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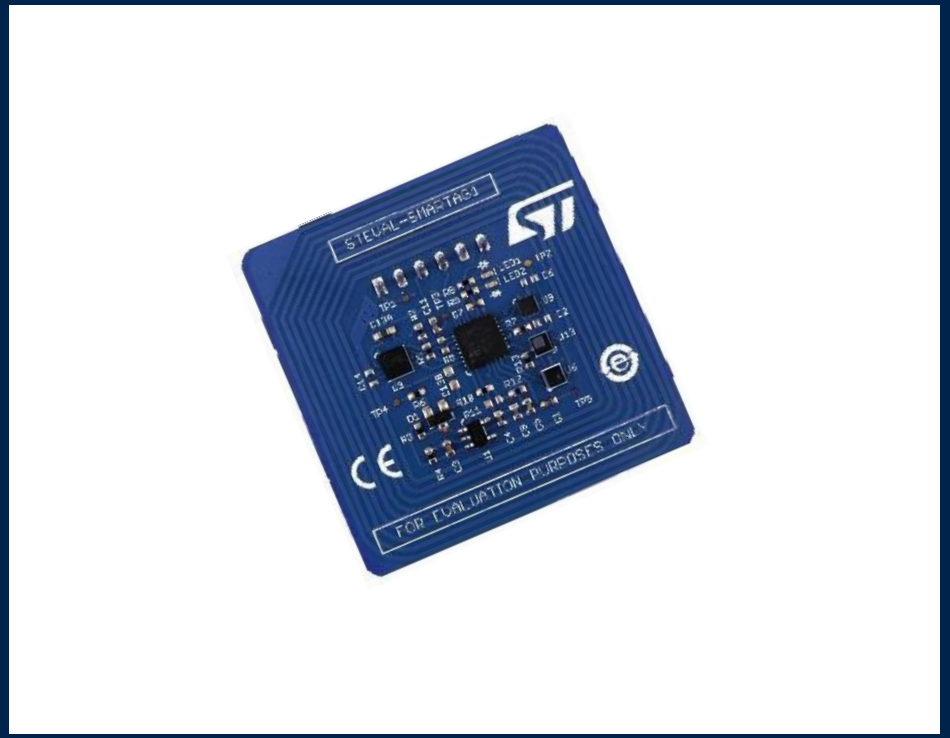

Quick Start Guide

STM32Cube function pack for IoT node with dynamic NFC tag, environmental and motion sensors (FP-SNS-SMARTAG1)

Version 1.5 (July 12, 2021)

Agenda

1. Hardware and Software overview
2. Setup & Demo Examples
3. Documents & Related Resources
4. STM32 Open Development Environment: Overview

1- Hardware and Software overview

NFC Dynamic Tag sensor node evaluation board (STEVAL-SMARTAG1)

Hardware Overview

STEVAL-SMARTAG1 Hardware Description

- STEVAL-SMARTAG1 is a flexible NFC Tracker evaluation board with sensors includes a comprehensive software library and a sample application to monitor and log sensor data over NFC from an Android or iOS device. Ultra-low power sensor node evaluation board mounts an ST25DV NFC Tag, an STM32L0 ARM Cortex M0+, environment sensors (temperature, humidity and pressure) and motion (accelerometer) sensor.
- The evaluation board features NFC harvesting to supply power and a battery cradle for a CR2032 battery.

Key Product on board

- ST25DV64K dynamic NFC tag solution based on 64K-bit (8K-Byte) EEPROM and with I²C interface, Fast Transfer Mode and Energy Harvesting features
- STM32L031K6 ultra-low-power ARM Cortex-M0+ MCU running at 32 MHz with 32-Kbytes Flash and 8-Kbytes RAM
- LIS2DW12 ultra-low-power high-performance three-axis linear accelerometer
- LPS22HB ultra-compact piezo-resistive absolute pressure sensor which functions as a digital output barometer: 260-1260 hPa
- HTS221 capacitive digital sensor for relative humidity and temperature
- STLQ015 low drop linear regulator power management
- CR2032 Battery powered (not included)

Latest info available at www.st.com
STEVAL-SMARTAG1

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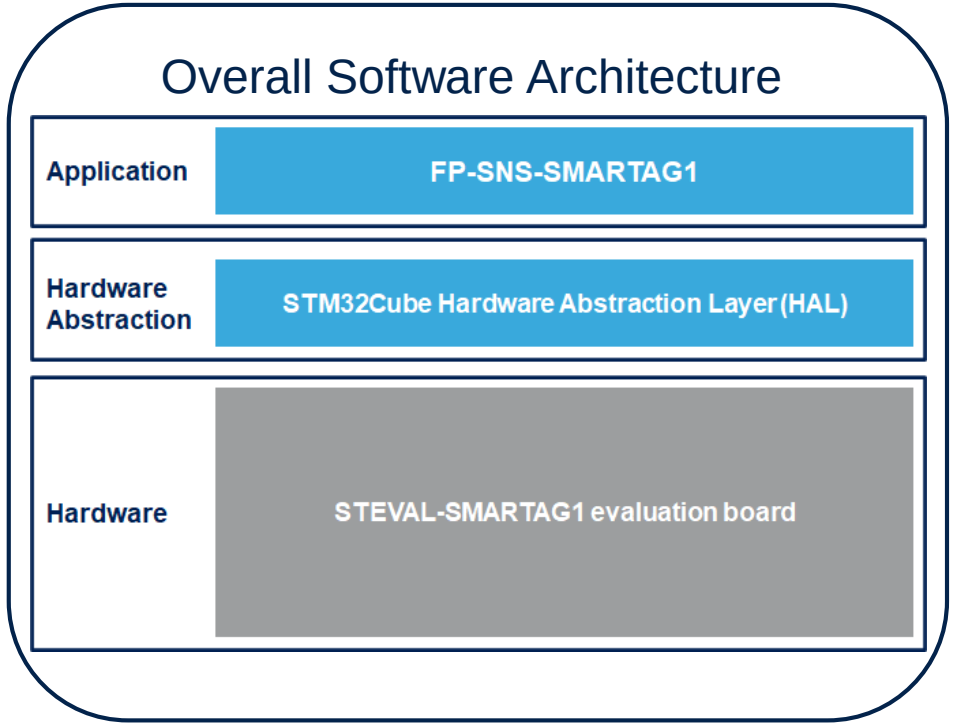
FP-SNS-SMARTAG1
Software Overview

Software Description

- FP-SNS-SMARTAG1 is an STM32Cube function pack which allows you to read the motion and environmental sensor data on your IoT node via an NFC enabled reader such as a mobile phone or a tablet. The package supports energy harvesting (enabled by NFC) and battery-operated use cases.
- This software, together with the suggested combination of STM32 and ST devices can be used, for example, to develop tracking, cold chain, medical, smart sensing, and smart home, city and building applications.
- The software runs on an ultra-low power STM32L0 microcontroller and includes Product summary drivers for the Dynamic NFC tag and for the motion and environmental sensors.
- You can register the NFC Sensor Tag node on the DSH-ASSETRACKING web application for asset tracking that stores and monitors on-board sensor data as well as the geolocalization of the smartphone used to read the IoT node data.

