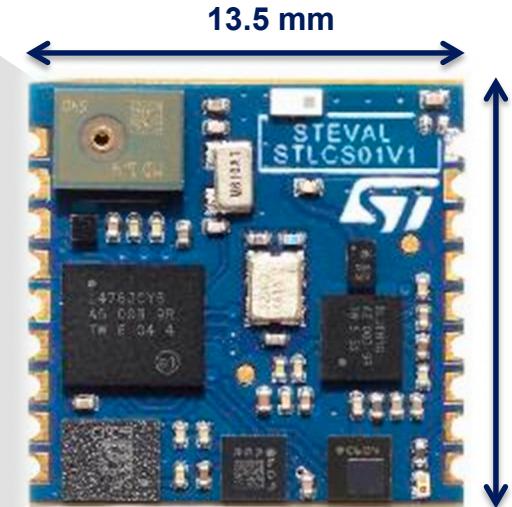
LSM6DSM  
LSM303AGR

LPS22HB

MP34DT04

STM32L4

BlueNRG-MS



13.5 mm

13.5 mm

Miniaturized Tile that can be  
**soldered or plugged** on a host board

open.AUDIO  
open.MEMS  
open.RF



SensorTile is a Bluetooth Smart sensorized development kit.

The miniaturized tile-shaped design includes all that is needed to remotely sense and measure motion, environmental and acoustical parameters.

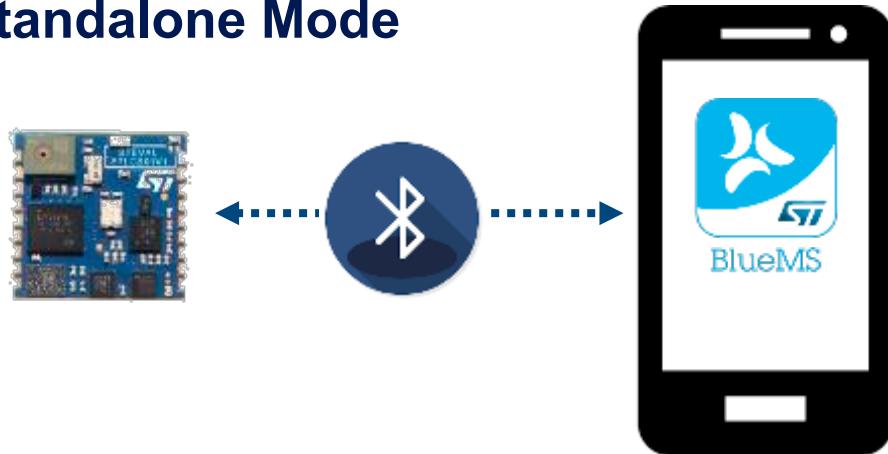
## Simple, powerful, extendible

An all-ST Reference Design

**Designed to fit your needs**

**Engineered for makers and developers**

### Standalone Mode



### BLE Sensor HUB Mode



**SensorTile is a Programmable Development Kit:**

Leverage on the on-board STM32 processing capability and provided software API to create your new BLE-connectable sensor node

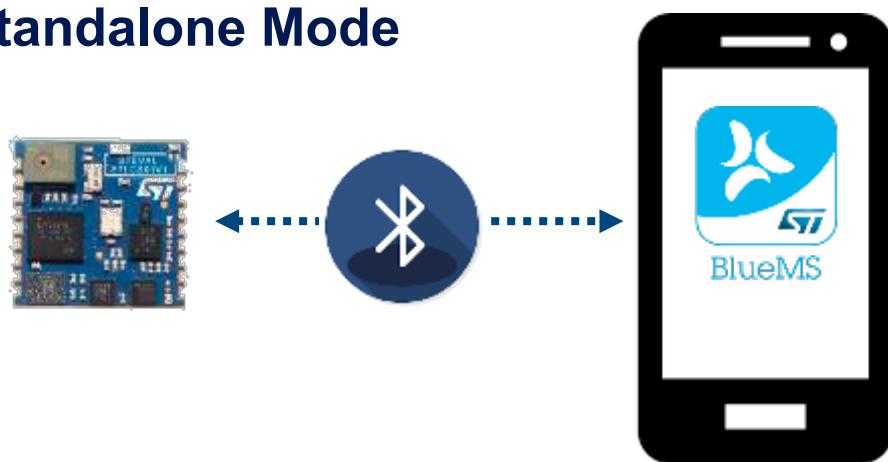
## Simple, powerful, extendible

An all-ST Reference Design

**Designed to fit your needs**

**Engineered for makers and developers**

### Standalone Mode



- Used as a **standalone sensor** node to MONITOR, TRACK and REMOTELY CONNECT to a Smartphone App (Android/iOS)
  - i.e. Acquisition Campaigns:
    - Turn it on, configure it via BLE and start acquiring sensor data remotely on your Smartphone

### SensorTile is a Programmable Development Kit:

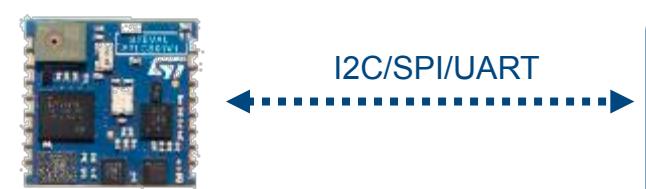
Leverage on the on-board STM32 processing capability and provided software API to create your new BLE-connectable sensor node

An all-ST Reference Design

**Engineered for makers and developers**

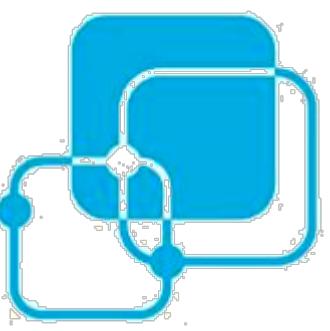
- Easily **plug into new designs** to add SENSING and CONNECTIVITY capabilities through a SMART HUB solution
  - i.e. make your product smart:
    - Turn your electronic system into a smart product with wireless connectivity and sensors

### BLE Sensor HUB Mode



### SensorTile is a Programmable Development Kit:

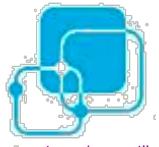
Leverage on the on-board STM32 processing capability and provided software API to create your new BLE-connectable sensor node



# SensorTile Kit

## Hardware & Architecture





[www.st.com/sensortile](http://www.st.com/sensortile)

# SensorTile

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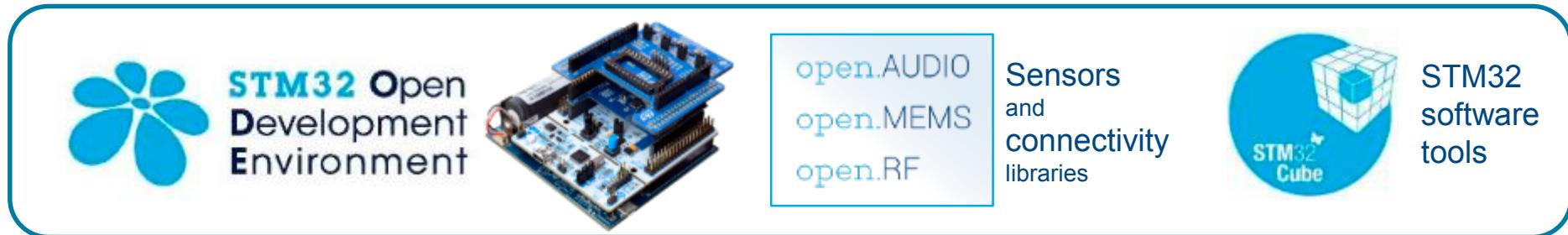
## Integrated Development Platform

### HW components

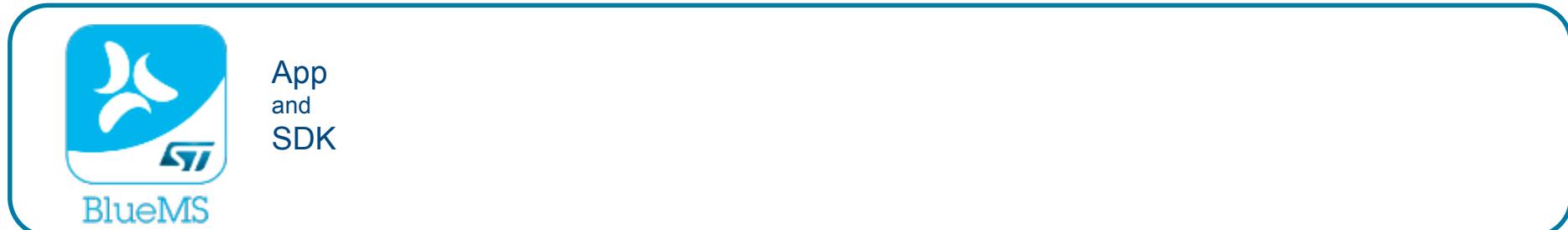


STEVAL-STLKT01V1

### Embedded SW components



### iOS and Android App



# SensorTile Development Kit

SensorTile Kit: STEVAL-STLKT01V1

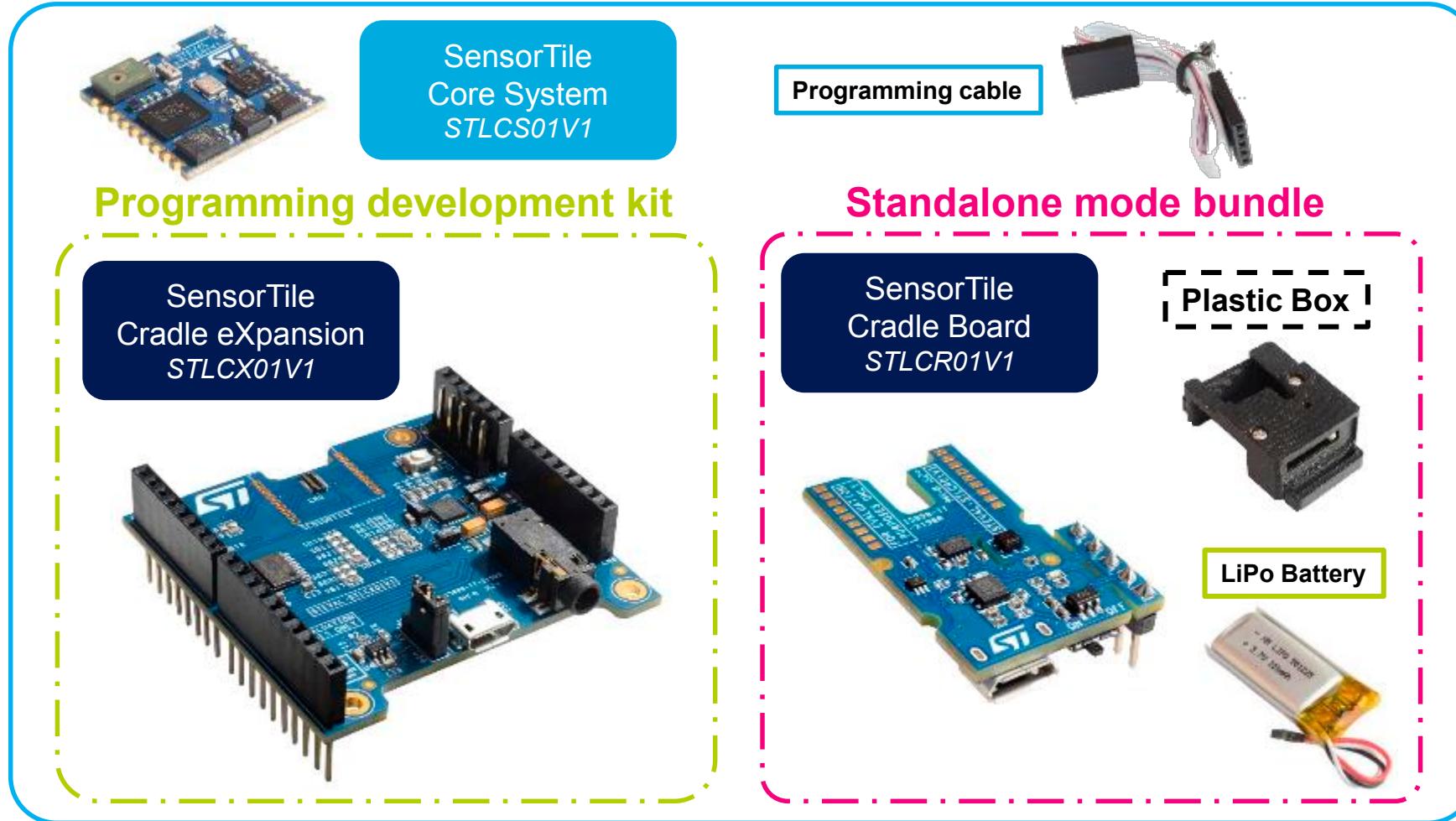


ID: S9NSTILE01

IC: 8976C-STILE01

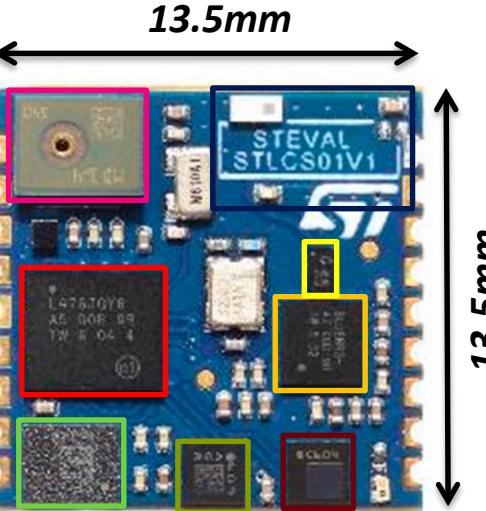
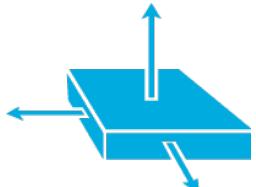
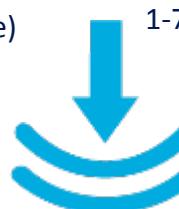
# SensorTile Development Kit

## SensorTile Kit: STEVAL-STLKT01V1

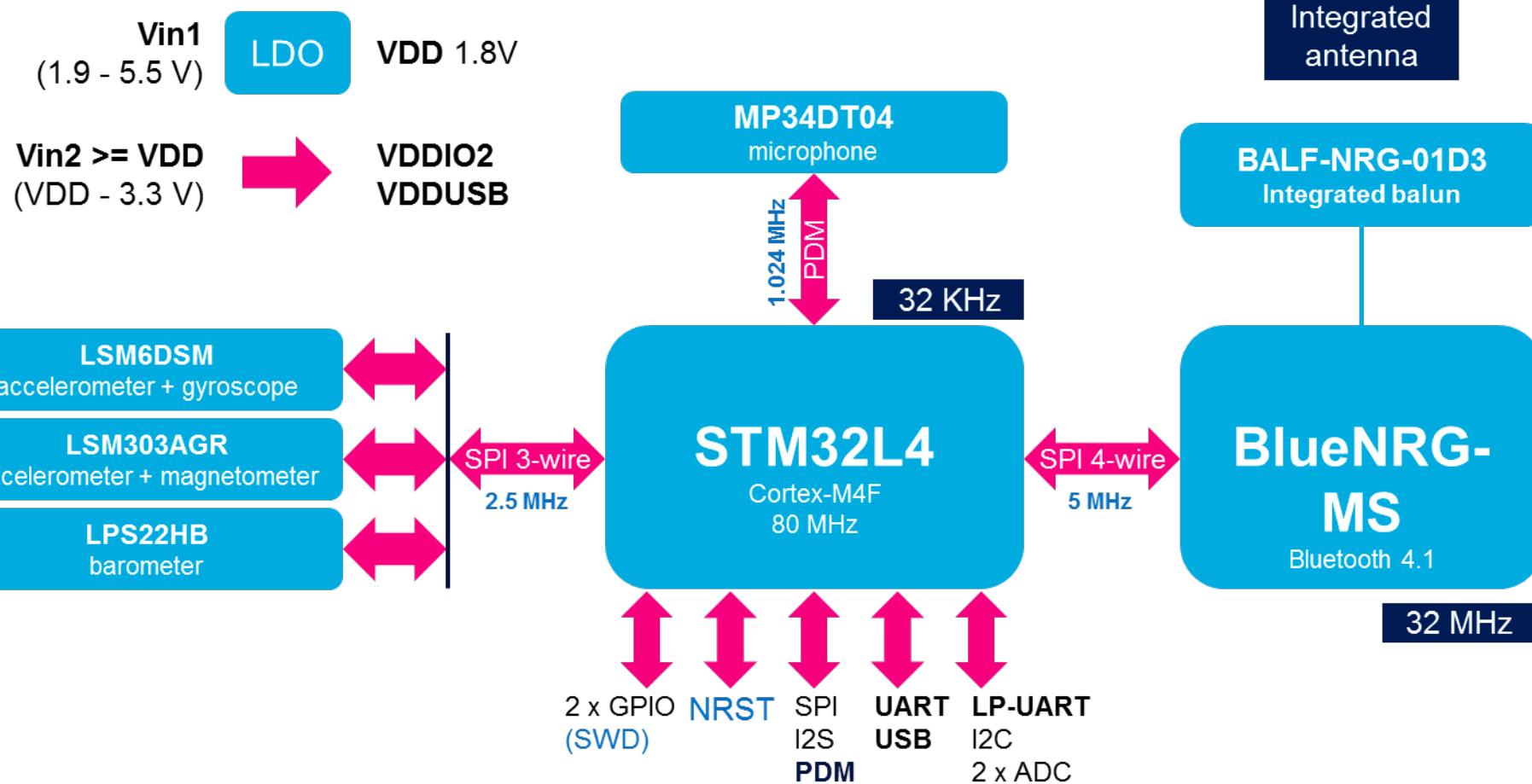


# SensorTile – Sensors, MCU, Connectivity

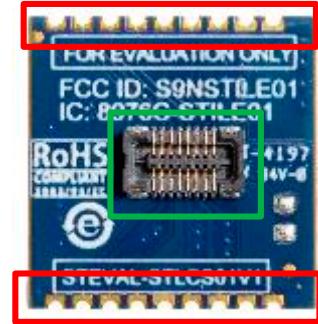
## SensorTile Core System: STLCS01V1

**MP34DT04**Microphone  
64dB SNR, 120dBSPL**STM32L476**Cortex-M4  
Up to 100DMIPS 80MHz  
100uA/MHz@24MHz in run mode**LSM6DSM**3DAcc+3DGyro  
0.65mA @ 1.6kHz - 9µA @ 12.5HzAntenna  
Clearance Area**Balun Filter****BlueNRG-MS**Bluetooth low-energy  
Concurrent master/slave  
BT4.1**Bottom View****LSM303AGR**3DAcc+3DMag  
200µA @ 20 Hz (HR mode)  
Accel/Mag independent power down mode**LPS22HB**Barometer  
1-75Hz, 3-12µA @ 1Hz

