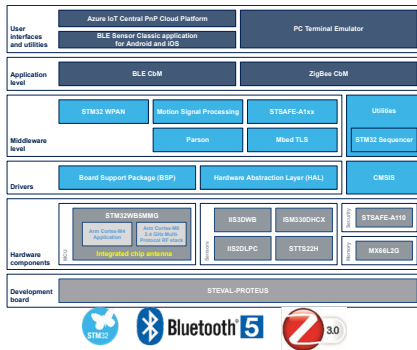


## Software package for the STEVAL-PROTEUS1 kit with signal processing to enable predictive maintenance in a WPAN



### Features

- Firmware package to demonstrate an industrial sensor node for condition-based monitoring (CbM) and predictive maintenance (PdM) applications in a WPAN based on Bluetooth® Low Energy or Zigbee connectivity
- Temperature and motion sensors real-time monitoring of meaningful key parameters and equipment status
- STM32 wireless personal area network middleware developed within the STM32WB framework used to support Bluetooth® Low Energy 5 or Zigbee 3.0 applications
- Motion signal processing middleware for vibration analysis in time domain (speed RMS and acceleration peak) and frequency domain (FFT with programmable size, averaging, overlapping, and windowing)
- Configurable alarm and warning thresholds based
- On-board battery status monitor
- Bluetooth® Low Energy application compatible with the [STBLEsensClassic](#) mobile app for Android and iOS, to display data on the app and bridging data to the Azure IoT central PnP cloud dashboard
- Zigbee mesh network example firmware with end-device and router connected to a coordinator displaying collected data on a PC serial terminal
- Sample implementations available for the [STEWAL-PROTEUS1](#) kit
- Based on [STM32Cube](#) software development environment for STM32 microcontrollers
- Free, user-friendly license terms

### Description

The [STSW-PROTEUS](#) is an [STM32Cube](#)-based software package for vibration and temperature condition equipment monitoring over Bluetooth® Low Energy and ZigBee connectivity.

The application captures vibration and temperature data from MEMS sensors. It uses them as inputs to perform complex algorithms such as frequency and time domain vibration analysis. Then, it transfers the ready-to-use results into a wireless personal area network (WPAN). This feature makes the IoT node suitable for condition-based maintenance (CBM) and predictive maintenance (PdM) to reduce productivity losses due to an unplanned machine downtime.

The [STSW-PROTEUS](#) software package includes two different projects to address both Bluetooth® Low Energy and Zigbee applications.

The Bluetooth® Low Energy application allows directly connecting a smartphone through a dedicated mobile app ([STBLEsensClassic](#)) to facilitate nodes configuration, local monitoring equipment status, fast firmware upgrade over the air (FUOTA), and data monitoring to the dedicated Azure IoT PnP central cloud dashboard.

The ZigBee application firmware provides an example to make different nodes, such as end devices and routers, communicate within the same ecosystem, thanks to the strength of the mesh network. A coordinator runs on the [NUCLEO-WB55RG](#) and collects the network data, displaying them on a PC serial terminal.

Product summary	
Software package for the STEVAL-PROTEUS1 kit with signal processing to enable predictive maintenance in a WPAN	<a href="#">STSW-PROTEUS</a>
Industrial sensor evaluation kit for condition monitoring based on the 2.4 GHz STM32WB5MMG module	<a href="#">STEWAL-PROTEUS1</a>
STM32 Nucleo-64 development board with STM32WB55RG MCU, supports Arduino, ST Zio and morpho connectivity	<a href="#">NUCLEO-WB55RG</a>
BLE Sensor Classic application for Android and iOS	<a href="#">STBLEsensClassic</a>
Applications	<a href="#">Condition Monitoring/IoT for Smart Industry</a>



Each project is released as a source code for the [STEVAL-PROTEUS1](#) kit. The projects are developed for three IDEs for the STM32 MCU: IAR Embedded Workbench for Arm, Keil® microcontroller development kit for Arm, and ST integrated development environment for STM32.

## Revision history

**Table 1. Document revision history**

Date	Revision	Changes
24-Jun-2022	1	Initial release.
21-Jun-2023	2	Updated STBLESensor with STBLESensorClassic in all the document.

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