Key features

- Complete firmware to access data from an IoT node with dynamic NFC tag, environmental and motion sensors
- Ultra-low power operations, with support of both energy harvesting and battery-operated use cases
- Compatible, in single-shot mode only, with the ST NFC Sensor application for Android/iOS, to read and display sensor data
- Compatible with the ST Asset Tracking application for Android/iOS for reading data logs from the NFC tag and for sending them to the DSH-ASSETRACKING cloud-based dashboard
- Sample implementation available for the STEVAL-SMARTAG1 evaluation board
- Easy portability across different MCU families thanks to STM32Cube
- Free user-friendly license term



Latest info available at www.st.com
FP-IND-SMARTAG1

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2- Setup and demo examples

Setup & Demo Examples
Software and Other prerequisites

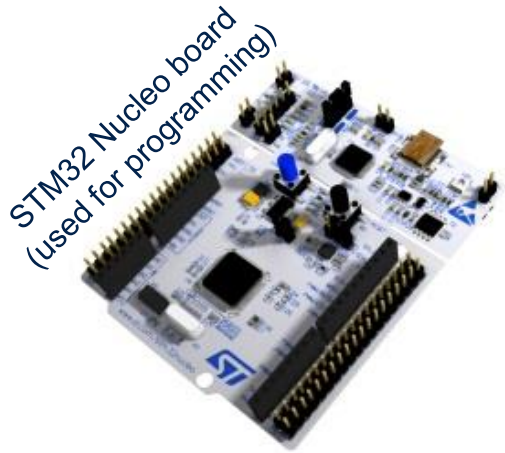
- **STSW-LINK009**
  - ST-LINK/V2-1 USB driver
- **STSW-LINK007**
  - ST-LINK/V2-1 firmware upgrade
- **FP-SNS-SMARTAG1**
  - Copy the .zip file content into a folder on your PC. The package will contain source code example (Keil, IAR, STM32CubeIDE) based only on **STEVAL-SMARTAG1**
- **ST Asset Tracking** and **ST NFC Sensor** (for single-shot mode only) applications for **Android/iOS** available from Google Store / iTunes

2.1- Setup Overview: STEVAL-SMARTAG1 evaluation boards

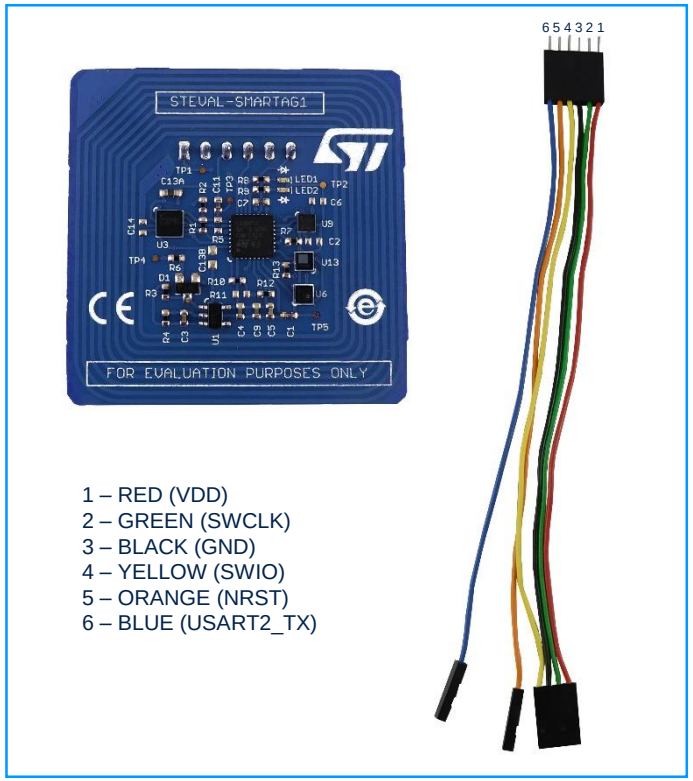
Setup Overview

HW prerequisites and setup with ST NFC SensorTag (1/2)

- 1x ST NFC SensorTag kit (**STEVAL-SMARTAG1**)
  - It includes SWD connector with a 6pin flat
- 1x Android™ or iOS™ device with **ST Asset Tracking** and **ST NFC Sensor** apps installed
- 1x PC with Windows 7 and above
- 1x STM32-Nucleo or ST-Link programmer
- 1x USB type A to Mini-B USB cable for the ST-Link



Mini USB

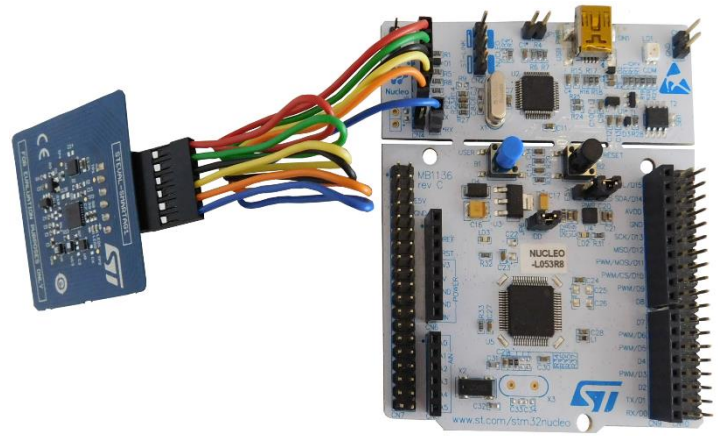


ST NFC Dynamic Tag sensor node evaluation board

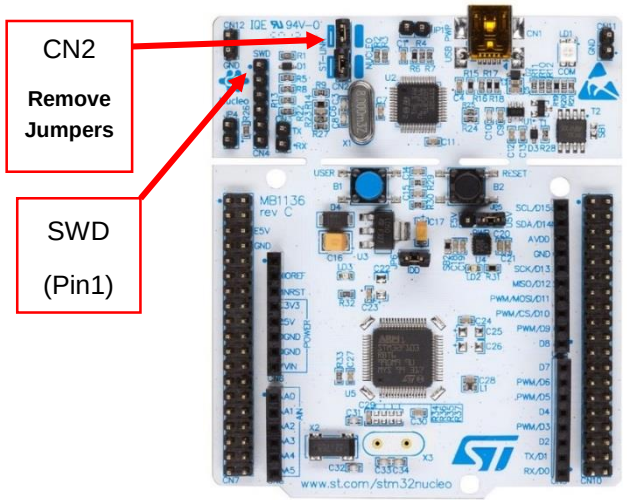
Setup Overview

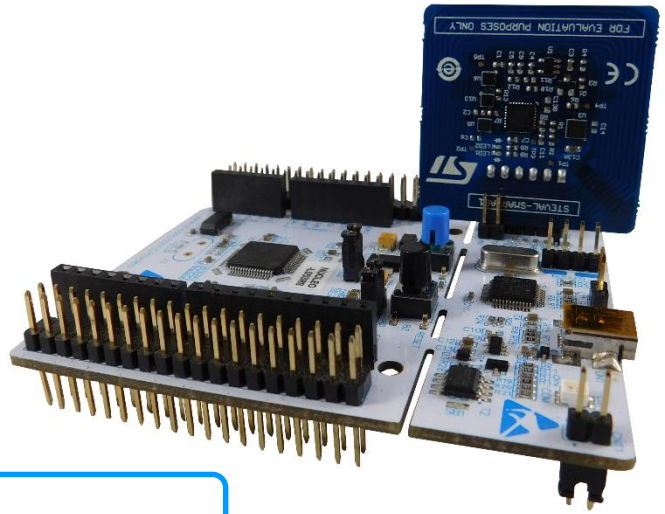
HW prerequisites and setup with ST NFC SensorTag (2/2)

- In order to program the board you need to connect an external ST-Link to the SWD connector on the cradles with a 6pin flat cable or directly.
- The easiest way is to get an STM32-Nucleo board which includes an ST-Link V2.1 programmer
- Be sure that CN2 Jumpers are OFF and connect your STM32 Nucleo board to the ST NFC SensorTag through the provided cable paying attention to the polarity of the connectors. Pin 1 can be identified by a little circle on the PCB silkscreen (STM32 Nucleo and ST NFC SensorTag board).