# SensorTile Core System - Architecture



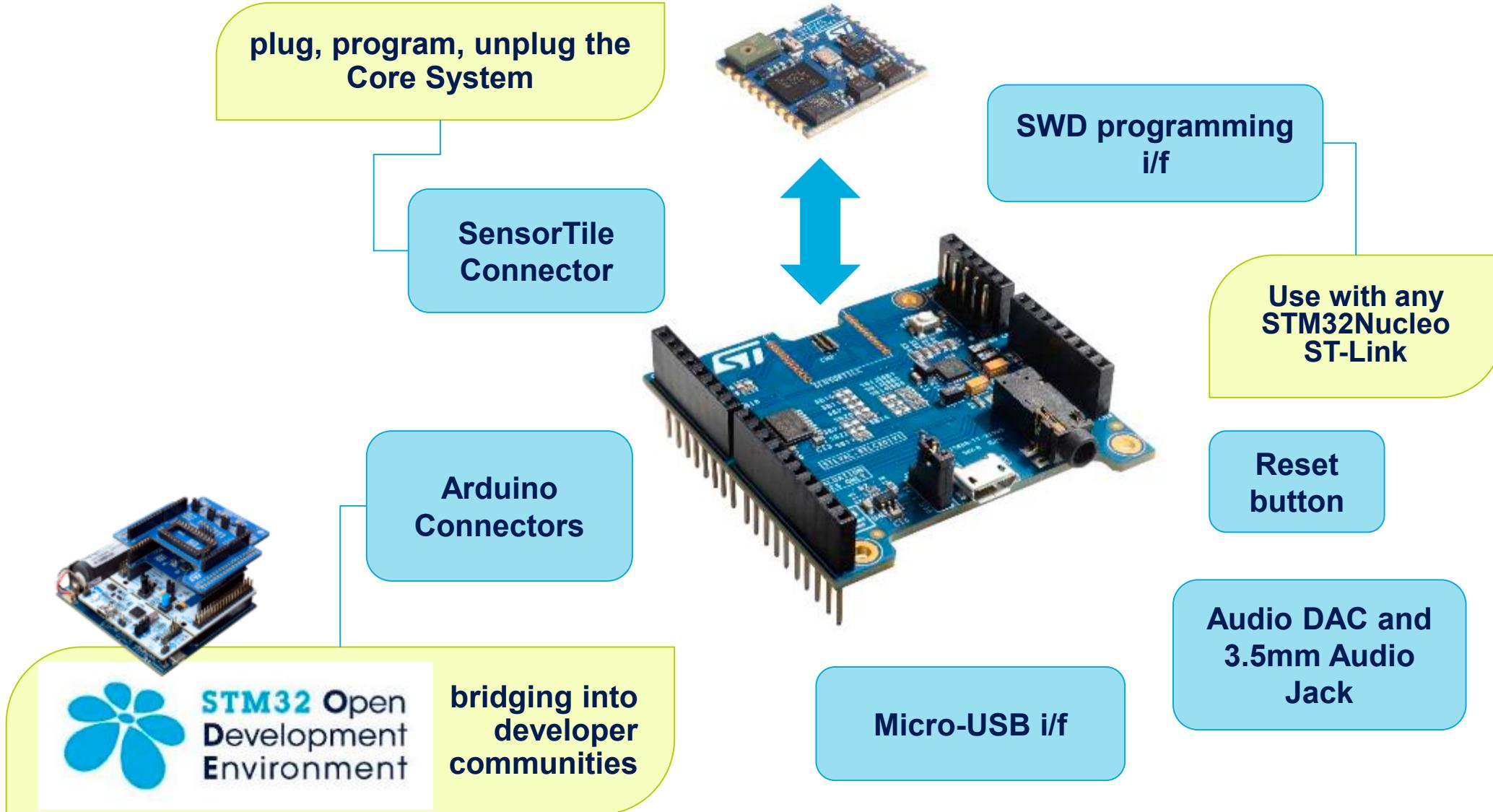
**Connections:  
Bottom side View**



**Solderable  
Plugin**

# SensorTile Cradle eXpansion Board

## Host board for firmware development





[www.st.com/sensortile](http://www.st.com/sensortile)

# STM32 Open Development Environment

## Fast, affordable Prototyping and Development

15

**16**  
NUCLEO  
L0 to L4  
F0 to F7



**33**  
X-NUCLEO



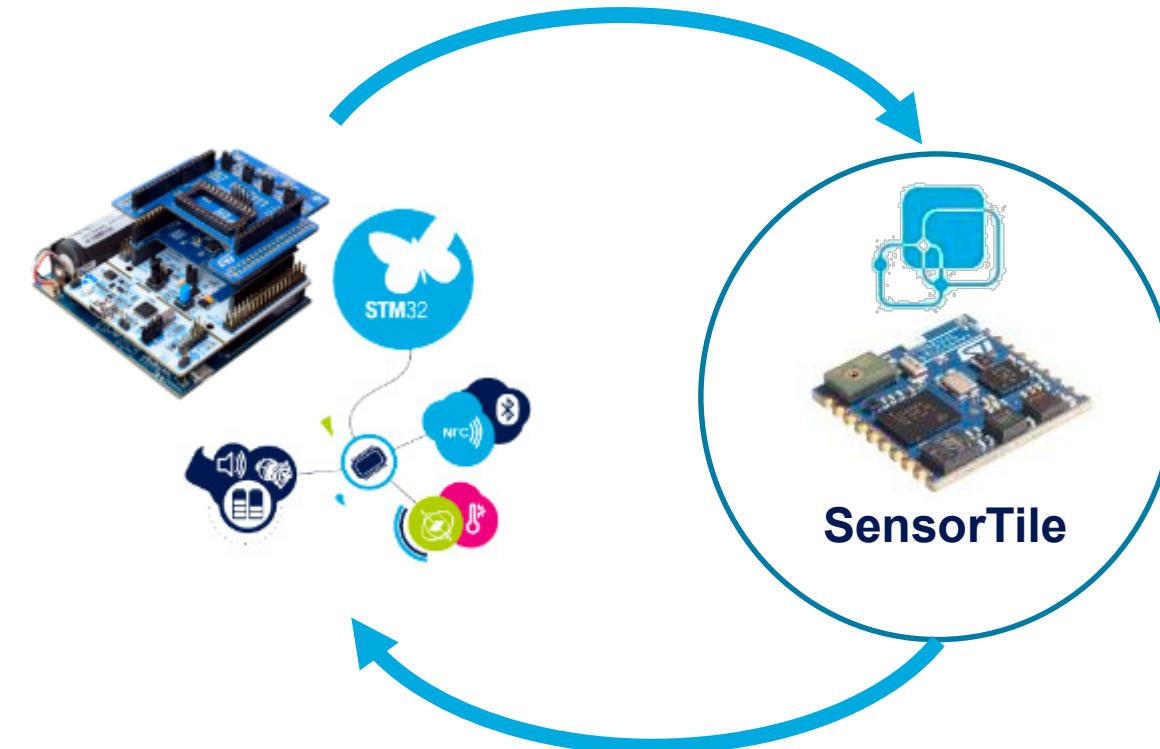
# STM32 Open Development Environment

## STM32 Nucleo and X-Nucleo

The building blocks

Your need

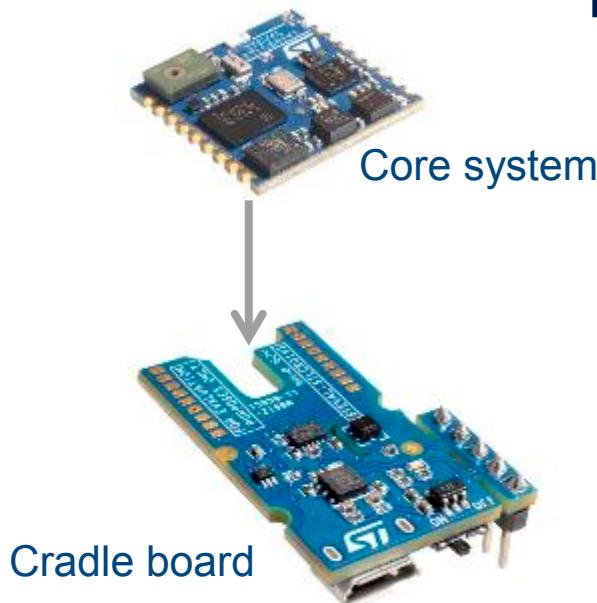
Our answer



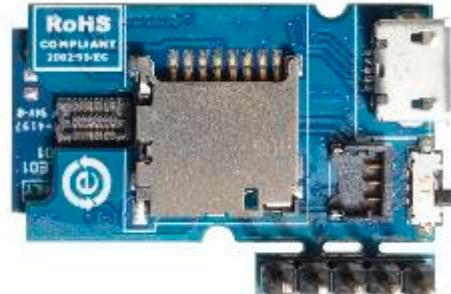
# SensorTile Cradle Board

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## Host board for Standalone Mode



**Bottom Side View**



- Solderable SensorTile Footprint
- Breakable SWD interface for programming
  - E.g. may use STLink on STM32Nucleo
- HTS221 Humidity and Temperature sensor
  
- Micro SD Card slot
- Micro-USB interface
- HTS221 Humidity and Temperature sensor
- Battery Charger and Battery Connector
- ON/OFF Switch

# Getting started with the SensorTile

## [www.st.com/sensortile](http://www.st.com/sensortile)

### • Design Resources

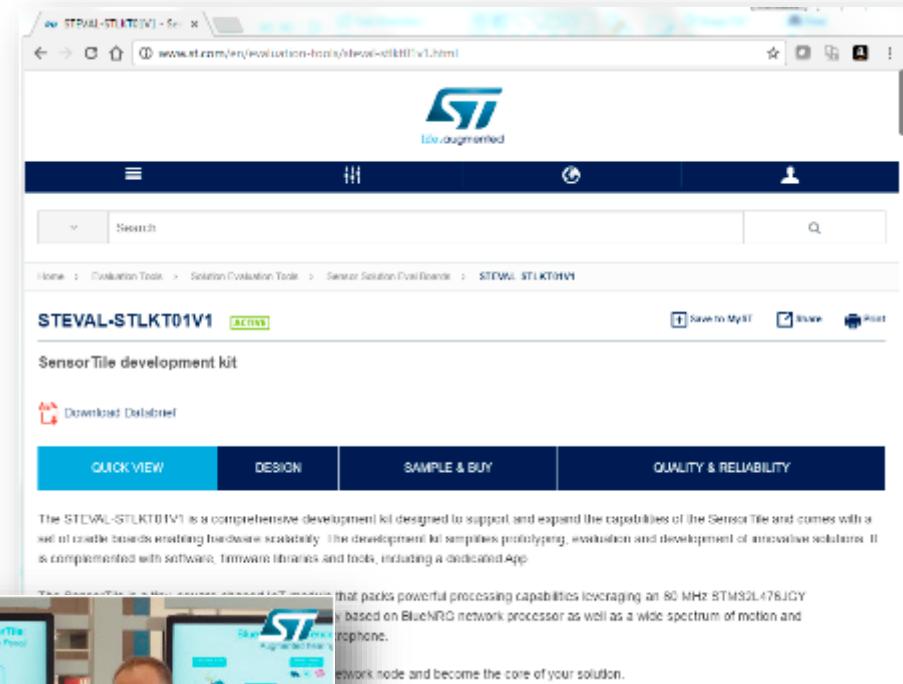
- Schematics, BOM, gerber files
- STM32ODE Firmware packages
- Bluetooth Smart Apps and SDK for iOS and Android

### • Learning

- Quick Start Guide and User Manuals
- 3 minutes video introduction
- 7 minutes unboxing sensortile video

### • Sample and Buy

- Distributors availability



The screenshot shows the product page for the STEVAL-STLKT01V1 SensorTile development kit. It features a large image of the board, a brief description, and tabs for 'QUICK VIEW', 'DESIGN', 'SAMPLE & BUY', and 'QUALITY & RELIABILITY'. Below the main image is a video thumbnail showing a man unboxing the kit.



**Video from the lab**  
Unboxing the SensorTile Development kit

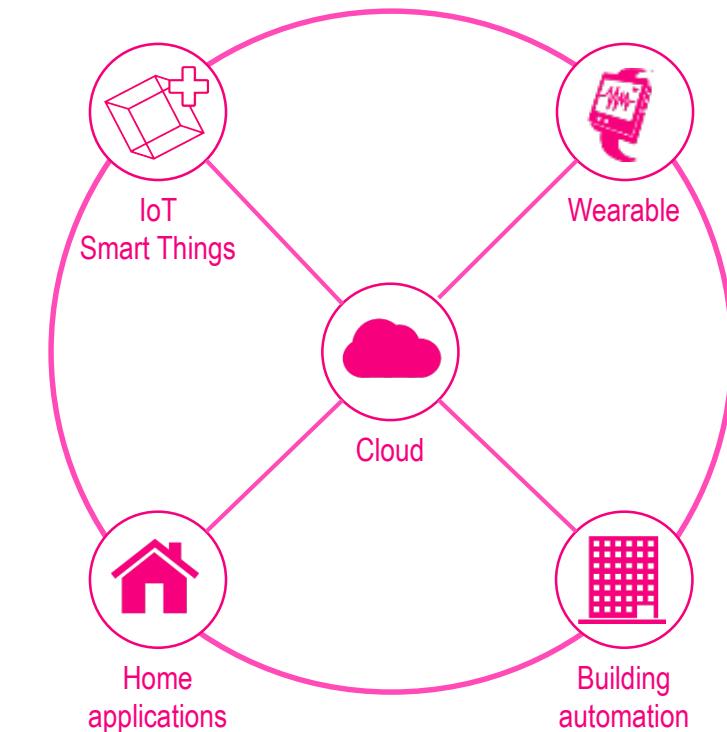
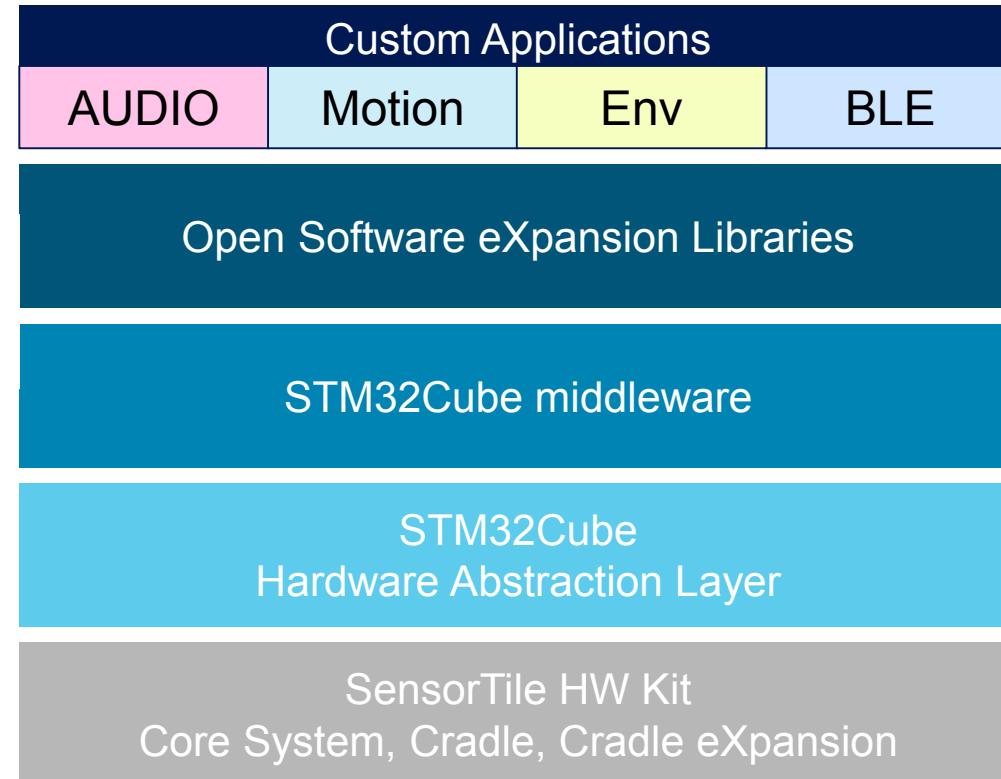




