# EXL-s1

## Wireless Inertial Measurement Unit

### TECHNICAL SPECIFICATIONS

**Wearable Devices, Biomechanics, Gait Analysis and Rehabilitation, Instrumentation, Attitude and Heading Reference System, Scientific Research and Motion Analysis**


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***Wireless Inertial Measurament Unit (IMU)***

## ■ *1. SPECIFICATIONS*

- Module Sizes: 45 x 32 x 15 mm
- 32 bit ARM® Cortex M3, 72MHz
- 3 Axis accelerometer: ±2g or ±6g
- 3 Axis gyroscope: full scale ±250, ±500, ±2000
- 3 Axis magnetometer: full scale ±1000µT
- Thermometer environment: resolution ±1°C
- Auto wake up by vibration
- Bluetooth 2.1 class 2
- Flash memory 1GB on board
- Power supply by USB connector or LiPo battery
- Battery operation time 3h (using a LiPo battery 3,7V, 160mA)

## ■ 2. GENERAL DESCRIPTION

- EXLs1 is an inertial sensor based on MEMS technology and wireless communication (Bluetooth™ 2.1) made for motion measurement, acquisition and transmission. It features a complete IMU sensor set with full axis gyroscope, magnetometer, accelerometer, vibration sensor, temperature sensor.

- It is particularly suitable to be used in the medical field as a wearable devices for the body movements analysis (posture assessment, rehabilitation, gait monitoring, joint's biomechanics analysis, activity monitoring). Other areas of application include multimedia interactions and vibration analysis.

- The Bluetooth™ radio allows standard interfacing to a wide range of devices (PC, Tablets, Smartphone) without the need of additional hardware so that data can be transmitted wirelessly up to 10 meters.

- The built in Flash memory (1 GB) allows data logging over long period of activity. Data can then be retrieved by using Bluetooth ™ connection or USB interface.

- Algorithms for motion characterization, statistical analysis, collision detection, orientation estimation, can be implemented on the on board 32 bit CPU (Cortex M3).

- IMU hardware and software can be fully customized.

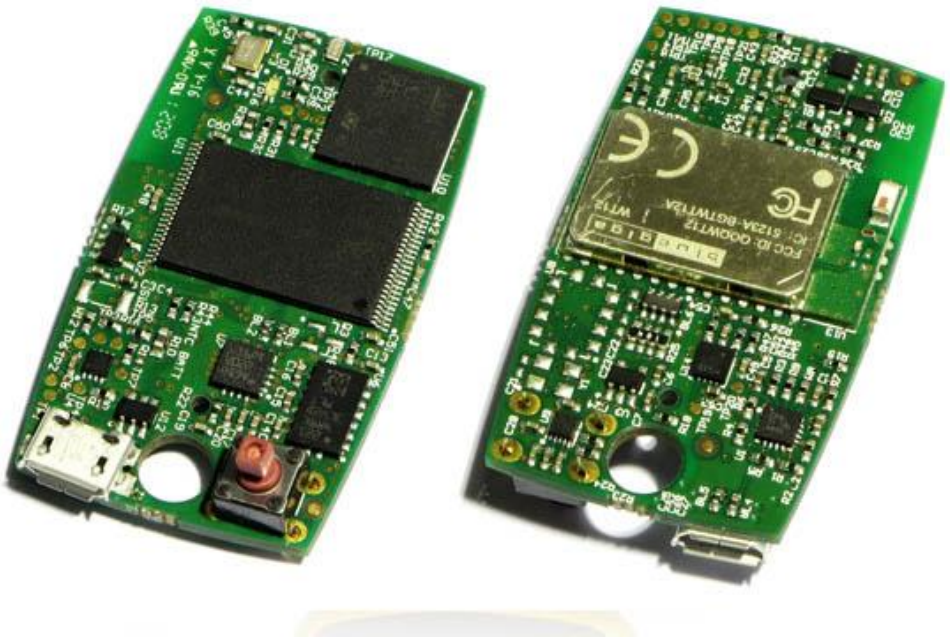
## 3. EXL-S1 KIT

The Sensor Data Kit is composed by three main components:
a set of four Sensor Nodes, one Tablet Based Application for data logging, one Hub USB to charge the batteries, one set of USB cables, user manual .
The connection between the Sensor Nodes and the tablet is realized by means of Bluetooth™ technology.

The Sensor Node is used to capture the subject inertial movements. It includes 3-axis accelerometer, 3-axis gyroscope, 3-axis magnetometer and a Bluetooth™ connection to send the data captured to the Tablet application.

The Tablet based application is used to acquire and store the inertial data received from each Sensor Node. The application has been designed to be easy to use. The Bluetooth™ connection with the Sensor Node is automatically managed by the application itself. The user has only to insert the subject ID and start/stop the data streaming. The data acquired is composed by nine fields for the inertial data (three fields for accelerometer data, three fields for gyroscope data and three fields for magnetometer data) and one additional field. The additional field is used to mark significant events. For example, inside of each test it's possible to mark additional significant events by using Segment (the "Blue flag") button: detailed information are provided in user's manual.

The application can be used with Tablet, Smartphone or PC



*The EXL series has been developed within the FP7 EU CUPID project in close cooperation with the Micrel lab and Bio lab at DEI (University of Bologna).*