SWD connections with 6-pin flat cable





NOTE
The battery must be present in order to use the ST-Link features (programming, debugging and serial communication)

Setup Overview
Start coding in just a few minutes

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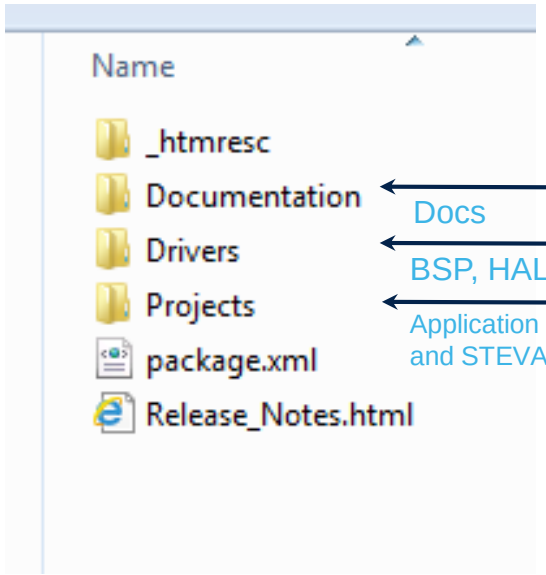
1 www.st.com/stm32ode

2 Select Function Pack: FP-SNS-SMARTAG1

3 Download & unpack

FP-SNS-SMARTAG1 package structure



4

. \Projects\STM32L031K6-SmarTag1\Examples\SmarTag1

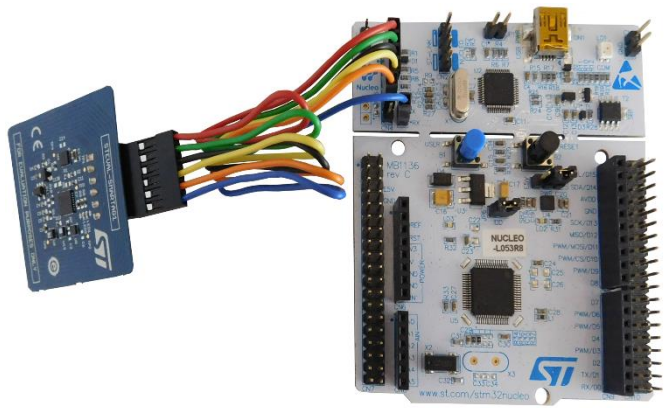
Android™/iOS™ smartphone with ST Asset Tracking and ST NFC Sensor applications

6

Use the pre-compiled binaries for registering your device, or alternative re-compile the code adding your device certificate

STM32 CubeIDE · KEIL™ Tools by ARM · IAR SYSTEMS

5



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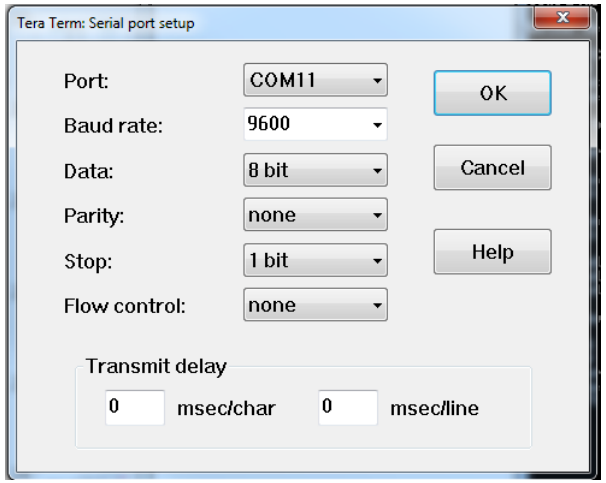
Setup Overview

Using serial line monitor – e.g.Tera Term

FP-SNS-SMARTAG1 for STEVAL-SMARTAG1

- After the **RESET** you could see the initialization phase
- After autostart the sensor data are logged
- These messages are written when getting (before) and removing (after) the smartphone from the NFC tag. In particular, the new config is written if a new one it is set. After the sensor data are logged (Sync and Async events).

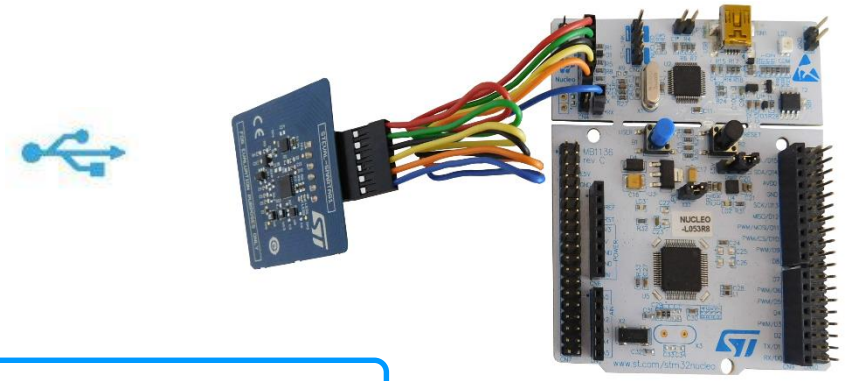
Serial line monitor for STEVAL-SMARTAG1 board



Configure the serial line monitor (speed, LF)

NOTE

For having the UART functionality on to STEVAL-SMARTAG1 board, it is necessary:
- To recompile the code uncommenting the line
//#define SMARTAG_ENABLE_PRINTF
on file: Projects\STM32L031K6-SmarTag1\Examples\SmarTag1\Inc\SMARTAG1_config.h
- To connect the BLUE (USART2_TX) cable to the RX pin on the STM32 Nucleo board



NOTE

UART is not available on STEVAL-SMARTAG1 using binary generated by System Workbench for STM32 (due to flash size constraints)

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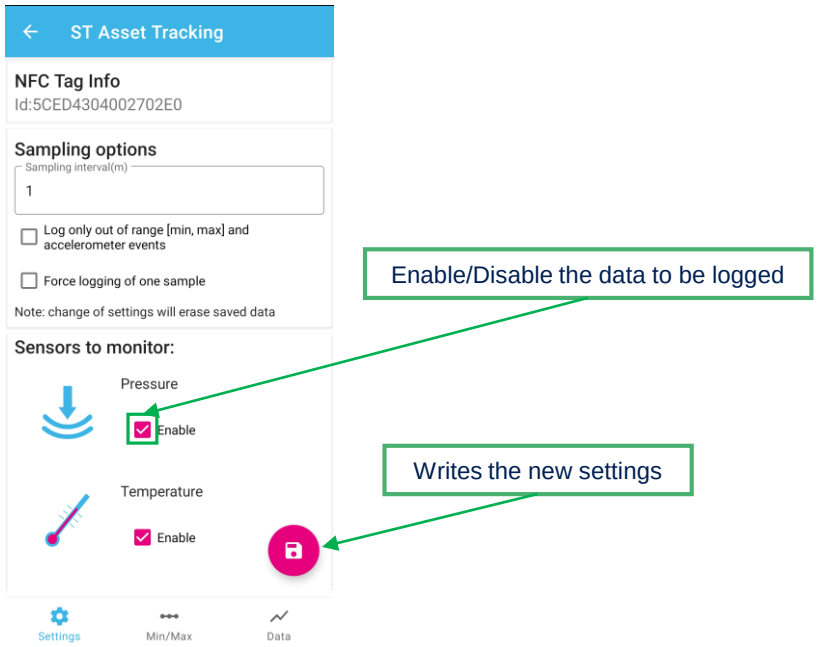
2.3- Demo Examples: ST Asset Tracking Application Overview

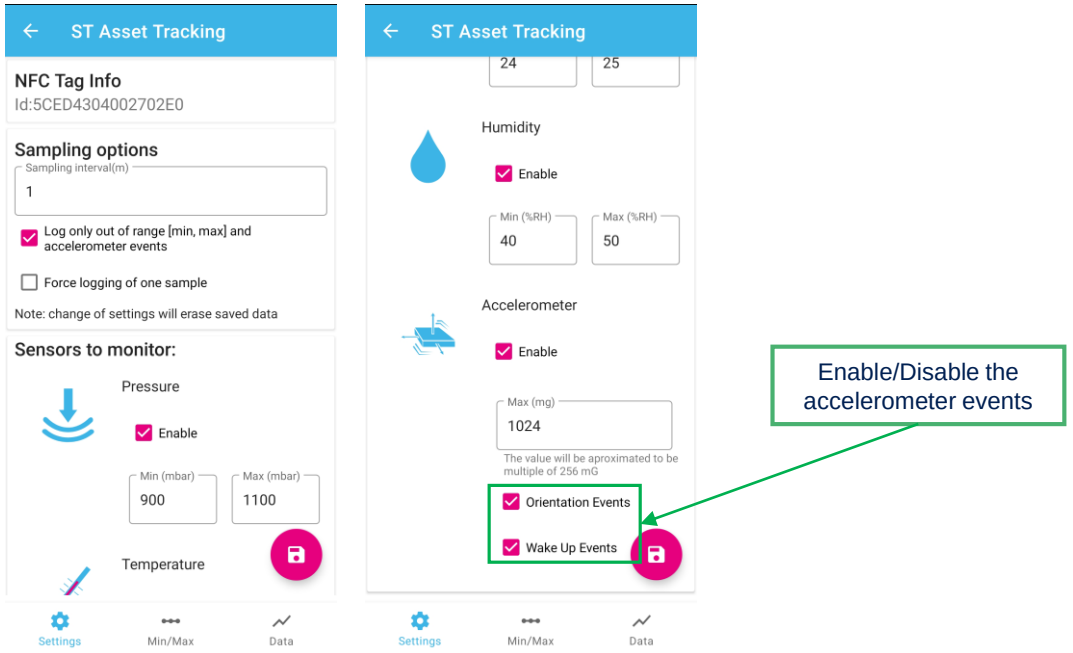
Demo Examples

ST Asset Tracking Application for Android/iOS (1/2)