# SensorTile Platform Firmware & Software

# SensorTile Embedded Software for Design and Prototyping

Modular design environment to fast prototype your designs in all application domains



SensorTile Development Kit is built on **STM32Cube**  
and supported by the **STM32 Open Development Environment**

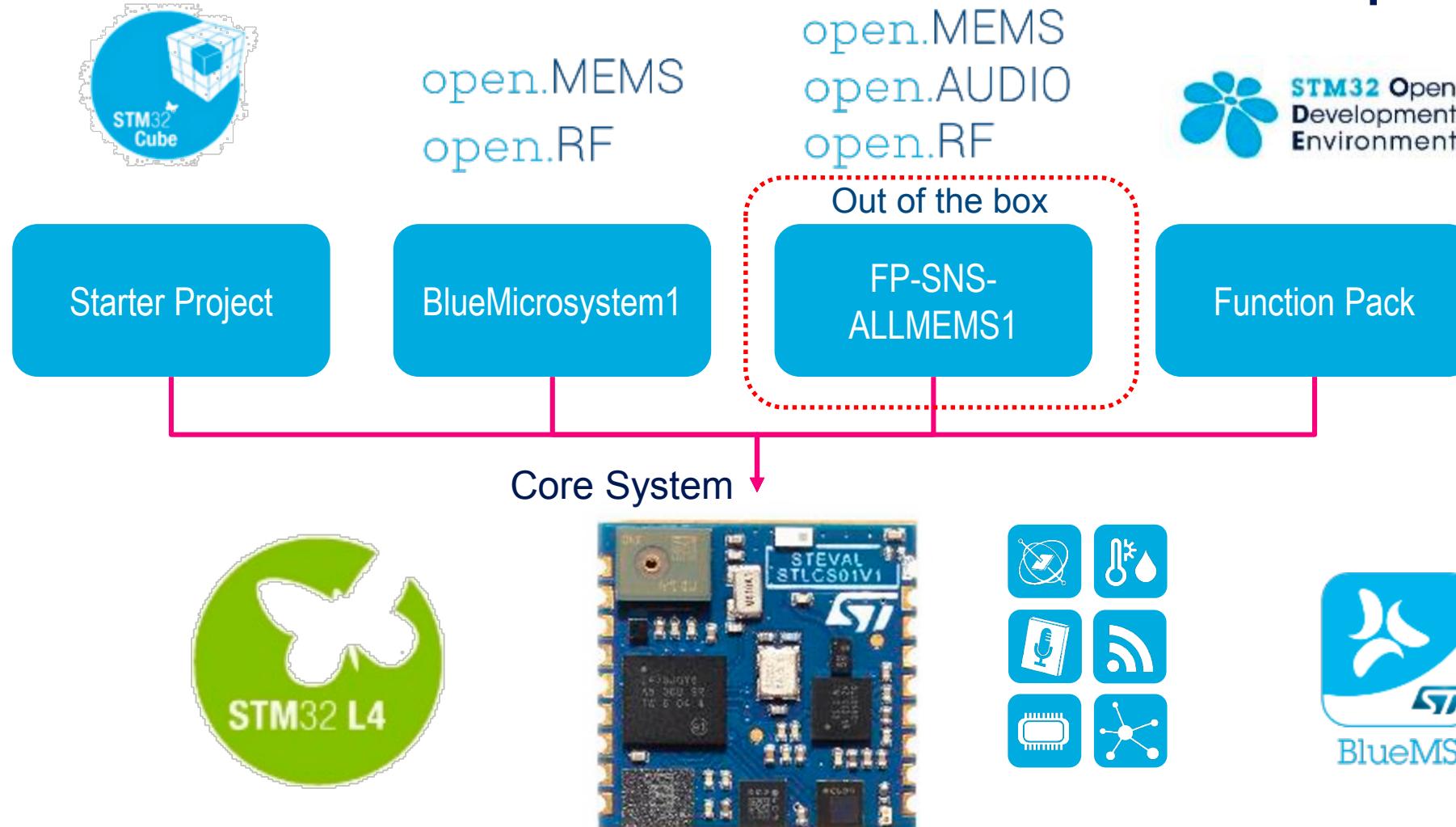


[www.st.com/sensortile](http://www.st.com/sensortile)

# SensorTile

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## Software platform





# SensorTile

## Software platform



# open.MEMS

## open.RF

open.MEMS  
open.AUDIO  
open.RF



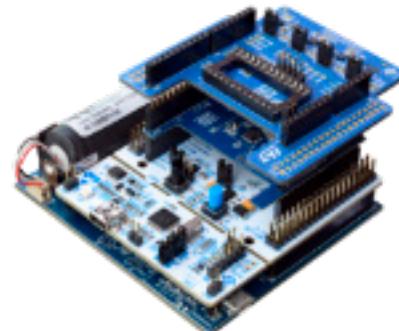
# Starter Project

# BlueMicrosystem1

# Out of the box

FP-SNS-  
ALLMEMS1

# Function Pack



App  
and  
SDK

## Software platform



Tools and Software		
EMBEDDED SOFTWARE		
Part Number	▲ Manufacturer	◆ Description
STSW-STLKT01	ST	Basic firmware application for STEVAL-STLKT01V1



MCUS EMBEDDED SOFTWARE		
Part Number	▲ Manufacturer	◆ Description
FP-SNS-ALLMEMS1	ST	STM32 ODE function pack for Bluetooth low energy and sensor software expansion for STM32Cube
FP-SNS-MOTENV1	ST	Bluetooth Low Energy and sensors software expansion for STM32Cube



MEMS AND SENSORS SOFTWARE		
Part Number	▲ Manufacturer	◆ Description
BLUERMICROSYSTEM1	ST	Bluetooth low energy and sensors software expansion for STM32Cube
BLUERMICROSYSTEM2	ST	Bluetooth low energy and sensor software expansion for STM32Cube



WIRELESS CONNECTIVITY SOFTWARE		
Part Number	▲ Manufacturer	◆ Description
BlueMS	ST	BlueMS Application for Android and iOS
BlueST-SDK	ST	Bluetooth Low Energy and Sensors Technology Software Development Kit (SDK)



# www.st.com/sensortile

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# SensorTile Software platform

firmware packages



Tools and Software	
EMBEDDED SOFTWARE	
EVALUATION TOOL SOFTWARE	
Part Number	▲ Manufacturer
STSW-STLKT01	ST



MCUS EMBEDDED SOFTWARE	
Part Number	▲ Manufacturer
FP-SNS-ALLMEMS1	ST
FP-SNS-MOTENV1	ST



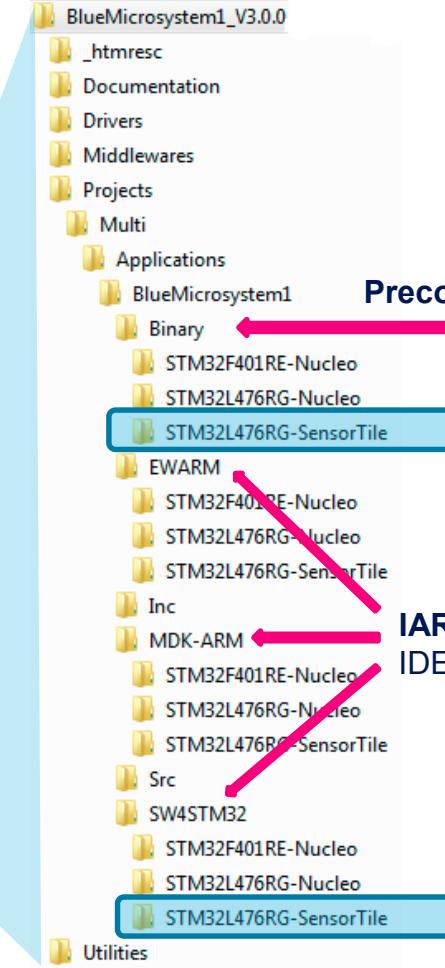
MEMS AND SENSORS SOFTWARE	
Part Number	▲ Manufacturer
BLUERMICROSYSTEM1	ST
BLUERMICROSYSTEM2	ST



WIRELESS CONNECTIVITY SOFTWARE	
Part Number	▲ Manufacturer
BlueMS	ST
BlueST-SDK	ST



apps

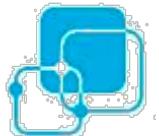


Precompiled Binary images

IAR, KEIL, System Workbench  
IDEs support



ac6



## Software platform

The screenshot shows the STM32CubeMX software interface. On the left, the Project Explorer displays the 'STM32L476RG\_SENSORTILE' project structure, including the 'Project - STM32L476RG\_S...' folder and its subfolders: BlueMS2\_SensorTile, EWARM, User, Doc, and Drivers. The 'Drivers' folder is expanded, showing sub-folders like BSP, Components, SensorTile, CMSIS, STM32L4xx-Nucleo, Middlewares, and Output. The 'SensorTile' folder contains several source files: SensorTile.c, SensorTile\_accelero.c, SensorTile\_audio\_in.c, SensorTile\_BlueNR.c, SensorTile\_ggc.c, SensorTile\_gyro.c, SensorTile\_humidity.c, SensorTile\_magno.c, SensorTile\_pressure.c, and SensorTile\_temperat...'. The code editor on the right shows the content of 'SensorTile\_accelero.c'. The code includes comments about legal disclaimers, includes, and various @addtogroup annotations for different sensor components. It defines sensor handles, data structures for Accelerometer sensors (ACCELERO\_SensorHandle, ACCELERO\_Data\_t), and prototypes for private functions related to the LSM6DSM and LSM303AGR sensors.

```
* SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER  
* CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY,  
* OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE  
* OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.  
*/  
/* Includes */  
  
#include "SensorTile_accelero.h"  
  
/** @addtogroup BSP */  
*/  
  
/** @addtogroup SENSORTILE */  
*/  
  
/** @addtogroup SENSORTILE_ACCELEERO */  
/* @brief This file provides a set of firmware functions to manage MEMS accelerometer */  
*/  
  
/** @addtogroup XSENSORTILE_ACCELEERO_Private_Variables SENSORTILE_ACCELEERO_Private_variables */  
*/  
  
static DrvContextTypeDef ACCELEERO_SensorHandle[ ACCELEERO_SENSORS_MAX_NUM ];  
static ACCELEERO_Data_t ACCELEERO_Data[ ACCELEERO_SENSORS_MAX_NUM ]; // Accelerometer - all.  
static LSM6DSM_X_Data_t LSM6DSM_X_0_Data; // Accelerometer - sensor 0.  
static LSM303AGR_X_Data_t LSM303AGR_X_0_Data; // Accelerometer - sensor 1.  
  
/** */  
*/  
  
/** @addtogroup SENSORTILE_ACCELEERO_ACCELEERO_Private_FunctionPrototypes SENSORTILE_ACCELEERO_Private_function_prototypes */  
*/  
  
static DrvStatusTypeDef BSP_LSM6DSM_ACCELEERO_Init( void **handle );  
static DrvStatusTypeDef BSP_LSM303AGR_ACCELEERO_Init( void **handle );  
  
/** */  
*/
```

**BSP**  
Board Support Package:  
Set of APIs for the  
HW components of the SensorTile

Accelerometer APIs



## Software platform

File Edit View Project ST-Link Tools Window Help

Workspace STM32L476RG\_SENSORTILE

Files

- Project - STM32L476RG\_SENSORTILE
  - BlueMS2\_SensorTile
  - EWARM
  - User
  - Doc
  - Drivers
    - BSP
      - Components
      - SensorTile
    - CMSIS
    - STM32L4xx-Nucleo
  - Middlewares
    - OSX\_BlueVoice
    - OSX\_MotionAR
    - OSX\_MotionCP
    - OSX\_MotionFX
    - OSX\_MotionGR
    - STM32\_BlueNRG
    - STM32\_USBD\_Library
  - Output

main.c SensorTile.c | SensorTile\_accelero.c | OTA.c

```
* the Licenses saved on FLASH because they could be not compatible */

/* Includes ----- */
#include <stdio.h>
#include <math.h>
#include <limits.h>
#include "TargetFeatures.h"
#include "main.h"
#include "LicenseManager.h"
#include "sensor_service.h"
#include "bluenrg_utils.h"
#include "HWAdvanceFeatures.h"

/* Private typedef ----- */

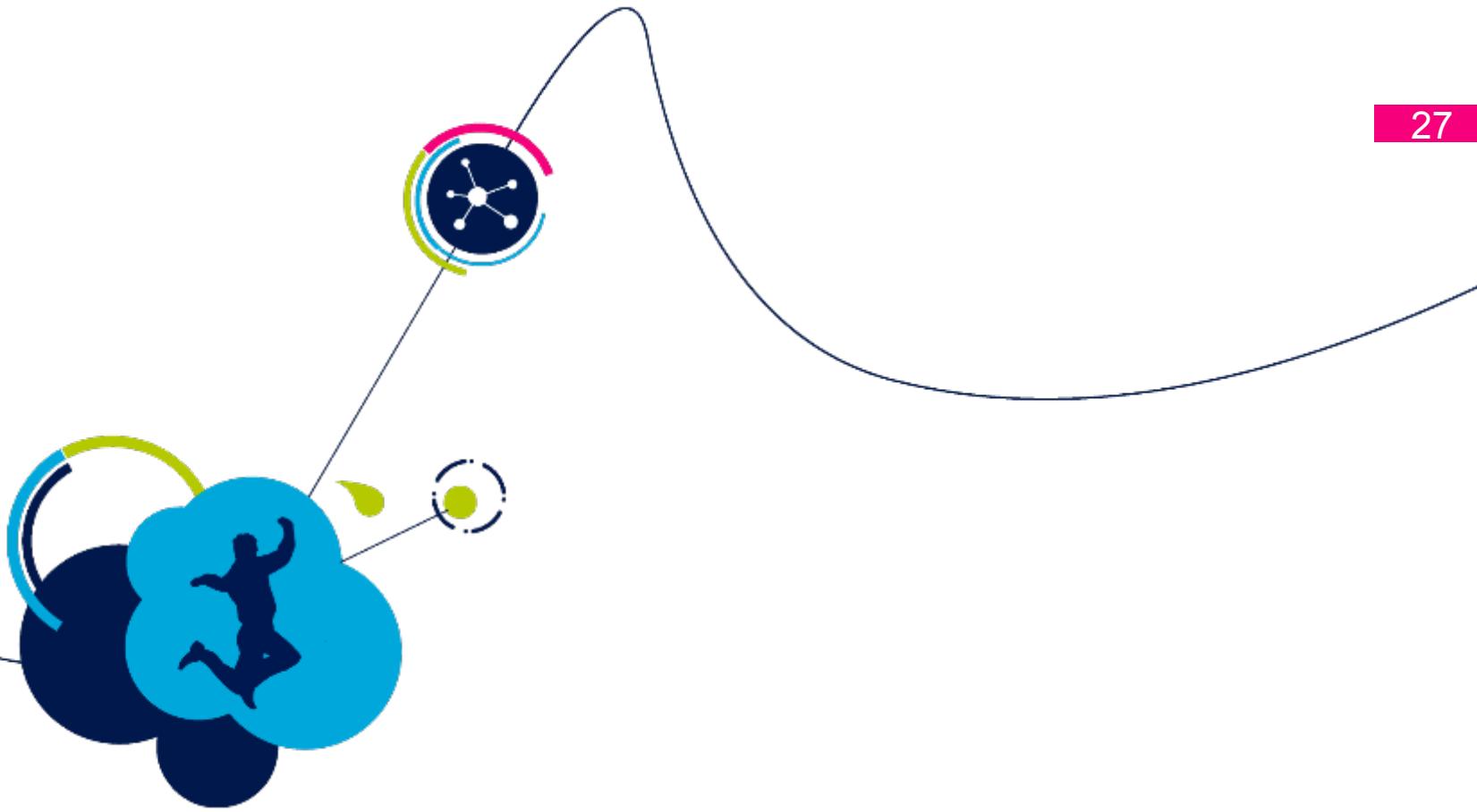
/* Private define ----- */

#define BLUEMSYS_N_BUTTON_PRESS 3
#define BLUEMSYS_CHECK_CALIBRATION ((uint32_t)0x12345678)

#ifndef STM32_NUCLEO
#if defined (_IAR_SYSTEMS_ICC_)
    _no_init uint32_t RestartInBootLoaderMode;
#elif defined (_CC_ARM)
    uint32_t *RestartInBootLoaderMode = (uint32_t *)0x10000008;
#elif defined (_GNUC_)
    uint32_t RestartInBootLoaderMode __attribute__ ((section (".noinit")));
#else
    #error "Toolchain not supported"
#endif
#endif /* STM32_NUCLEO */
```

