# 1 Overview

1.1 General Information

The **SensiBLE 2.0** is a low cost System on Module with low power consumption. **SensiBLE 2.0** integrates rechargeable Li-Ion battery, a variety of Sensors and a low power Cortex M0 core that can execute both Bluetooth protocols and customer application. It provides an ideal building block that easily integrates with a wide range of target markets requiring rich functionality. **SensiBLE 2.0** is compact, cost effective and with low power consumption.

The **SensiBLE 2.0** enables wireless connectivity, not requiring any RF experience or expertise. It provides a complete RF platform in a tiny form factor and being a certified solution optimizes the time to market of the final applications.

SensiBLE 2.0 IoT Module is a Bridging-the-Gap solutions to any embedded design. Fit to the vast array of battery-powered applications requiring the integration of Multiple Sensors with BLE connectivity without compromising on cost and power consumption.

Figure 1 - SensiBLE 2.0
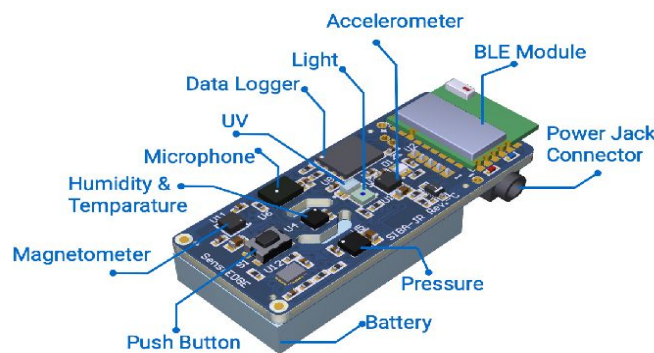
1.2 How To Buy

Two options are available for sale:

1) **SensiBLE 2.0** Module - Wearable Bluetooth 4.2 Data Logger, including Accelerometer, Magnetometer, Humidity, Temperature, Pressure, Microphone, UV and Light Sensors integrating Rechargeable battery and power adaptor. WearaBLE is integrated inside Enclosure plastic BOX.

2) **SensiBLE 2.0** Dev Kit - Wearable Bluetooth 4.2 Data Logger, including Accelerometer, Magnetometer, Humidity, Temperature, Pressure, Microphone, UV and Light Sensors integrating Rechargeable battery and power adaptor + **SED Base programmer**, which allows to flexibly modify the firmware of the module. **WearaBLE** is integrated inside Enclosure plastic BOX.
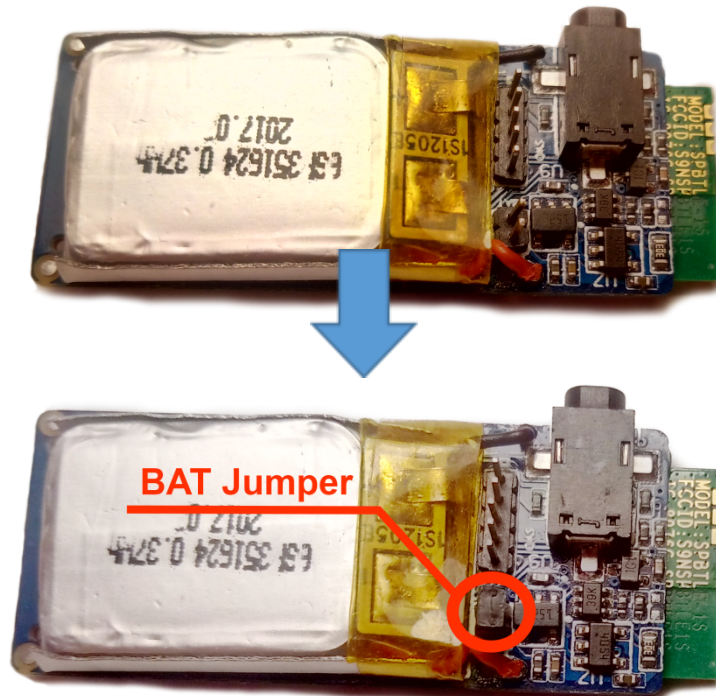
Contact SensiEDGE support services for further information:
mailto:Support@SensiEDGE.com.

# 2 Getting Started

2.1 Starting SensiBLE 2.0

The **SensiBLE 2.0** module is sold ready for use. To start the device it is enough to set the BAT jumper (Figure 2). This action connects the battery to the device.

Figure 2 - SensiBLE 2.0, Battery connection

After setting the BAT jumper, the LED D1 blinks red. This indicates that the device is in Advertisement mode and is available for connection via Bluetooth.