Android version



Settings



Settings: log only out of range and accelerometer events

- **Settings**: it is open when getting the smartphone near the NFC tag
  - the data to be logged can be selected (Pressure, Temperature, Humidity and Vibration) together with the time interval.
  - In addition to the default mode, there are two different logging mode that can be chosen:
    - **Log only out of range [min, max] and accelerometer events:**
      - the selected data will be logged only if a minimum or maximum threshold value will be matched (sync events).
      - logging only if a wake up or change of orientation events occurs if enabled (async events)
    - **Force logging of one sample:**
      - the current value of the selected data will be logged, after that the data logging re-starts with the previous

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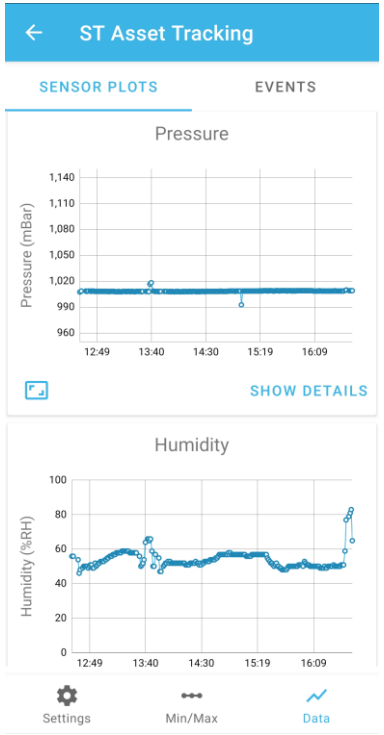
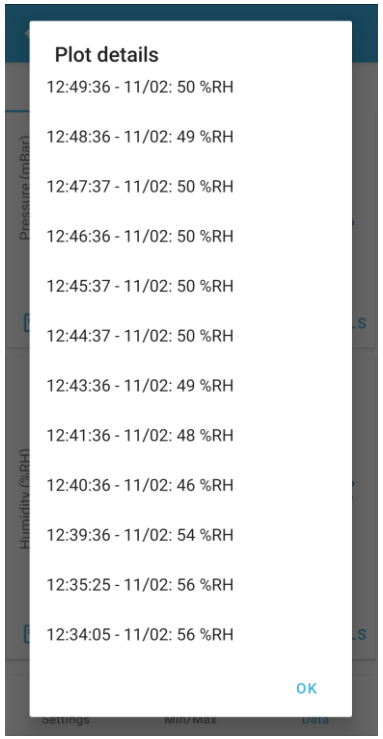
Demo Examples

ST Asset Tracking Application for Android/iOS (2/2)

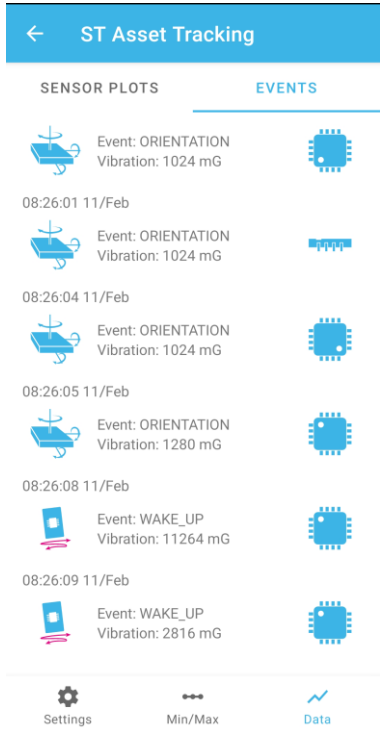
Android version



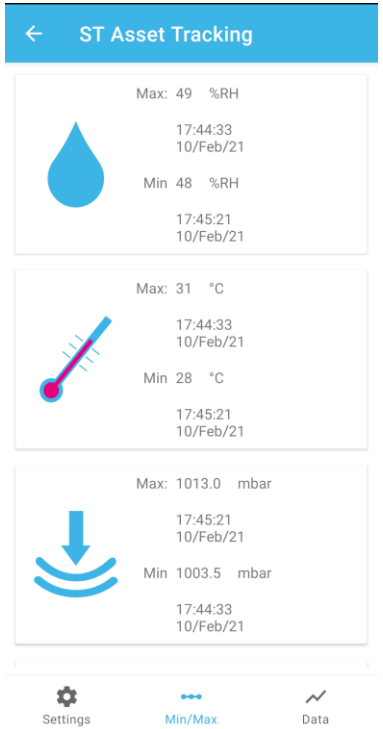
Data: Sensor plot



Data: Sensor plot details



Data: Events



Min/Max

- **Data:**
  - **Sensor Plot:**
    - the plots of the selected data for the logging are shown.
    - for any plot, when selecting “SHOW DETAILS” the values of the logged data are shown
  - **Events:**
    - if the "Log only out of range" option has been selected, the accelerometer events are shown, in case they have occurred.
- **Min/Max:**
  - shows the maximum and minimum value obtained during the data logging of the selected data.

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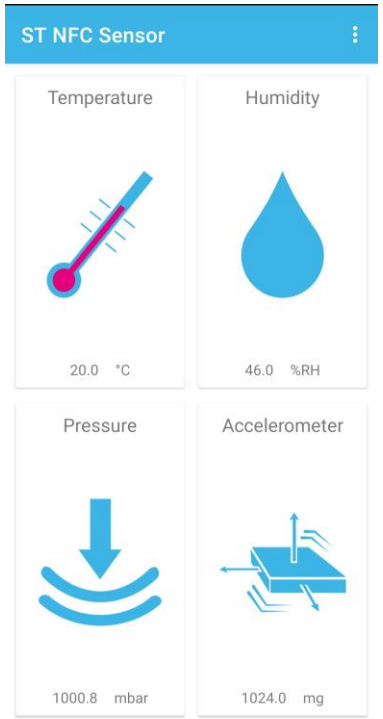
2.3- Demo Examples: ST NFC Sensor Application Overview

Demo Examples

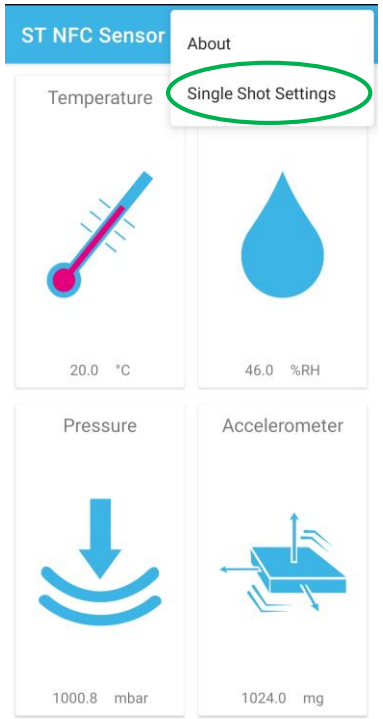
ST NFC Sensor Application for Android/iOS