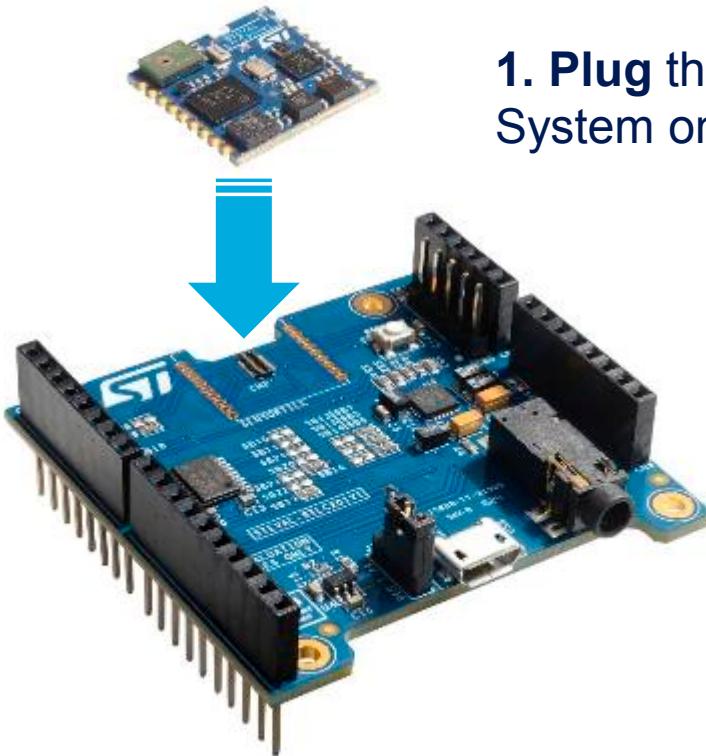
**Middleware**

Set of APIs for the  
Sensor Fusion, Voice over Bluetooth  
Smart , FW OTA upgrade, etc



# Out-of-the-box SensorTile

# Out-of-the-box FP-SNS-ALLMEMS1 with the eXpansion Cradle



**1. Plug the SensorTile Core System on the eXpansion Cradle.**



**2. Power it via USB**

**3. Run the BlueMS App on your Android or iOS device to Connect**

Video available at  
[www.st.com/sensortile](http://www.st.com/sensortile)

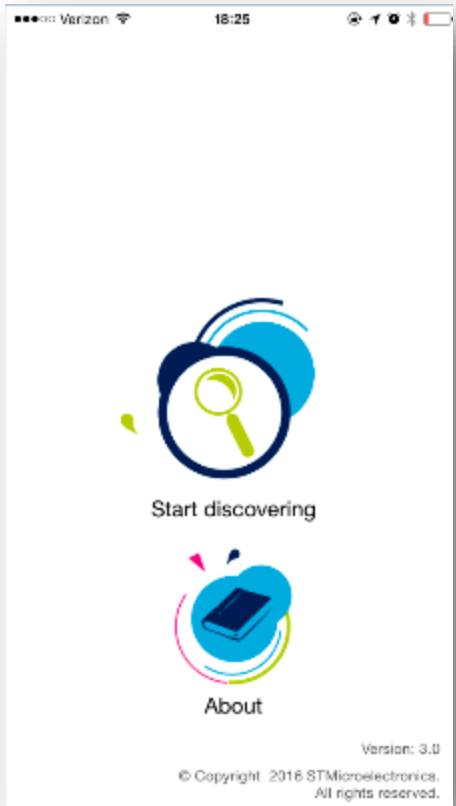
Video from the lab  
Unboxing the SensorTile Development kit



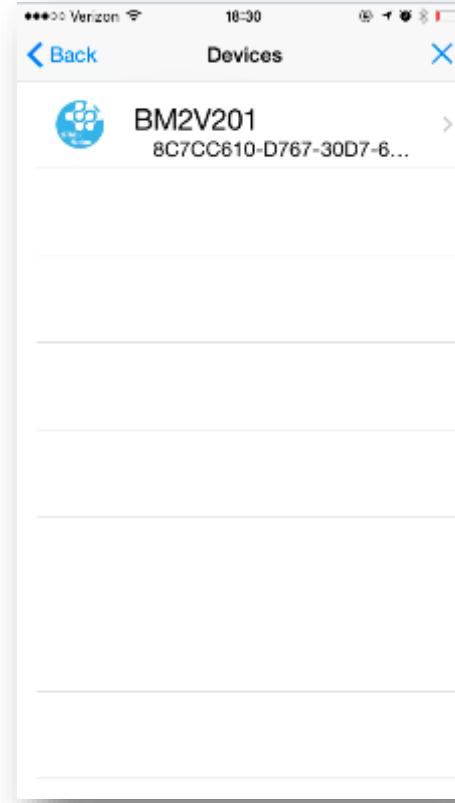
# “Out of the box” SensorTile FW



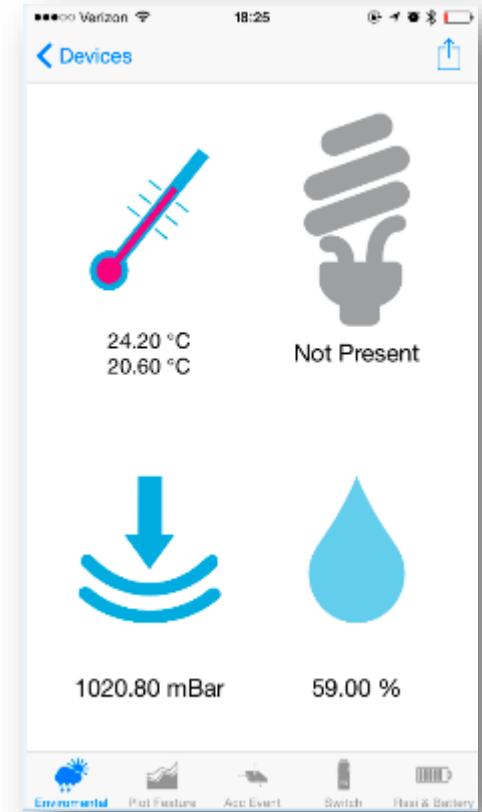
BlueMS



Discover SensorTile



Connect to it

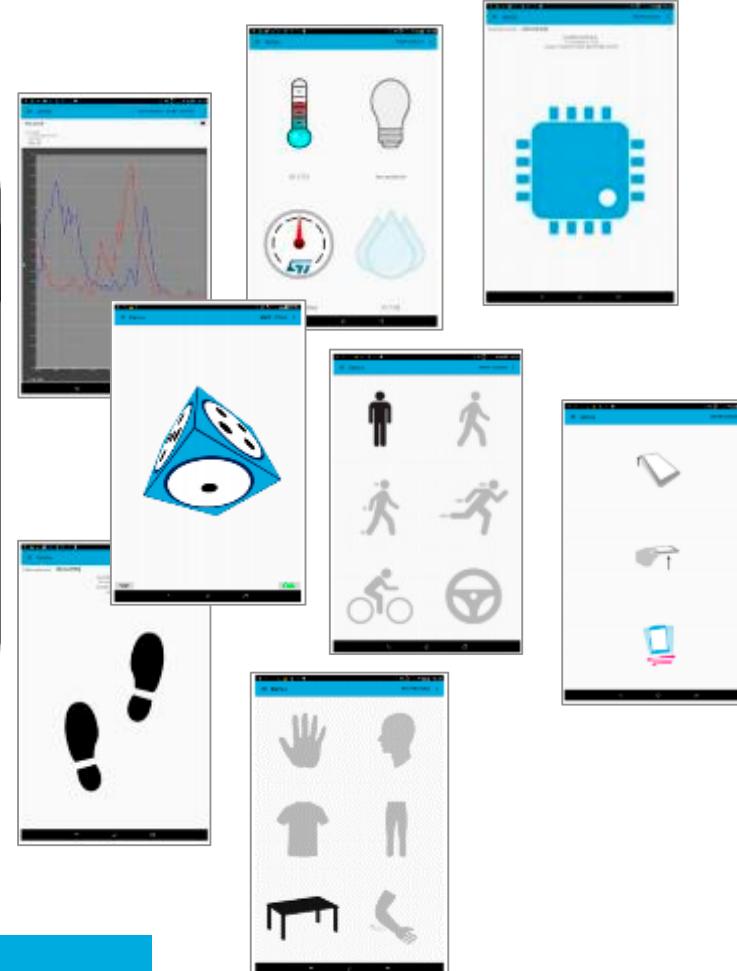


Stream Sensor Data

# FP-SNS-ALLMEMS1



**STM32 Open  
Development  
Environment**



open.MEMS  
open.AUDIO  
open.RF

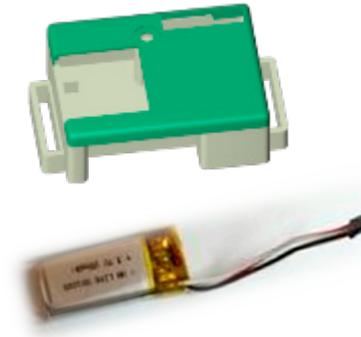
STM32 OTA Firmware upgrade

BMS Android and iOS App free download

# FP-SNS-ALLMEMS1 Instant Data Tracking with the SensorTileCradle



**Solder** the SensorTile Core System  
to the Cradle.



**Plug** the battery,  
protect it with the  
plastic cover

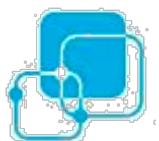


**Connect** to your Android or iOS  
smartphone or tablet



**Run** the BlueMS App





www.st.com/sensortile

# FP-SNS-ALLMEMS1 Instant Data Tracking with the SensorTileCradle

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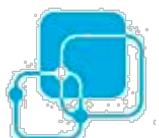
The image shows a step-by-step guide for instant data tracking using the ST Sensortile app:

- 1. Select Plot Feature tab**: A blue box highlights the "Plot Feature" tab at the bottom of the screen, which is connected by a dashed line to the "Select Feature" button in the top right corner of the main plot area.
- 2. Select the Feature**: A modal dialog box titled "2. Select the Feature" lists the following options: Pressure, Magnetometer, Gyroscope, Accelerometer, and Mic Level. At the bottom are "Select" and "Cancel" buttons.
- 3. Select Time Scale**: Another modal dialog box titled "3. Select Time Scale" shows time scale options: 1s, 2s, 5s, and 10s. At the bottom are "Select" and "Cancel" buttons.
- 4. Plot Accelerometer data**: The final result is a plot titled "Stop plotting Accelerometer" showing three lines (X, Y, Z) over time. The X-axis ranges from -2000 to 8000 mg, and the Y-axis ranges from 0000 to 10000 ms. The plot shows a sharp vertical spike at approximately 7500 ms.

At the bottom of the screen, there are tabs for Environmental, Sensor Fusion, Plot Feature (highlighted with a blue box), Activity Recognition, and More.

Text at the bottom right: Ts:17337 X: 1.00 (mg) Y: 15.00 (mg) Z: 1003.00 (mg)

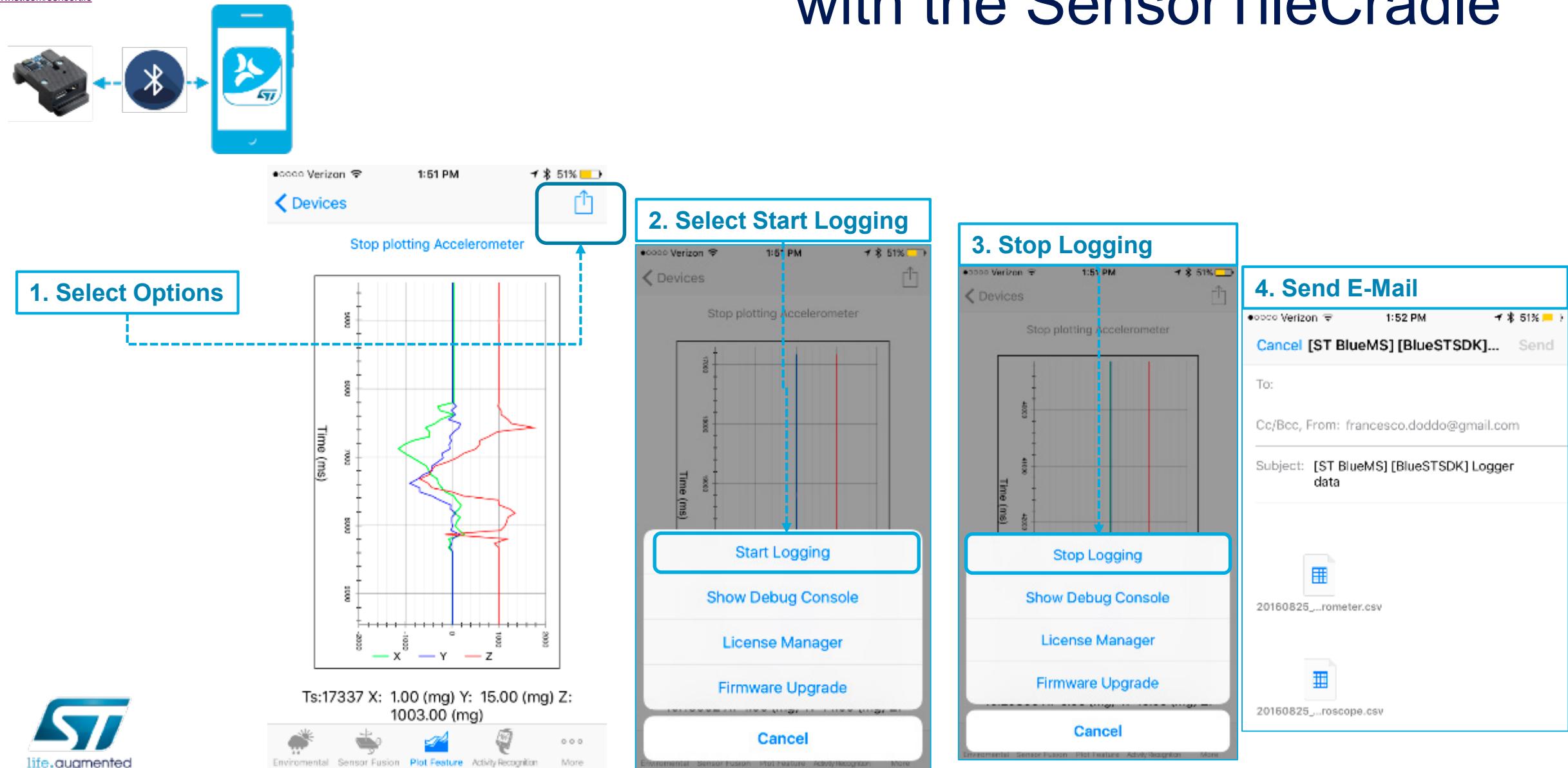
Logos at the bottom right: Environmental, Sensor Fusion, Plot Feature, Activity Recognition, and More.