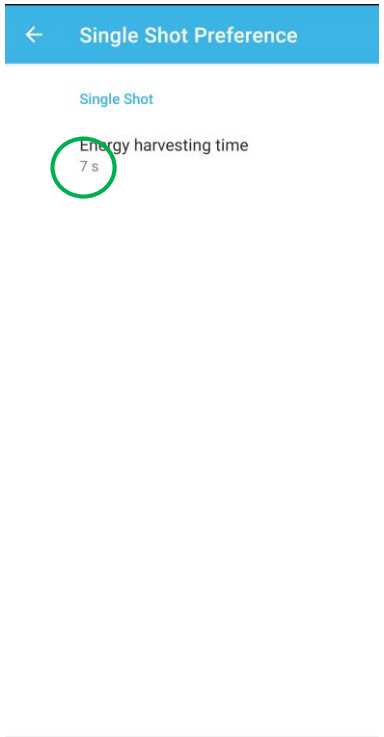
Android version

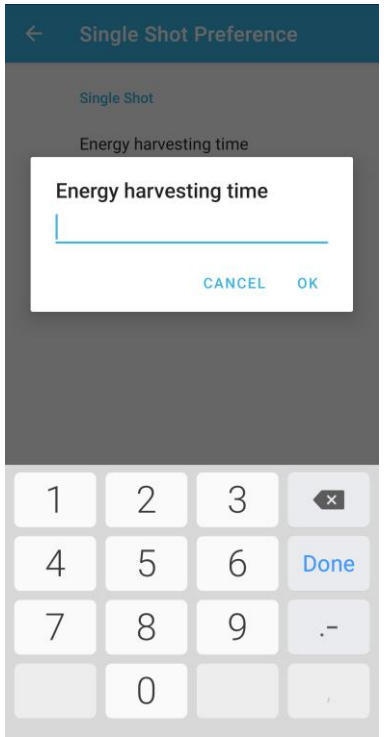
Reading Single Shot Data



Single Shot Data







Single Shot Settings

- **Single Shot (only in case the battery is not inserted):**
  - the current values of the data are read in energy harvesting mode from the tag and then displayed
  - with the single shot setting the energy harvesting time can be changed

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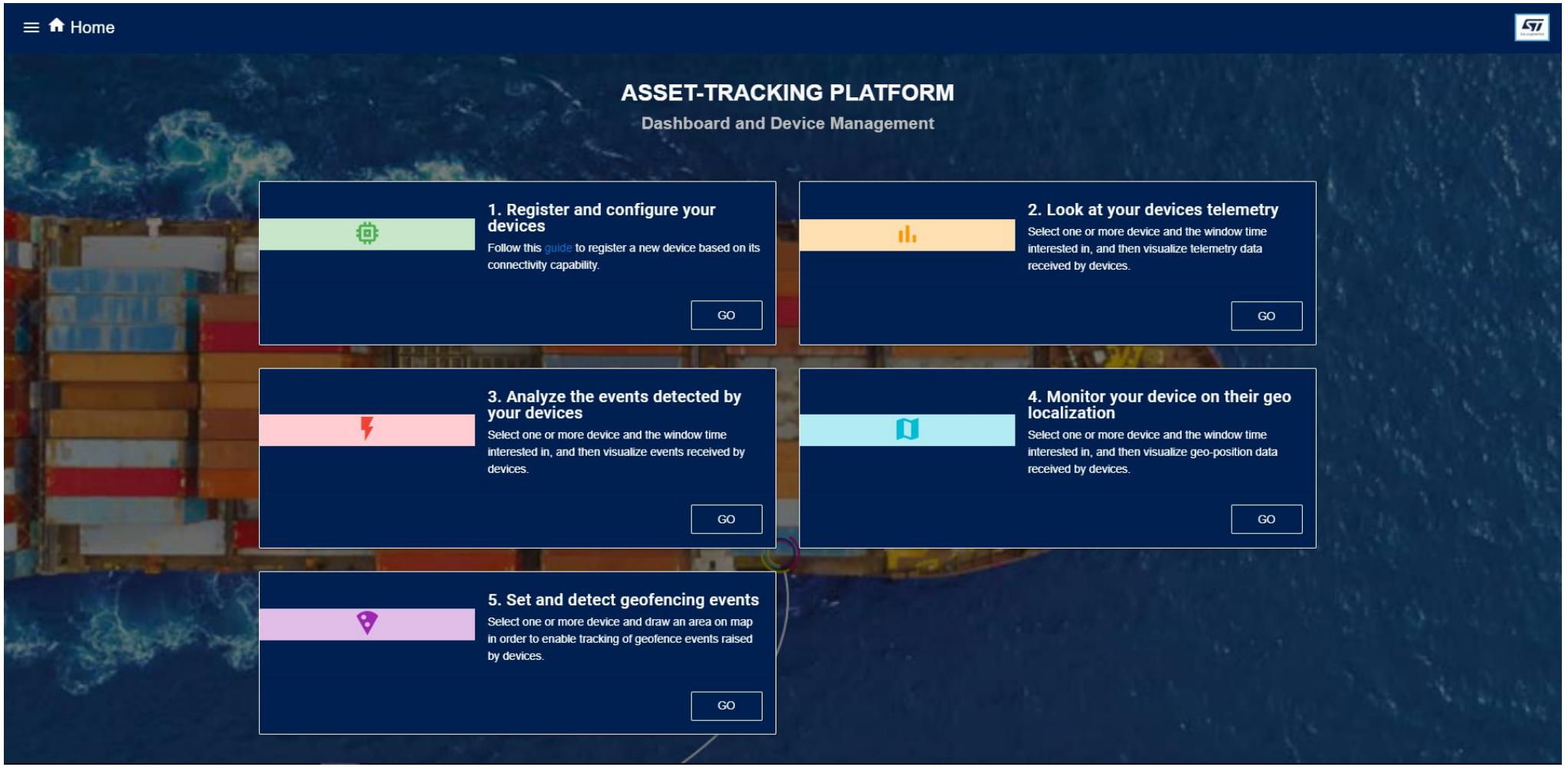
2.4- Demo Examples: Using the Asset Tracking Web Dashboard

Demo Examples

Using the Asset Tracking Web Dashboard (1/6)

- Visit the home page of the DSH-ASSETRACKING dashboard on ST site for information and web dashboard URL (Link), or go Go to DSH-ASSETRACKING dashboard URL at https://dsh-assetracking.st.com/#/home