www.st.com/sensortile

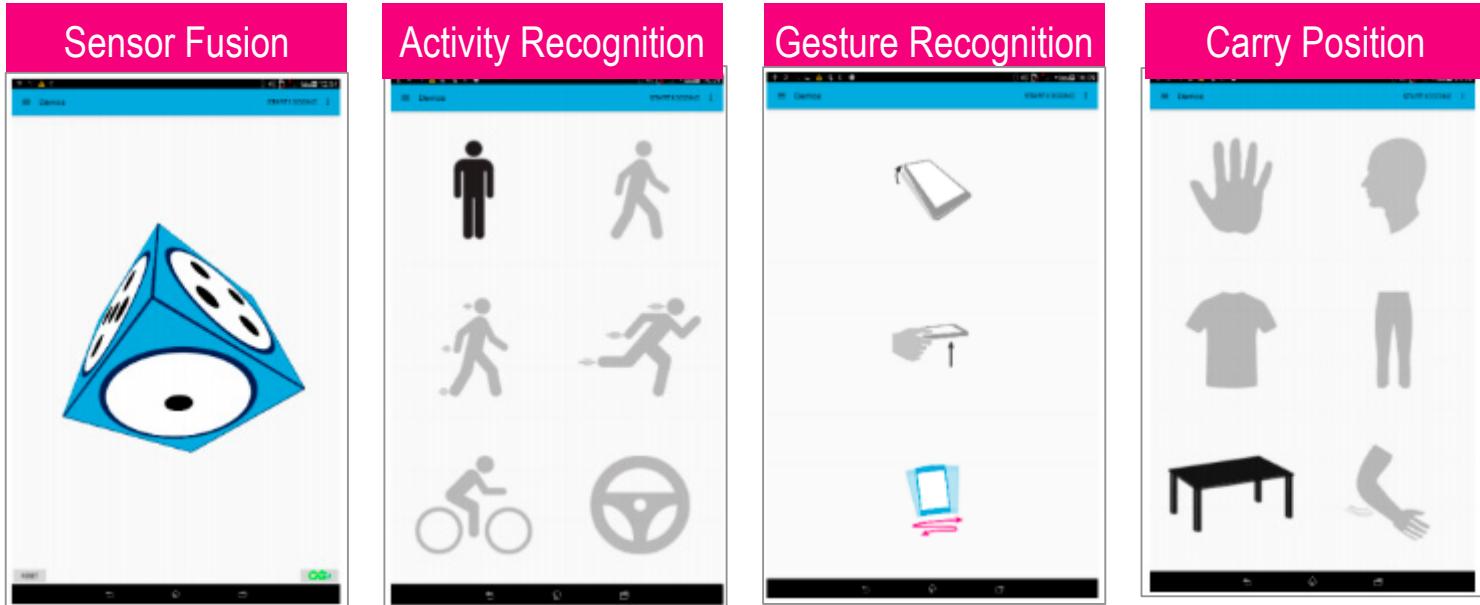
# FP-SNS-ALLMEMS1 Instant Data Tracking with the SensorTileCradle

33



# FP-SNS-ALLMEMS1 Sensor Fusion and context awareness Algorithms

Native, out-of-the-box support for  
**open.MEMS**  
*Software libraries*



Orientation	Tilt	Free Fall	Single Tap	Double Tap	Pedometer	Wake up



## Firmware Over The Air Upgrade

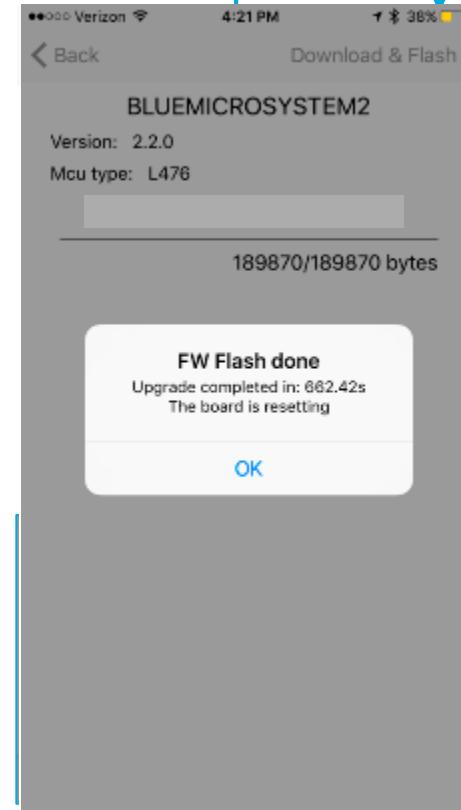
1. Select Options

2. Select Firmware Upgrade

Native, out-of-the-box support for

*FOTA*

*Firmware Over The Air Upgrade*



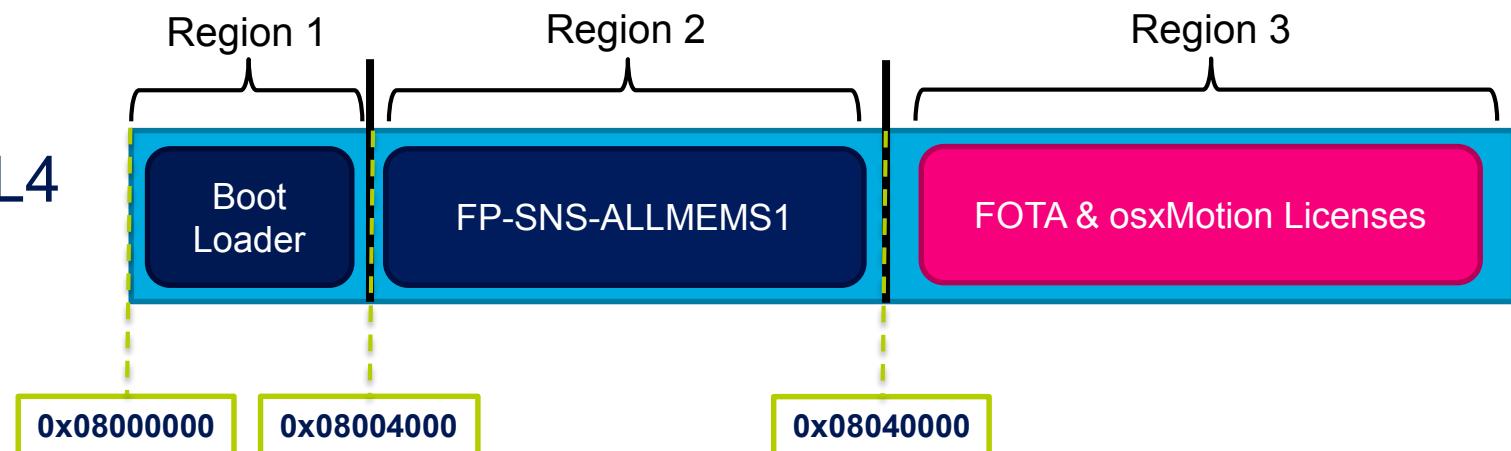
## Firmware Over The Air Upgrade

### MEMORY ORGANIZATION

- By default, all SensorTile FW applications use a bootloader that resides in the first part of the flash memory of the STM32.
- For this reason the memory is organized into 3 different regions:

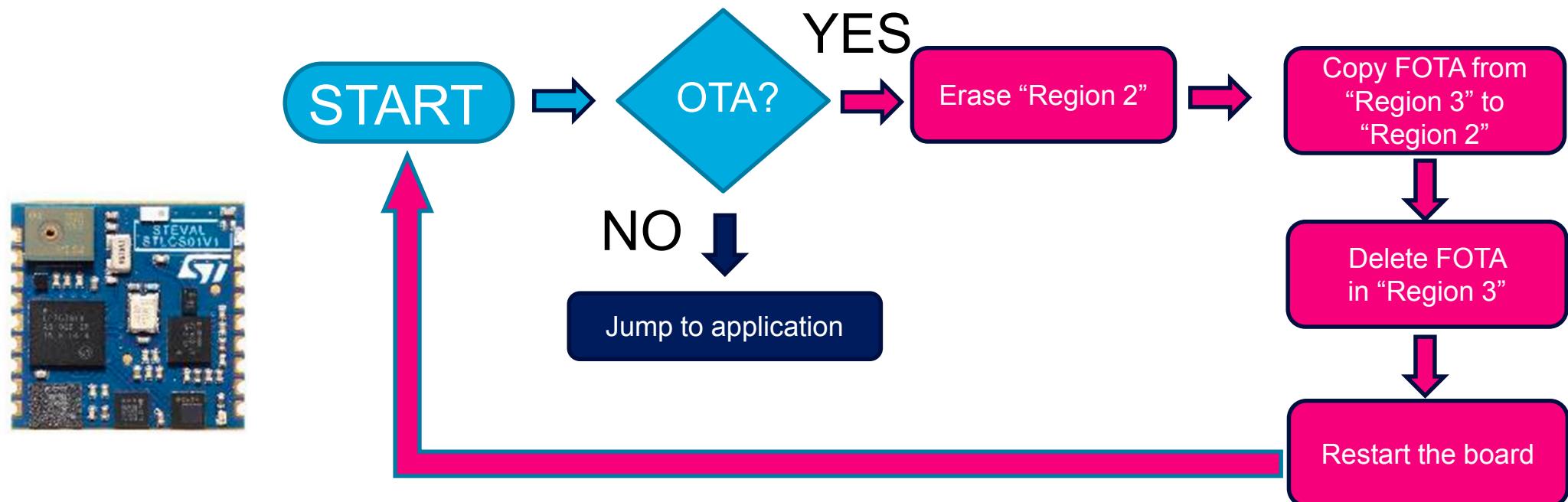


STM32L4  
Flash



# Firmware Over The Air Upgrade – BootLoader

- The bootloader manages the installation of On-The-Air upgrades, if any.
- Otherwise it jumps to the application

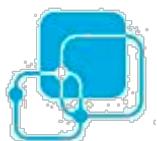


Voice over Bluetooth Smart Service and Cloud based Automatic Speech Recognition



ST BlueMS available on Google Play and App Store





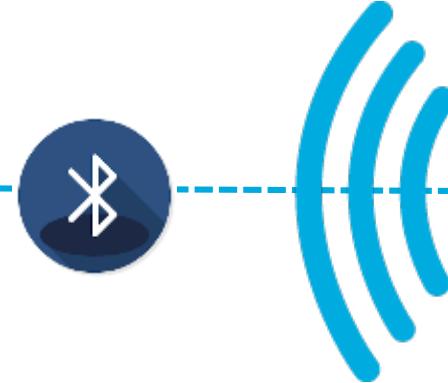
[www.st.com/sensortile](http://www.st.com/sensortile)

# SensorTile data to the cloud with the BlueMS app

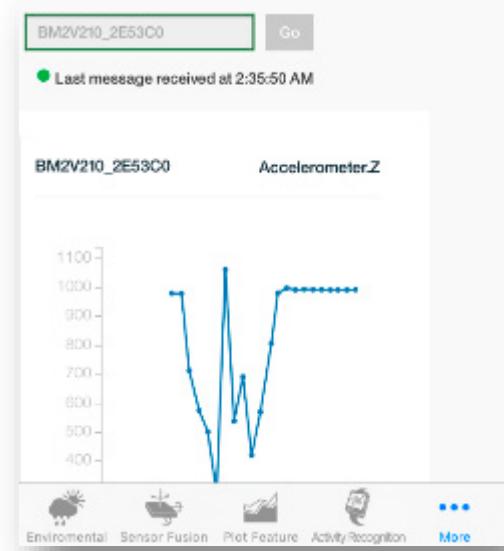
39



**Acquire sensor data  
...send them over BLE**

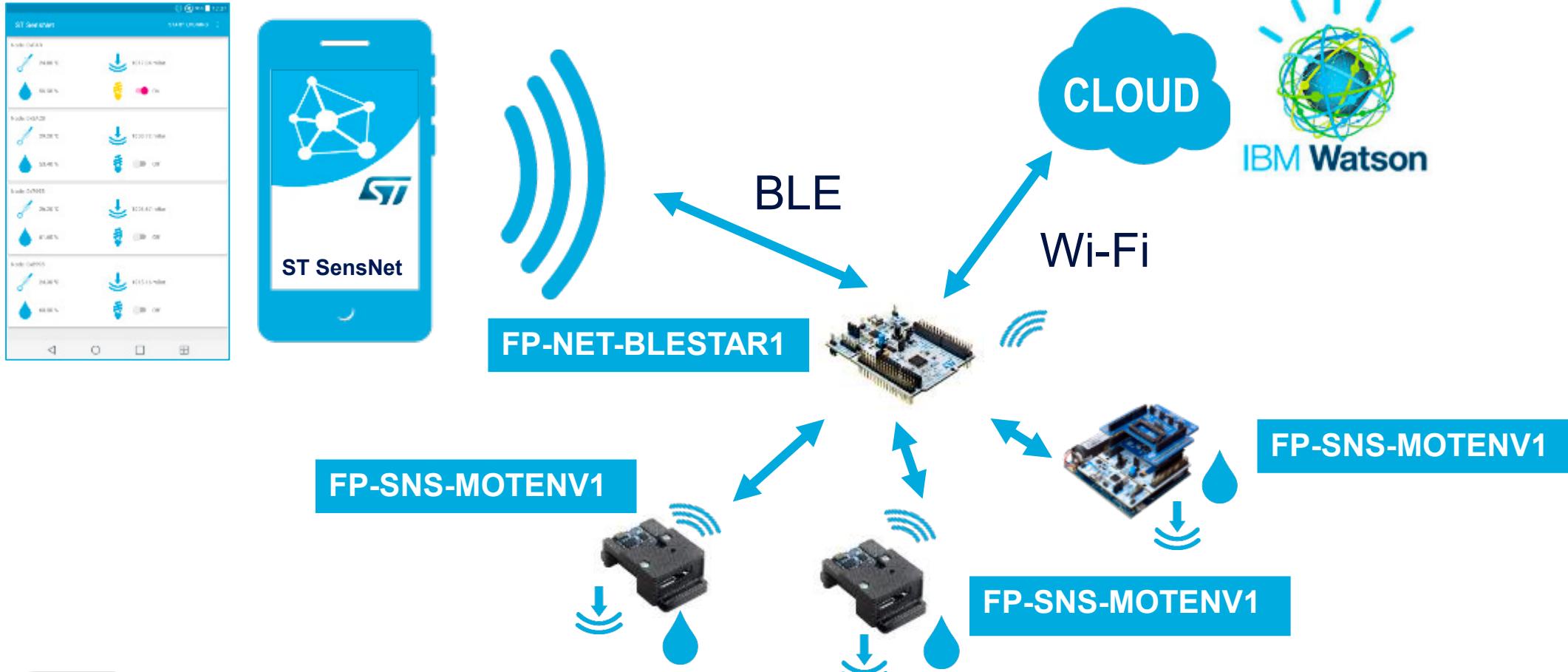


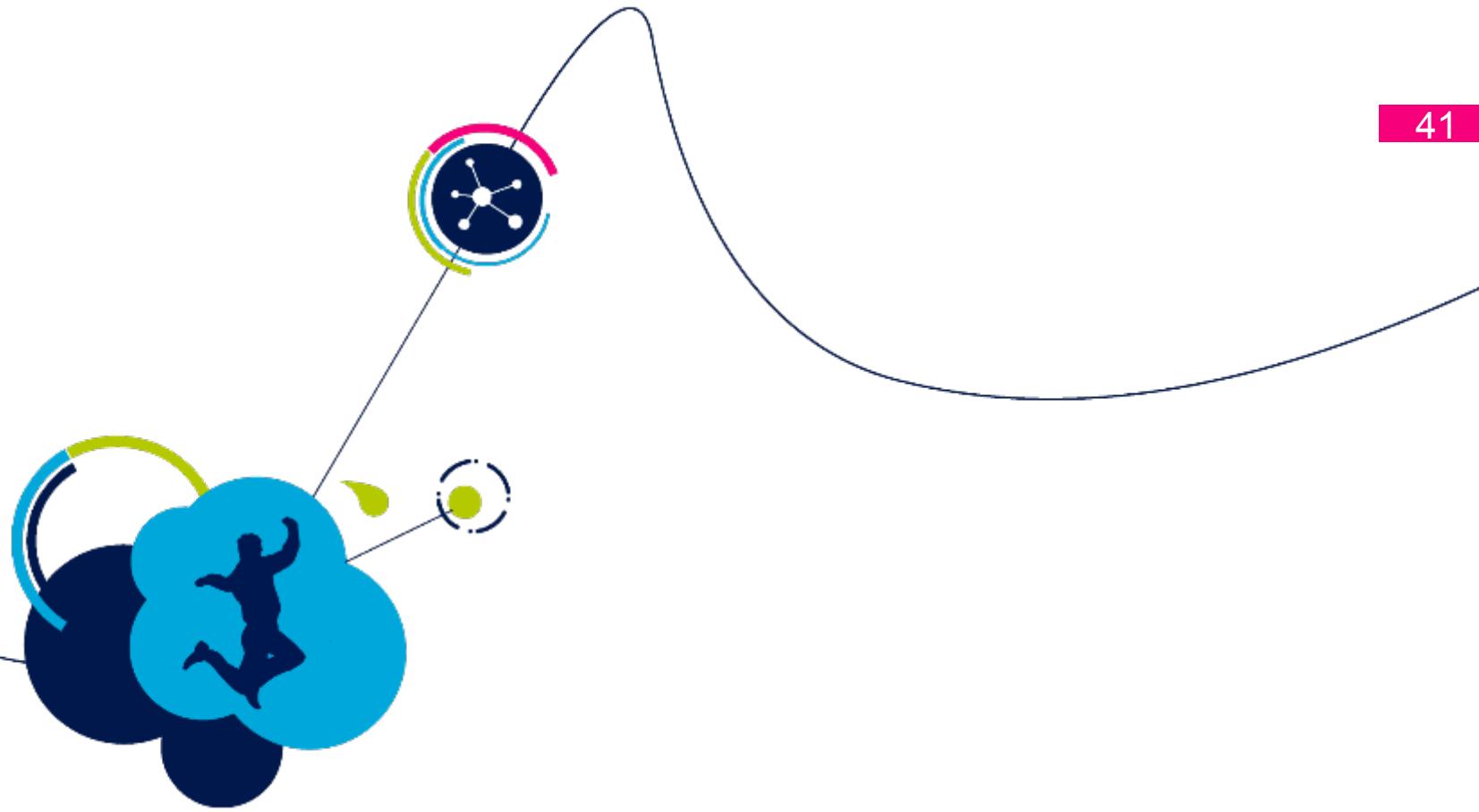
**Receive sensor data over BLE  
...post them to IBM Watson**



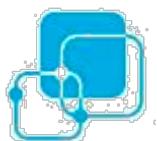
# SensorTile Sensor Network to Cloud with STM32ODE

Gateway for BLE-based sensor networks





# Start Developing our first application with SensorTile



[www.st.com/sensortile](http://www.st.com/sensortile)

# New Design Startup with SensorTile

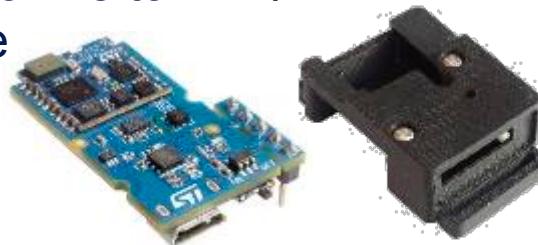
**Plug**  
the SensorTile  
Core System on  
the eXpansion  
Cradle.