DSH-ASSETRACKING



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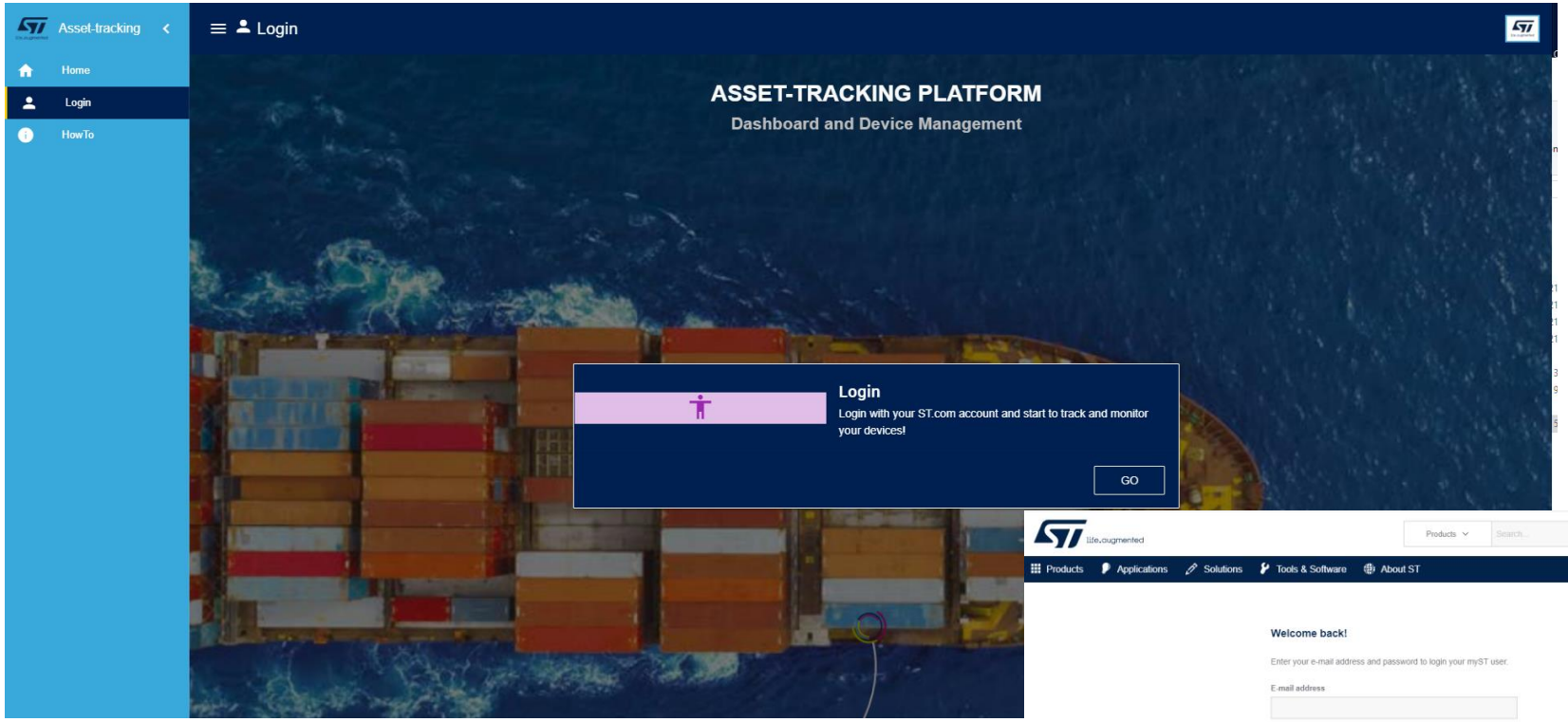
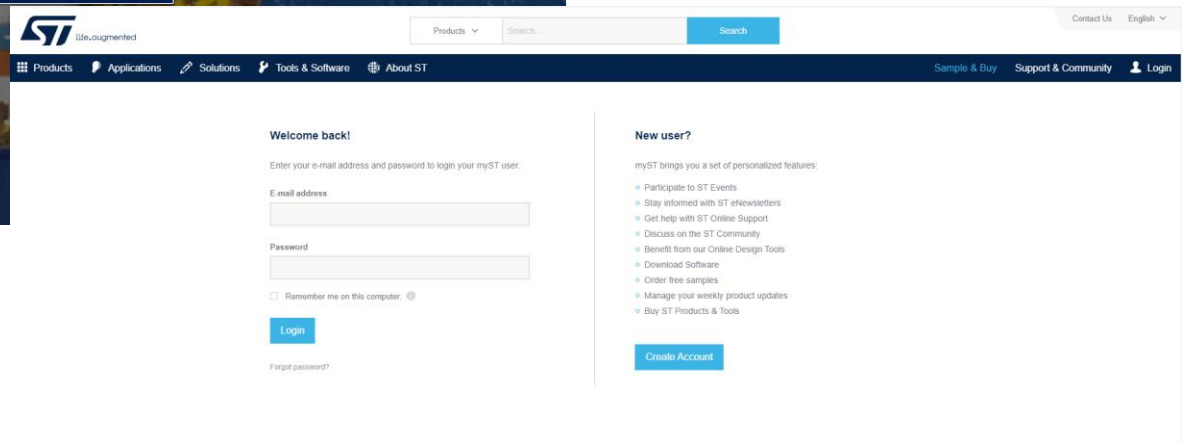
Demo Examples
Using the Asset Tracking Web Dashboard (2/6)

- Provide your username and password:
  - Select login and click GO button

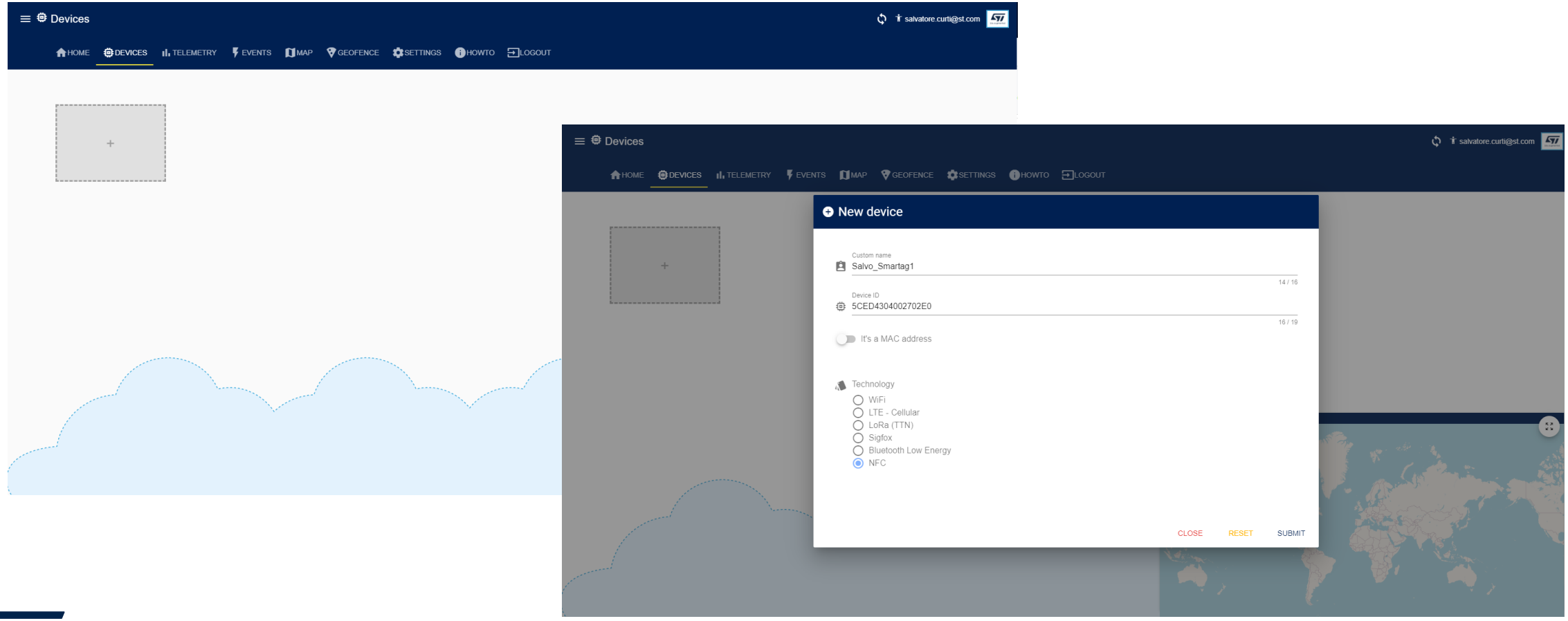
DSH-ASSETRACKING





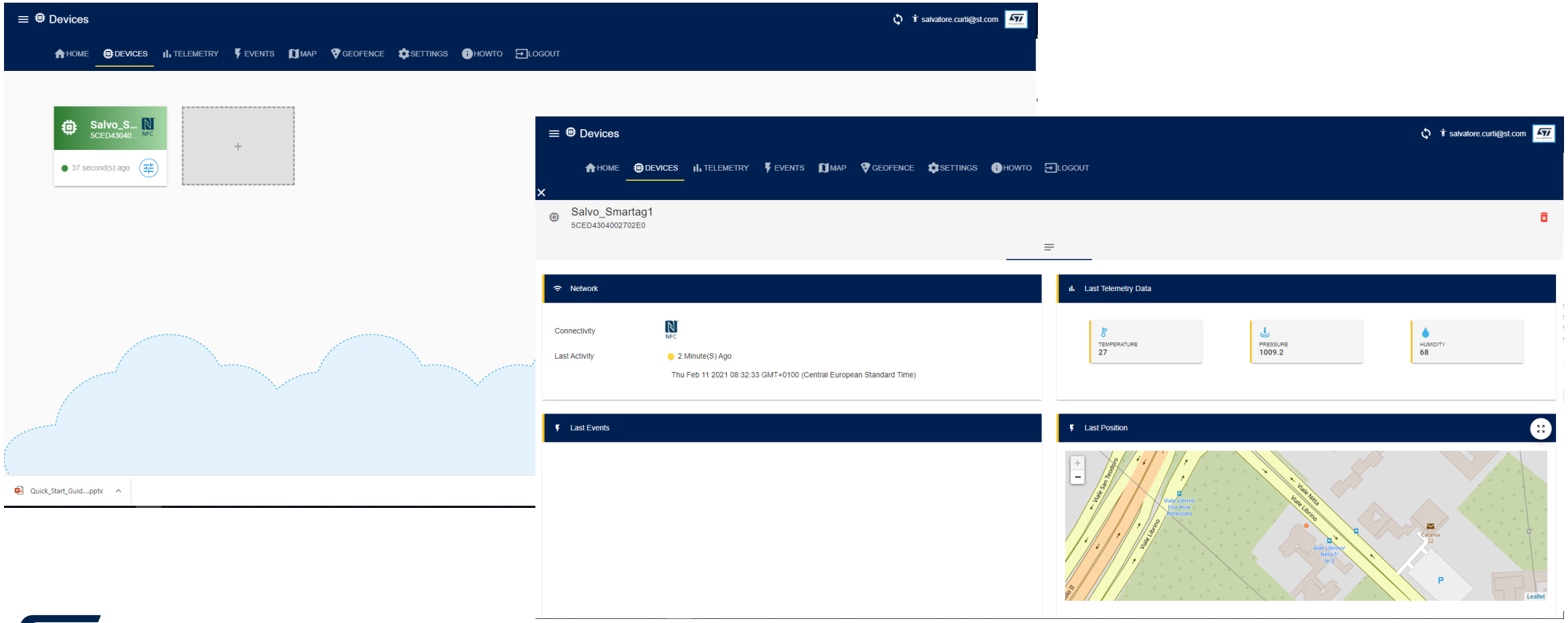
Demo Examples
Using the Asset Tracking Web Dashboard (3/6)

- Adding new the device:



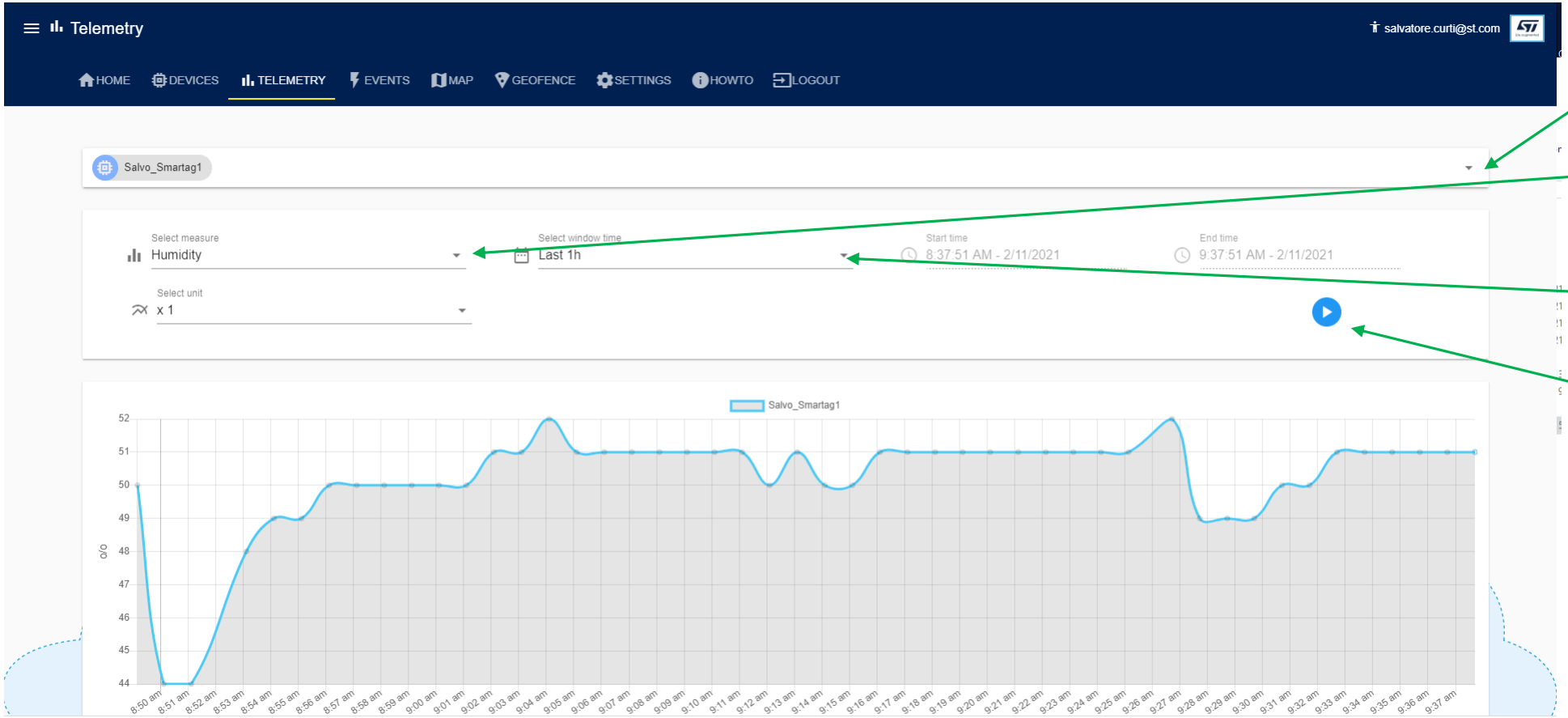
Demo Examples
Using the Asset Tracking Web Dashboard (4/6)

- Select the device you want to monitor :



Demo Examples
Using the Asset Tracking Web Dashboard (5/6)

- Selecting telemetry:

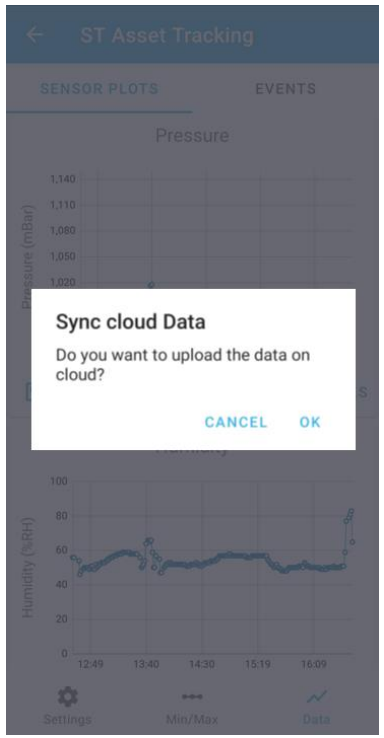


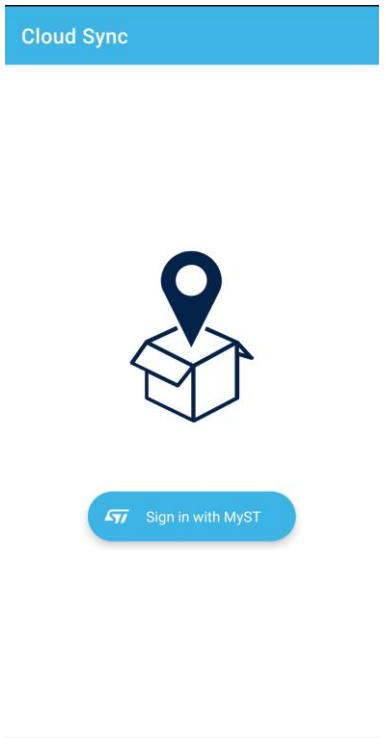
- Select the device you want to monitor.
- Select desired telemetry data to display
- Choose the amount of data to display
- Select Play Button