**OR**

**Solder**  
the SensorTile to  
its Cradle

*protect it with its  
plastic cover!*



**Setup** your PC programming environment

**SWD**



**Field test** your application



**Program** your IoT application

```
File: SensorTile_01.c
F:\ST\ST-Link\ST-Link Utility\ST-Link Utility V2\ST-Link Utility V2.exe
1 main()
2 {
3     char command[100];
4     int i;
5
6     // Read command from user
7     for(i=0;i<100;i++)
8     {
9         if((Serial.available() > 0) && (Serial.read() == '\n'))
10        {
11            command[i] = Serial.read();
12        }
13        else
14        {
15            command[i] = ' ';
16        }
17    }
18
19    // Print command
20    Serial.println(command);
21
22    // Check command
23    if(strcmp(command,"ledon") == 0)
24    {
25        ledOn();
26    }
27    else if(strcmp(command,"ledoff") == 0)
28    {
29        ledOff();
30    }
31
32    // End of program
33}
```

# New Design Startup with SensorTile



[www.st.com/sensortile](http://www.st.com/sensortile)

Plug the Sensors  
Core System  
the eXpansion  
Cradle.

[www.st.com/sensortile](http://www.st.com/sensortile)

Presentations & Training Material

[Presentations](#)

Setup your



**SWD**

Description

Version

Size

BLUERMICROSYSTEM2 Quick start guide

2.1.2

3 MB



Field test your application



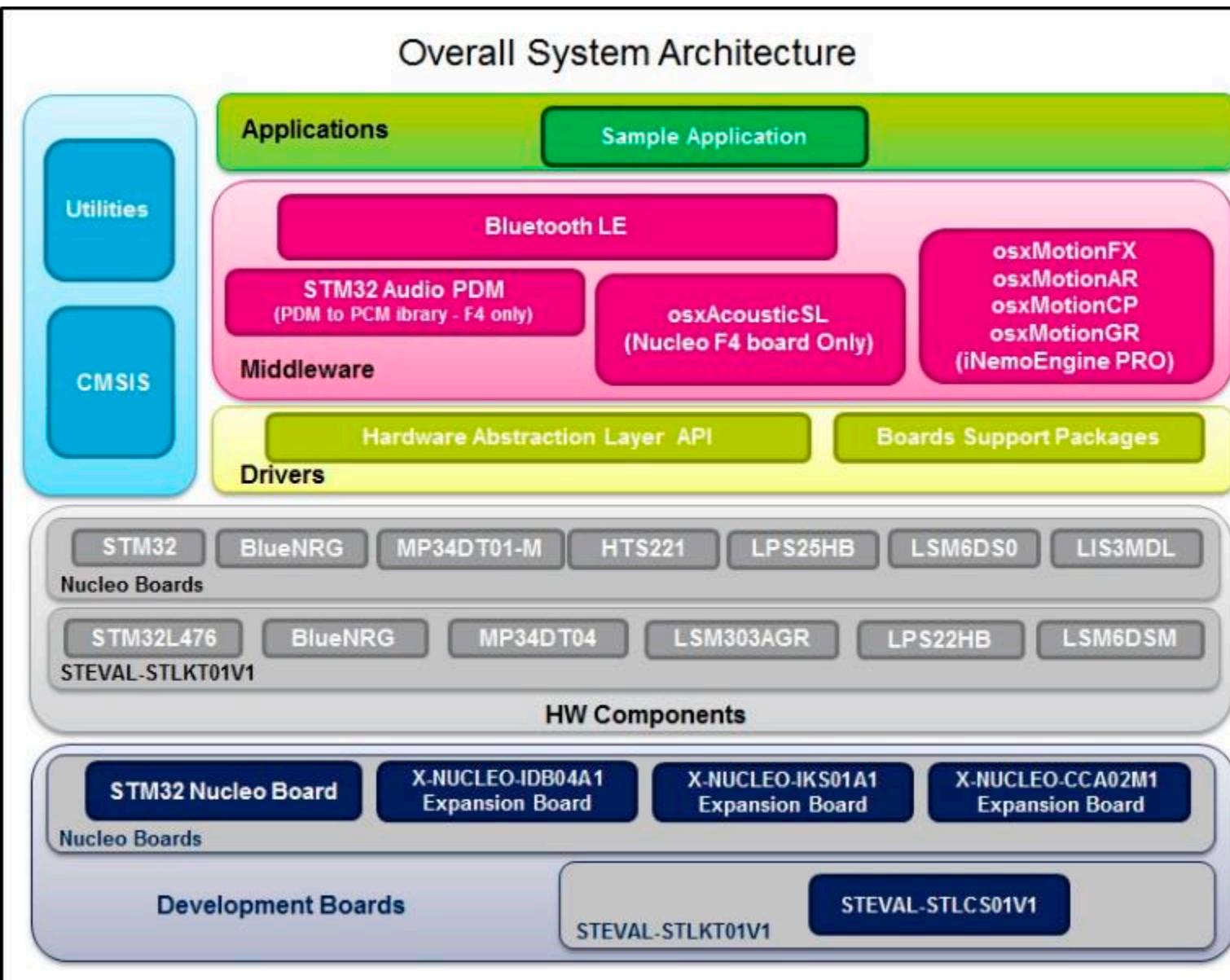
Solder the SensorTile to  
*protect it with its plastic cover!*





www.st.com/sensortile

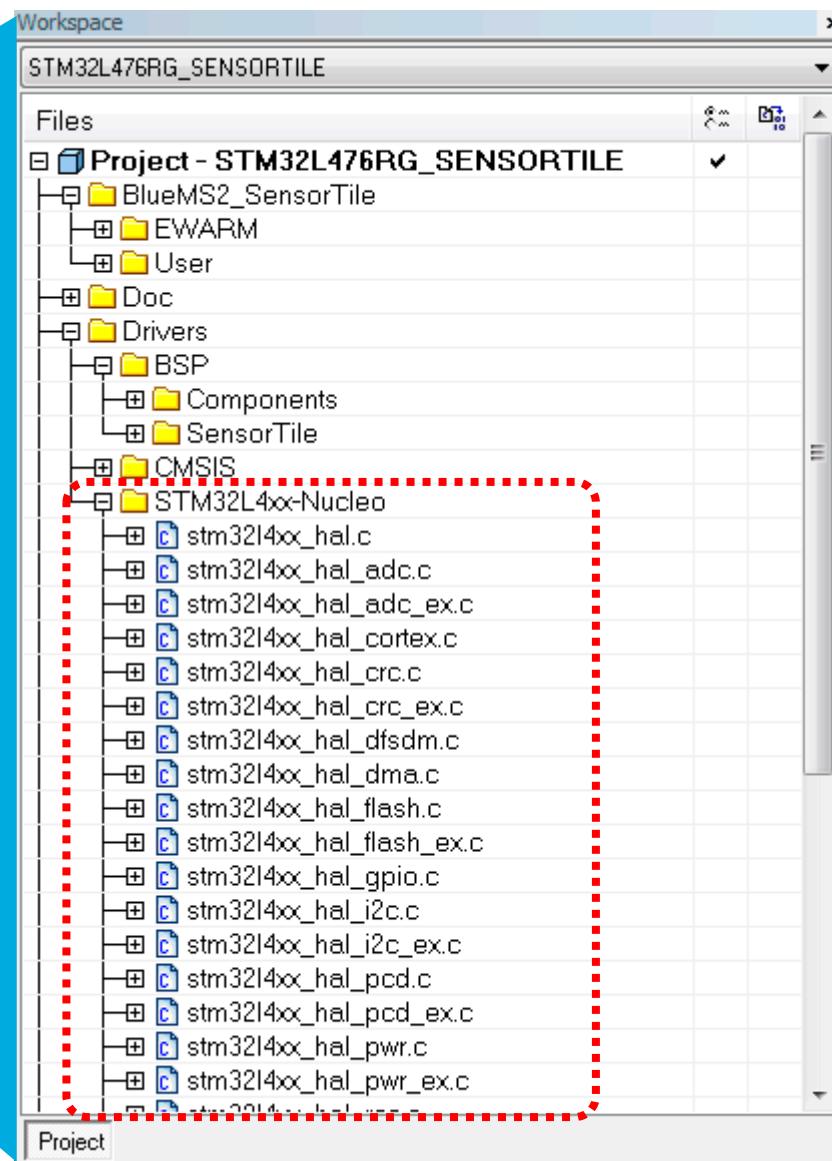
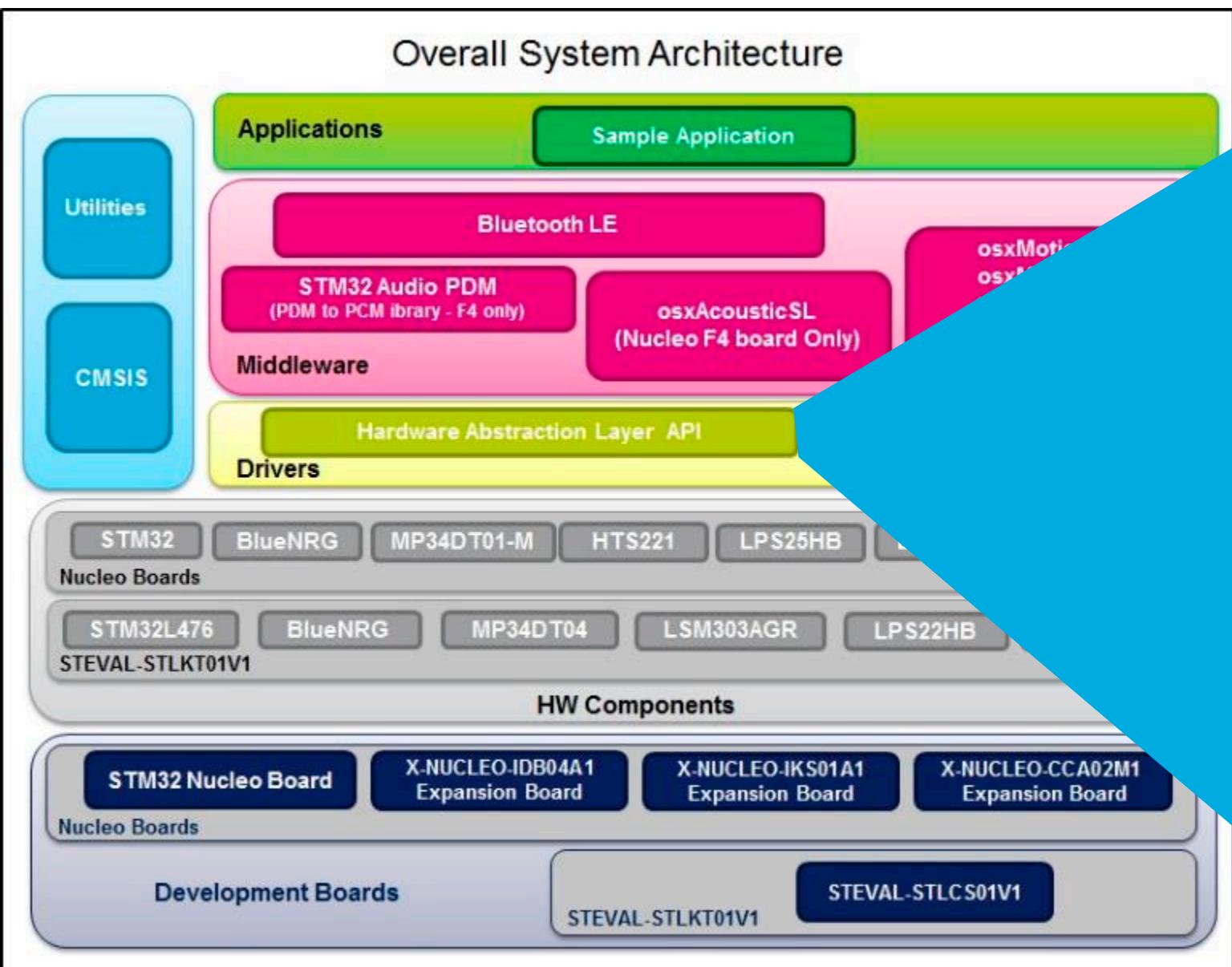
# FP-SNS-ALLMEMS1 Block Diagram