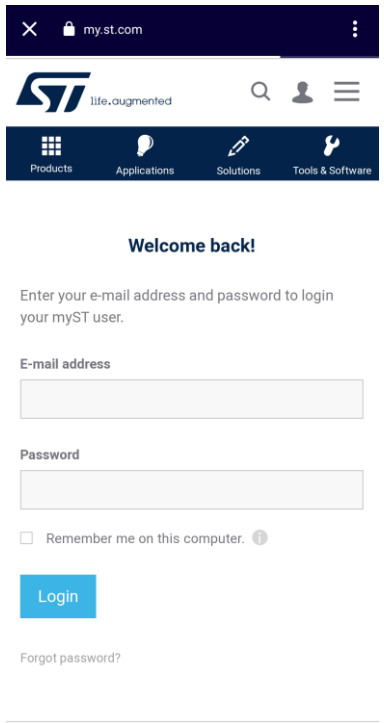
Humidity data displayed

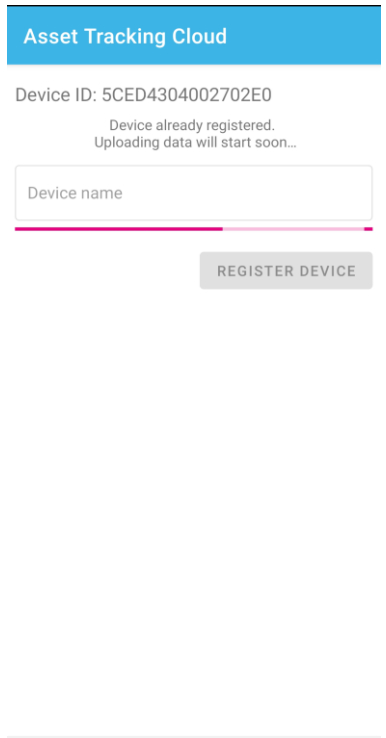
Demo Examples
Using the Asset Tracking Web Dashboard (6/6)

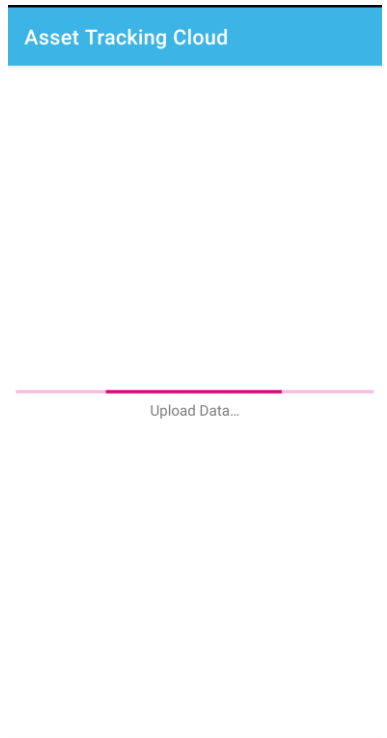
- Register device from ST Asset Tracking Application and upload the data on cloud:

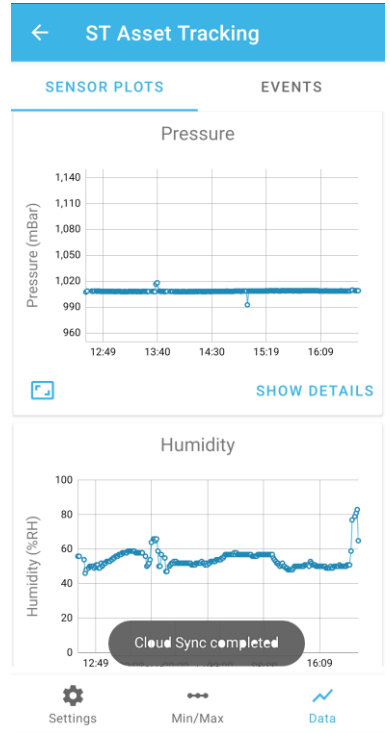












3- Documents & Related Resources

Documents and related resources (1/2)

All documents are available in the RESOURCES tab of the related products webpage

FP-SNS-SMARTAG1

- **DB3553:** STM32Cube function pack for IoT node with dynamic NFC tag, environmental and motion sensors for STM32Cube – **data brief**
- **UM2389:** Getting started with the FP-SNS-SMARTAG1 dynamic NFC tag, environmental and motion sensors for STM32Cube – **user manual**
- **Software setup file**

STEVAL-SMARTAG1

- **Gerber files, BOM, Schematic**
- **DB3533:** NFC Dynamic Tag sensor node evaluation board– **data brief**

DSH-ASSETRACKING

- **DB4207:** Cloud Amazon-based web application for asset tracking – **data brief**

STNFCSensor

- **DB3666:** NFC Sensor TAG mobile application – **data brief**

STAssetTracking

- **DB3951:** ST Asset Tracking app to configure a Sigfox node based on the FP-ATR-SIGFOX1 function pack 3.0 – **data brief**

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Consult www.st.com for the complete list

4- STM32 Open Development Environment: Overview

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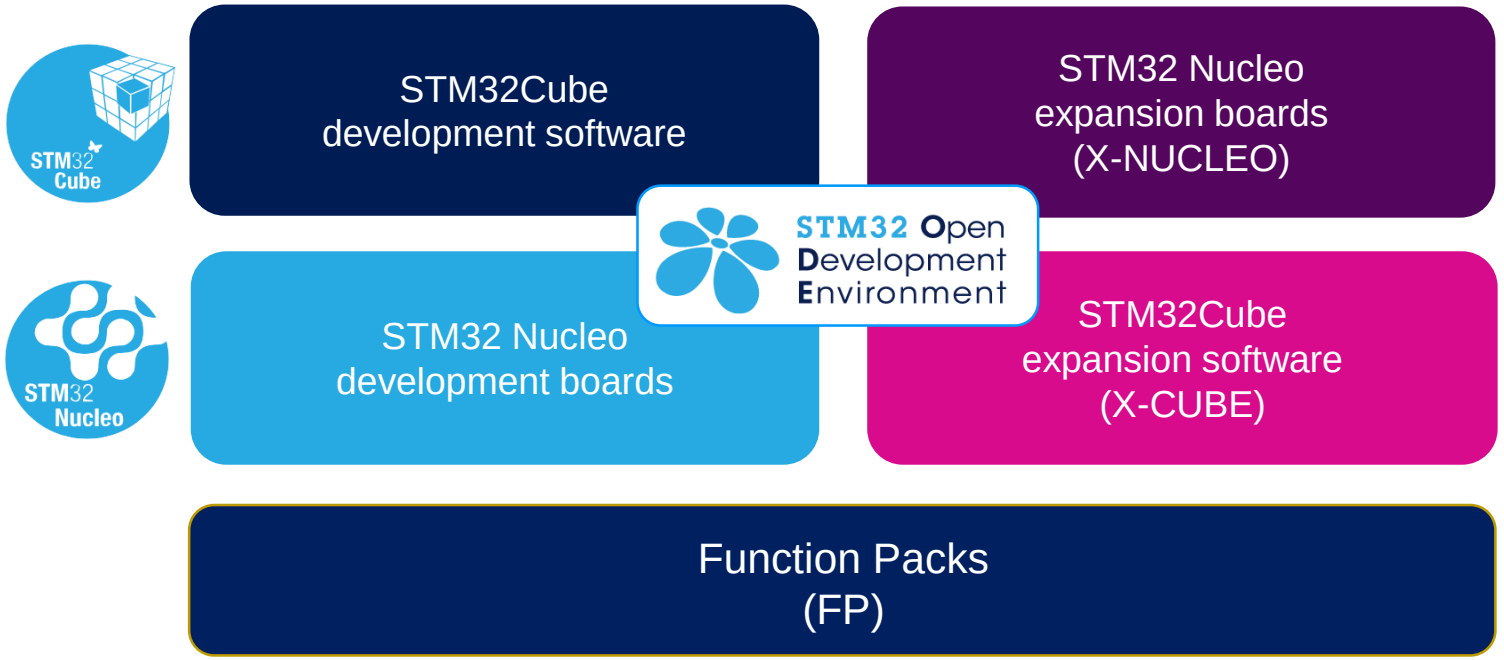
STM32 Open Development Environment
Fast, affordable Prototyping and Development

- The STM32 Open Development Environment (STM32 ODE) is an open, flexible, easy, and affordable way to develop innovative devices and applications based on the STM32 32-bit microcontroller family combined with other state-of-the-art ST components connected via expansion boards. It enables fast prototyping with leading-edge components that can quickly be transformed into final designs



For further information, please visit www.st.com/stm32ode

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Thank you

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