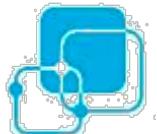




# FP-SNS-ALLMEMS1

## Block Diagram

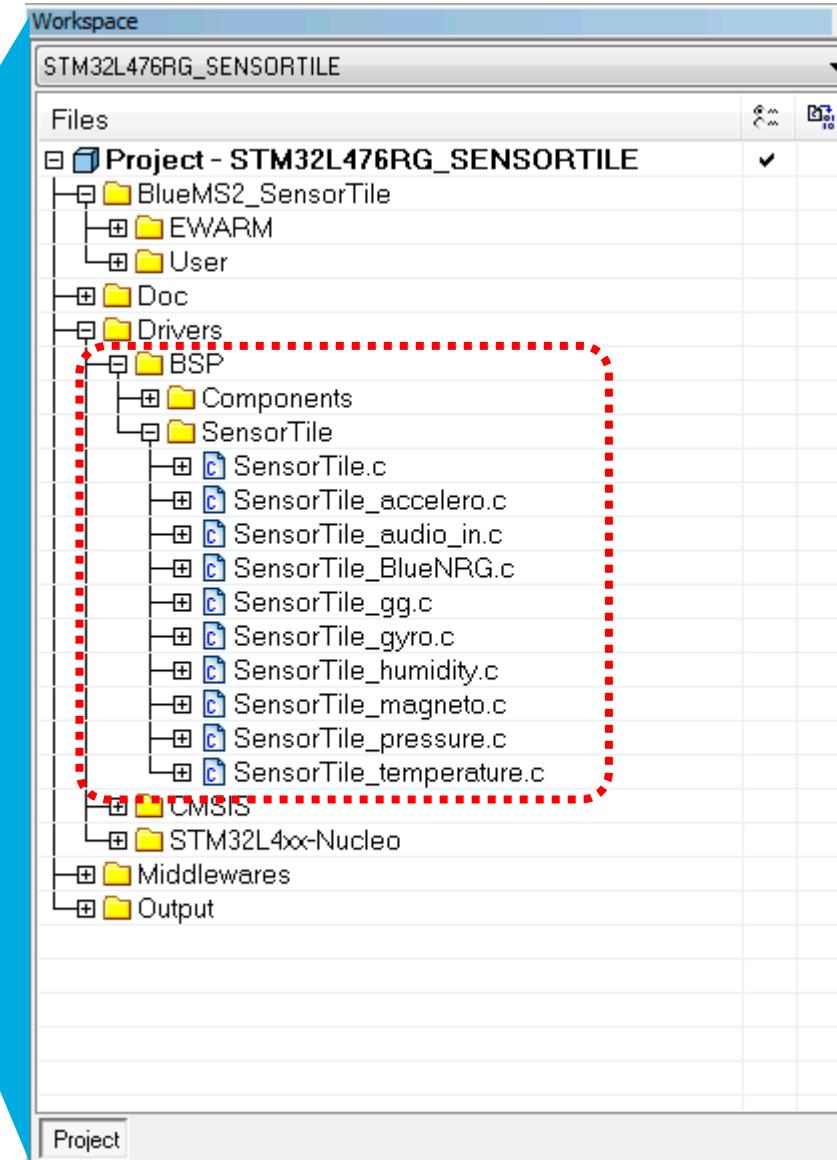
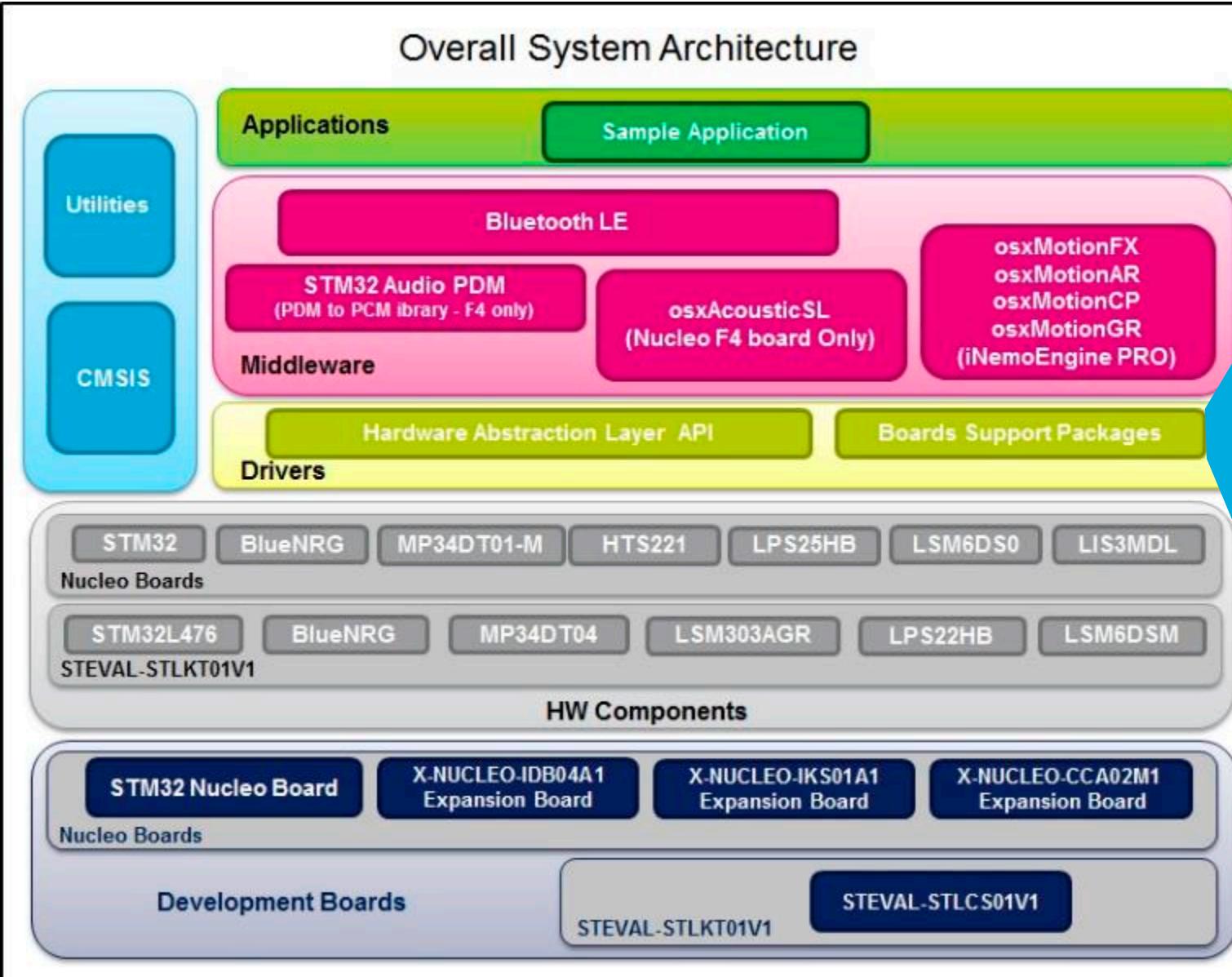




www.st.com/sensortile

# FP-SNS-ALLMEMS1 Block Diagram

## Overall System Architecture

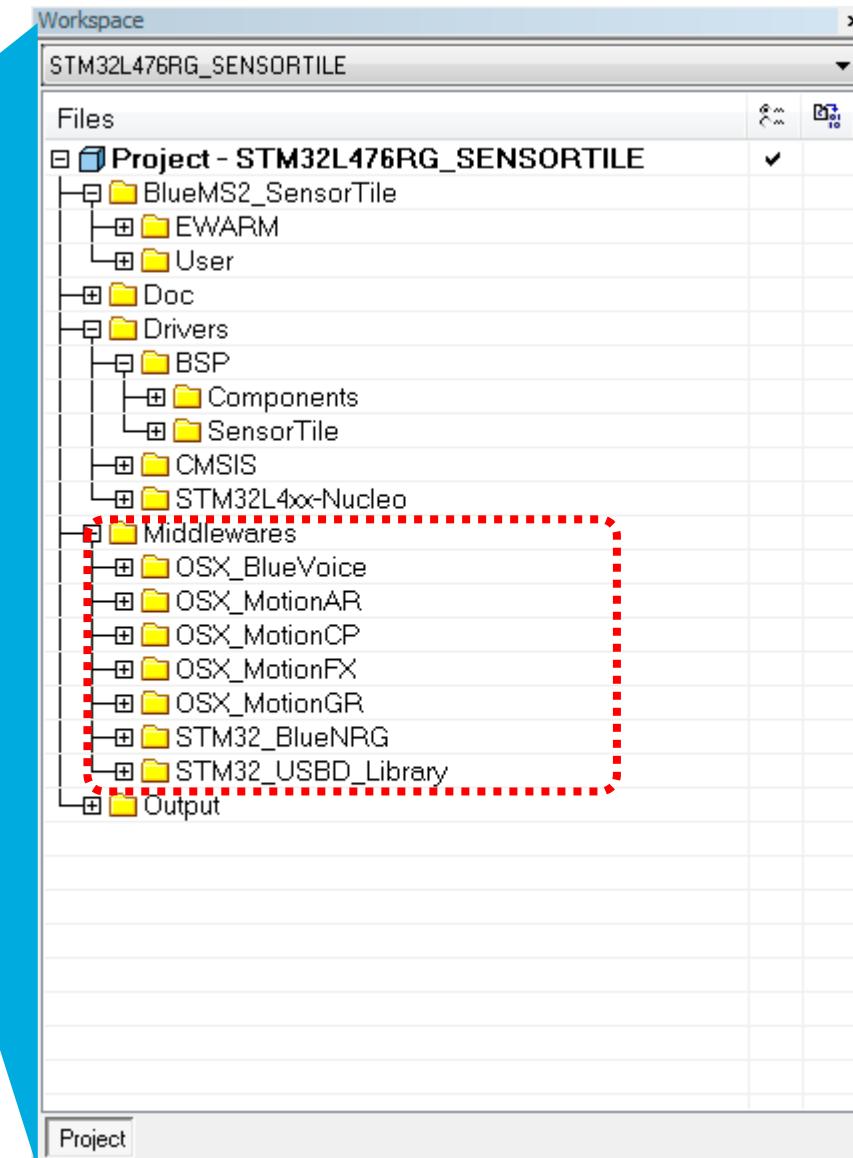
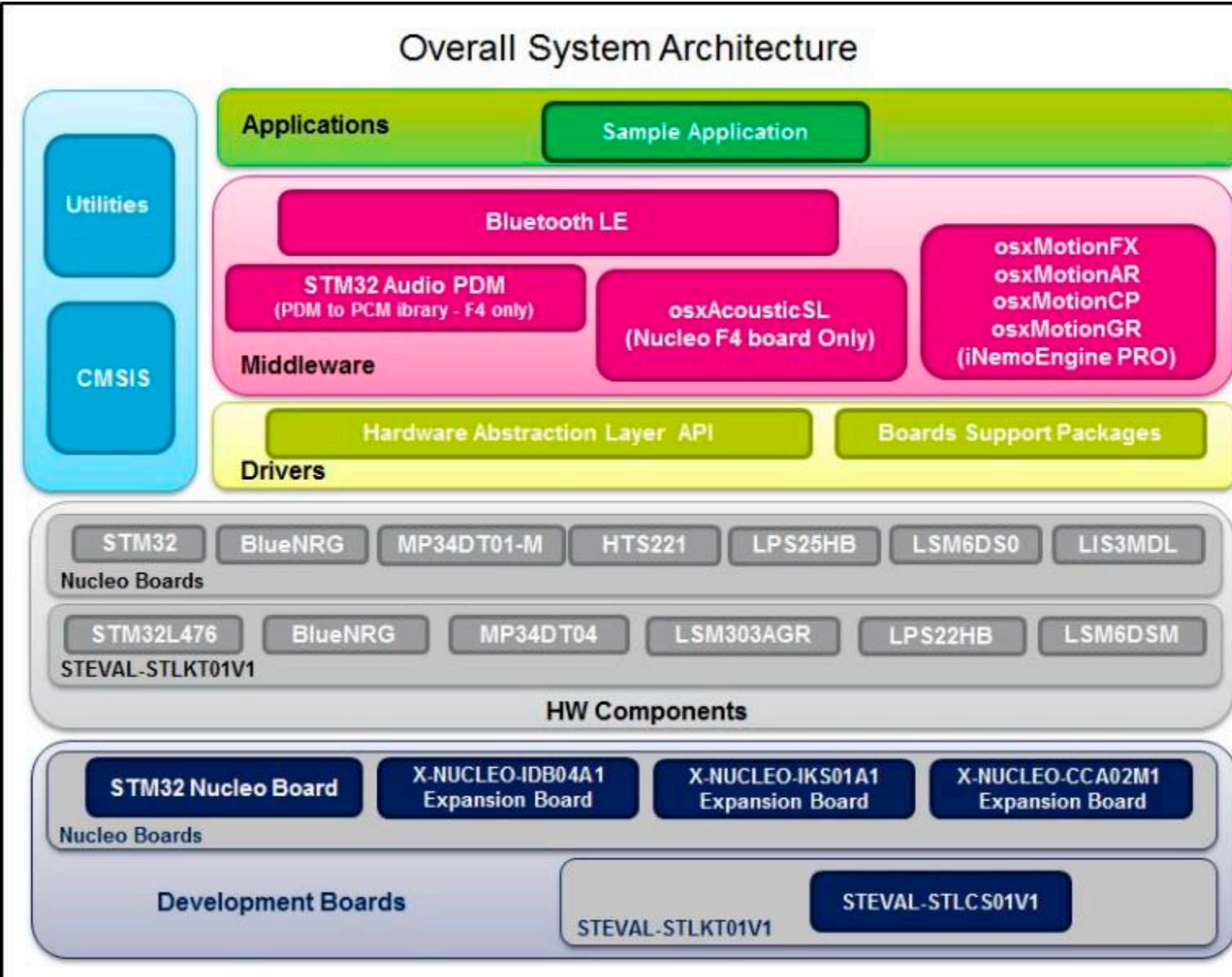




www.st.com/sensortile

# FP-SNS-ALLMEMS1 Block Diagram

## Overall System Architecture



# FP-SNS-ALLMEMS1

## FW Initialization Sequence

- RestartInBootLoaderMode
- SystemClock\_Config(); *//Configure the System clock*
- Sensor\_IO\_SPI\_CS\_Init\_All(); *// Configure and disable all the Chip Select pins*
- InitTargetPlatform(TARGET\_SENSORTILE)
  - USB (if enabled);
  - Init\_MEM1\_Sensors(); *//Sensors Init and Enable LSM6DSM, LSM303AGR (Mag), LPS22HB HTS221*
  - Init\_STC3115(); *//Initialize the Gas Gouge if the battery is present*
  - Init\_MEMS\_Mics() *//Initialize Mic*
- InitLicenseManager(); *//Init the osx Licenses Manager for sensor fusion*
- Init\_BlueNRG\_Stack(); *//Initialize the BlueNRG*

# FP-SNS-ALLMEMS1

## FW Initialization Sequence

- `Init_BlueNRG_Custom_Services();`
  - `Add_HWServW2ST_Service()` – Read, Notify
    - Add the HW Features service using a vendor specific profile (Sensors, Algorithms)
  - `Add_ConsoleW2ST_Service()` – Read, Notify, Write
    - Add the Console service using a vendor specific profile
  - `Add_ConfigW2ST_Service()` – Write, Notify
    - Add the Config service using a vendor specific profile (Calib Reset/ status, ACC Events)
    - ConfigCommandParsing
- `InitHWFeatures(); ACC...`
- `InitTimers();`
  - TIM4: Environmental → 500ms / 2 Hz
  - TIM1: Motion
  - TIM5: Mic → 10ms

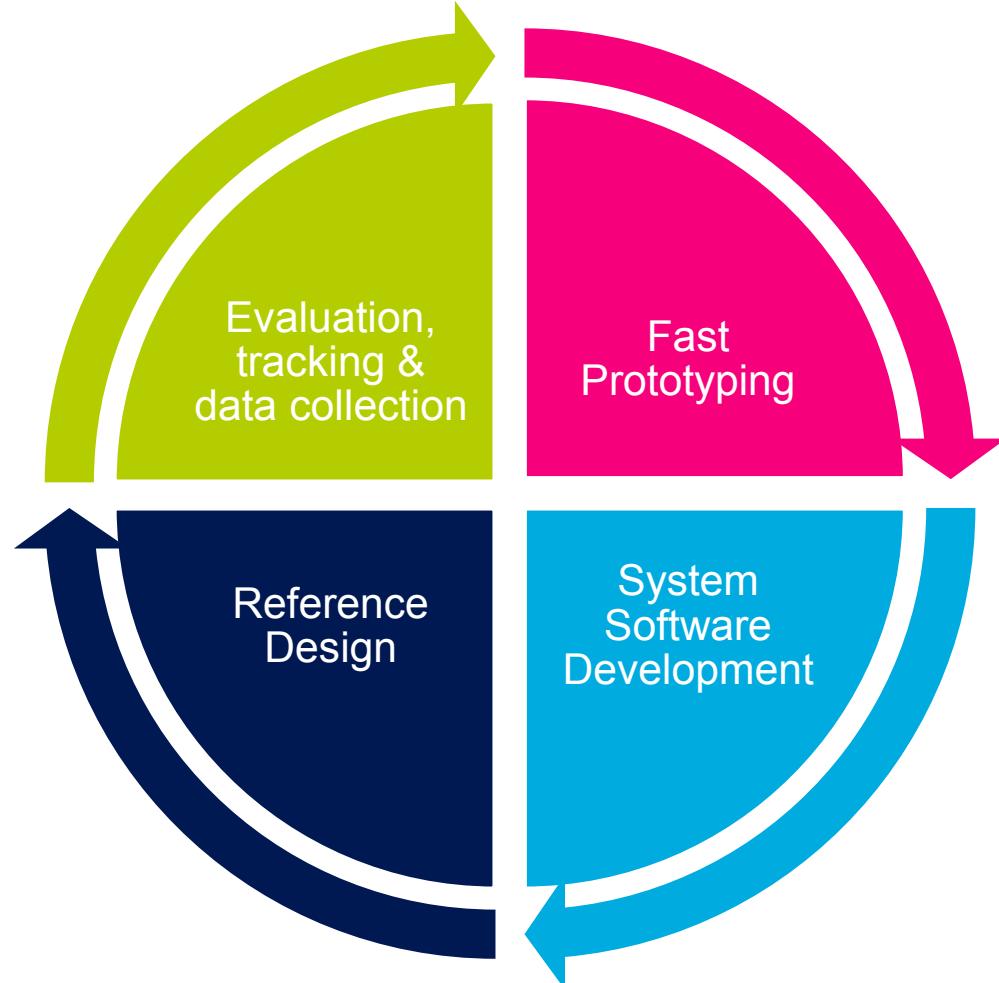


# FP-SNS-ALLMEMS1

## FW Main Loop

- Led Management();
- Handlers();
  - Handle Events through call backs
    - Ext IRQs (MEMS event, BLE event, Button Push event) or TIM Events
- setConnectable();
  - update the BLE advertize data and make the Board connectable
- Send *[SensorData]* or Update *[SensorData]*;
  - periodically send SensorData= environmental, audio, motion, quaternions, etc
- \_\_WFI();
  - Wait For Interrupt events: TIM, Systick, BLE IRQ, Accelerometer IRQ

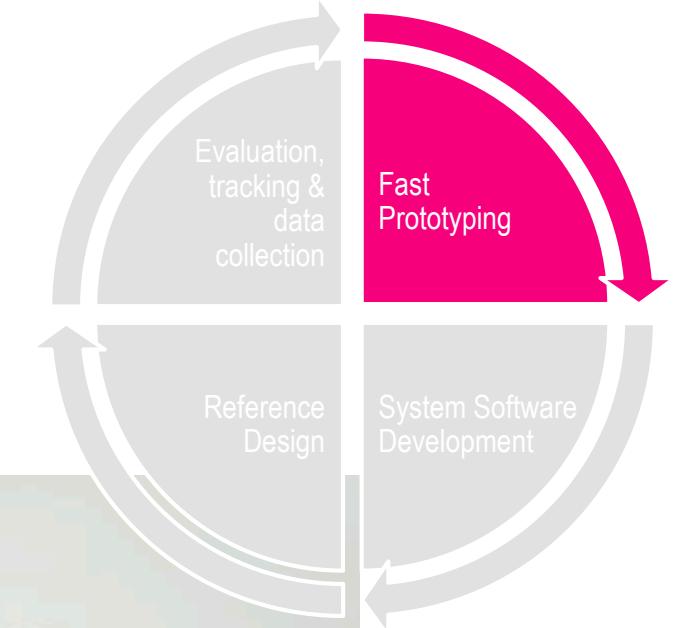
# One SDK fits all IoT Design Needs



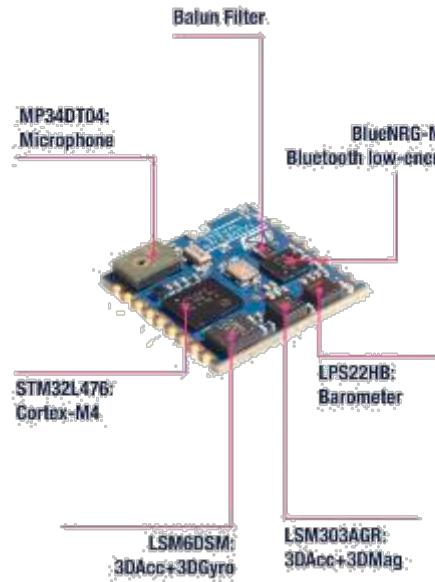
# Fast Prototyping

52

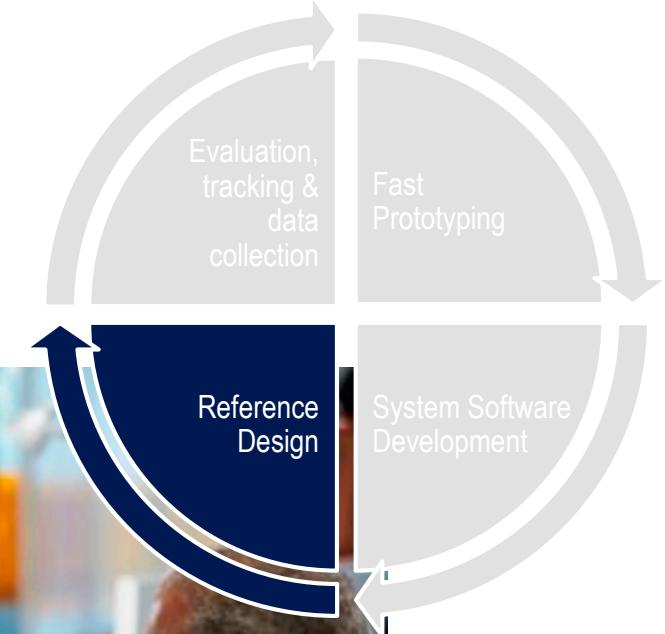
- **Plug** the SensorTile on your **prototype** motherboard to instantly add its embedded sensing and communication functionalities to your design
- Use the provided **3D CAD** files to integrate it in your mechanical prototype



- A solution for highly accurate and very low power sensing of motion, environmental, and audio data in form-factor constrained designs
- A complete **Hardware and Software example**, the starting point for your design
- **Freely download** all design information:
  - HW: Schematics, Gerber, BoM, 3D CAD
  - FW: from basic examples to the complete BlueMicroSystems application

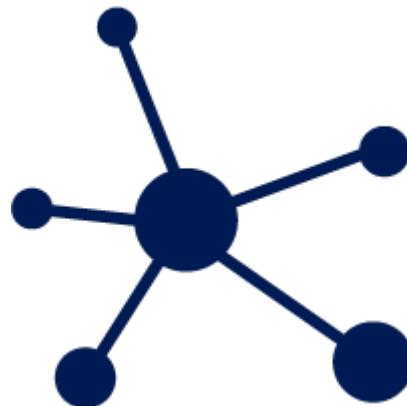


# Reference Design



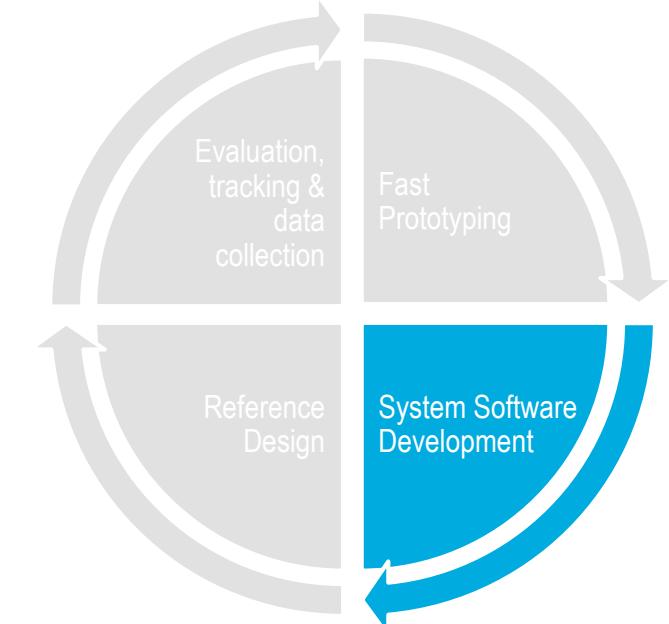
# Evaluation, Monitoring, Data Collection

- **Evaluate** the most advanced ST sensors in an all-ST optimized **system architecture**
- **Field-test** Data-Fusion and Embedded Signal Processing **Algorithms**
- Use it for **Data collection** campaigns, to develop new customized algorithms



# Software Developer's Platform

- Firmware examples based on **STM32Cube**
- Supported by the **STM32 Open Development Environment**
- Host board supports **Arduino expansion connector** to bridge into most makers ecosystems from Arduino itself to the STM32ODE, and other developer communities.



**STM32 Open  
Development  
Environment**

open.AUDIO  
open.MEMS  
open.RF



# Getting started with the SensorTile

## [www.st.com/sensortile](http://www.st.com/sensortile)

### • Design Resources

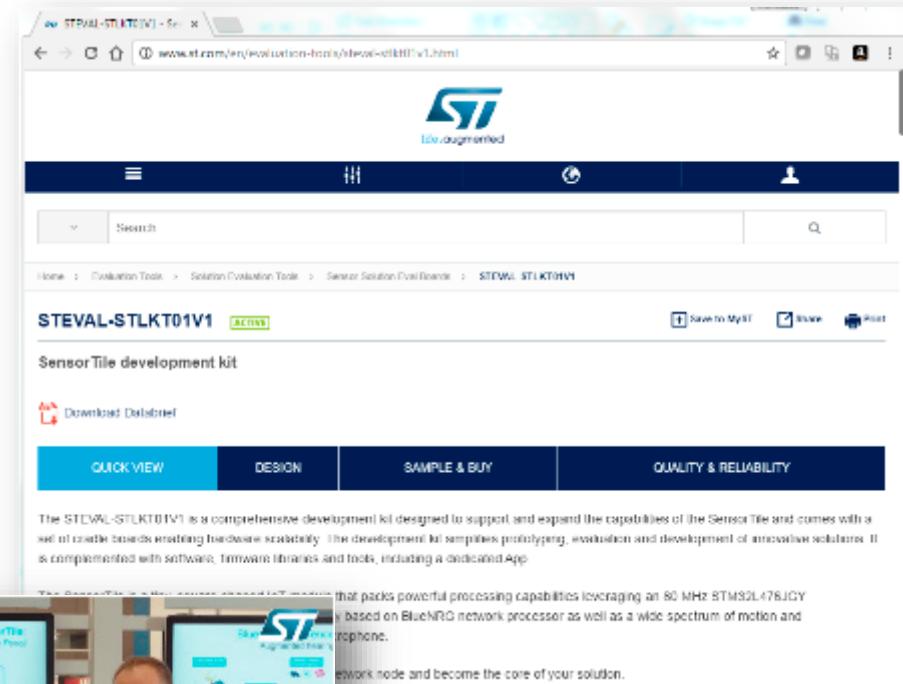
- Schematics, BOM, gerber files
- STM32ODE Firmware packages
- Bluetooth Smart Apps and SDK for iOS and Android

### • Learning

- Quick Start Guide and User Manuals
- 3 minutes video introduction
- 7 minutes unboxing sensortile video

### • Sample and Buy

- Distributors availability



The screenshot shows the product page for the STEVAL-STLKT01V1 SensorTile development kit. It features a large image of the board, a brief description, and tabs for 'QUICK VIEW', 'DESIGN', 'SAMPLE & BUY', and 'QUALITY & RELIABILITY'. Below the main image is a video thumbnail showing a man unboxing the kit.



**Video from the lab**  
Unboxing the SensorTile Development kit

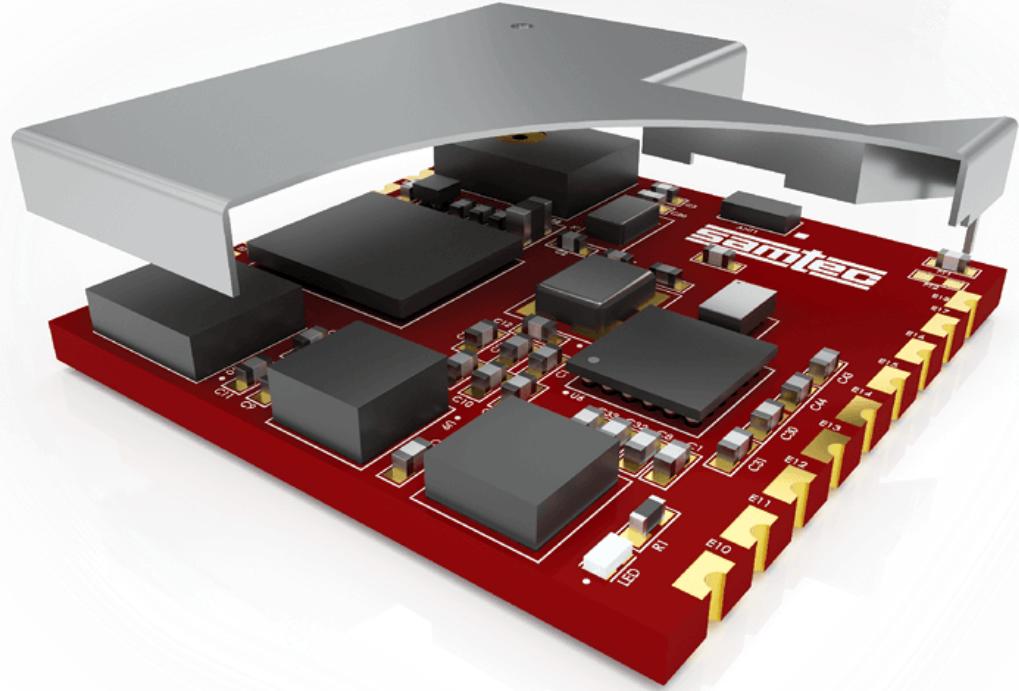




# nMODE™ WIRELESS SENSOR MODULE

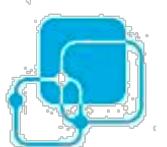
[www.st.com/sensortile](http://www.st.com/sensortile)

- Enables remote sensing and measurement of inertial, environmental, and acoustical parameters
- Leverages standard ICs and compatibility with STMicroelectronics' STM32 ecosystem
- Integrate industry standard, fully tested and certified wireless, microcontroller and sensor component
- Affords easy, functional customization during design and development
- Significantly reduces time to market for production
- Production version of STMicroelectronics' SensorTile



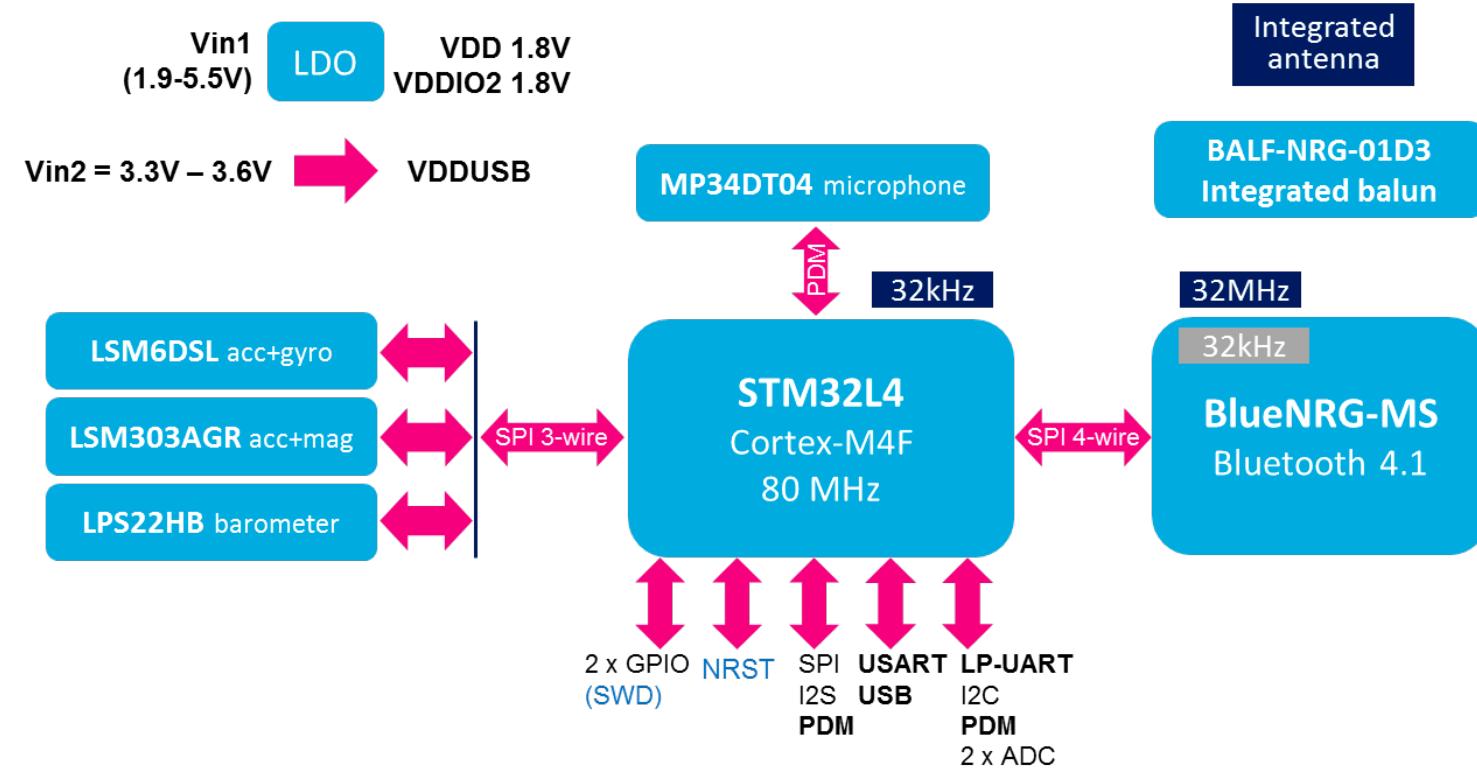
Samtec P/N OSM-1-1313

**Samtec**



# nMODE™ WIRELESS SENSOR MODULE features

- Compact size: 13.5 mm x 13.5 mm
- Highly integrated sensor platform
- Bluetooth® low energy technology
- Full link controller and host security
- Onboard BLE antenna included
- Single +3.6 V power supply input
- Regulated 1.8 V output for external sensors
- Multiple industry-standard serial interfaces
- Voice recognition using an integrated microphone



See [www.samtec.com/modules](http://www.samtec.com/modules) for more information

**samtec**

# SensorTile Events

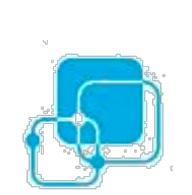
See you And Learn more at

ST Technology Tour  
(Seattle, Chicago, Boston, Toronto)

ST Developer Conference  
(Santa Clara, CA)

**For more info:**

Look for upcoming events at [www.st.com](http://www.st.com)



SensorTile  
IoT design lab  
on the tip of a pencil