**Figure 3 - SensiBLE 2.0 in Advertisement mode**
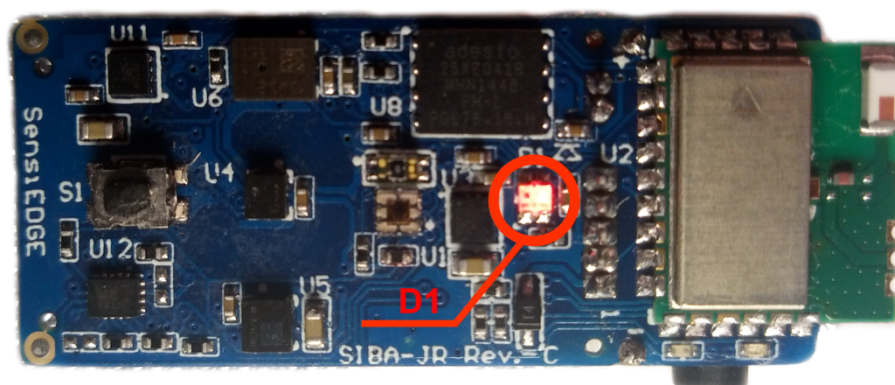
2.2 STBLESensor

For working with **SensiBLE 2.0**, t**he "STBLESensor"** application can be used. It is available for downloading on the "Play Market" and "Apple Store". For more information about **"STBLESensor"**, please visit https://www.st.com/en/embedded-software/stblesensor.html.

2.3 Connecting to SensiBLE 2.0

By default, the device has a BlueTooth name "SensiBLE 2.0".

Figure 4 - SensiBLE 2.0 in "STBLESensor"
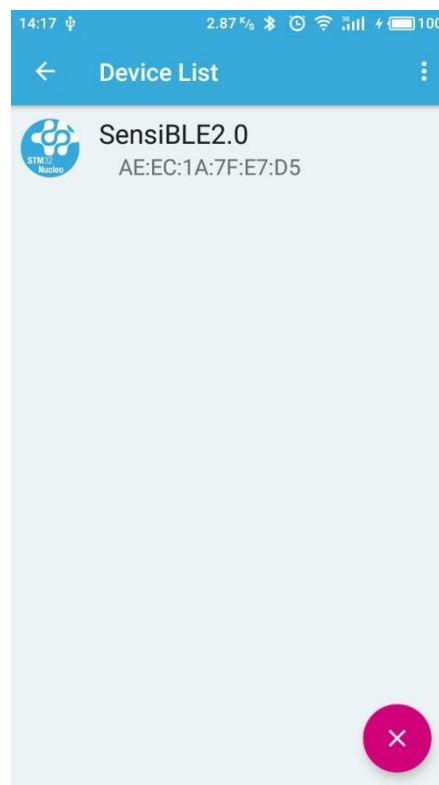
After connecting to the device, LED D1 blinks green and the **"STBLESensor"** shows Environment sensors information.

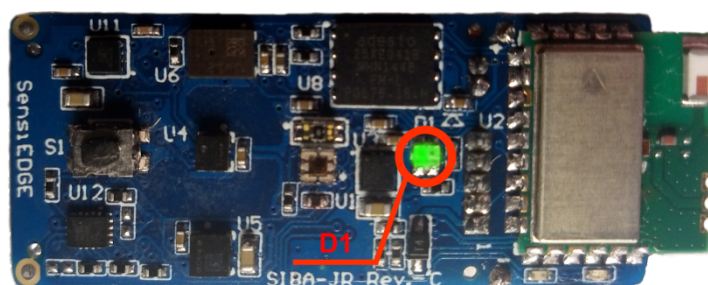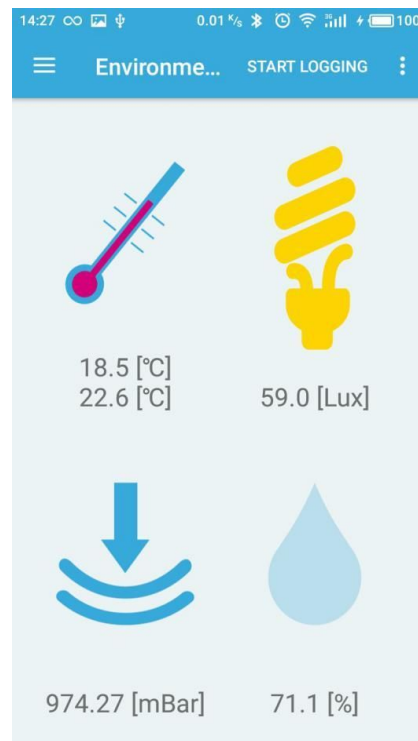**Figure 5 - SensiBLE 2.0 in active mode**

Figure 6 - Environment sensor information in "STBLESensor"

2.4 The SensiBLE 2.0 Standard Modes

By default the **SensiBLE 2.0** has 9 available working modes:
- Environmental
- Plot Data
- Acc Event
- Switch
- BlueVoice
- SpeechToText
- Compass
- Cloud Logging
- Rssi & Battery

In the "Plot Data" mode the next options for plotting are available:
- Accelerometer
- Magnetometer
- Pressure
- Humidity
- Temperature (two sensors)
- Luminosity
- Compass

To know more about using this modes, please visit
https://www.st.com/en/embedded-software/stblesensor.html.

Figure 7 - Available modes of SensiBLE 2.0 and options for plotting
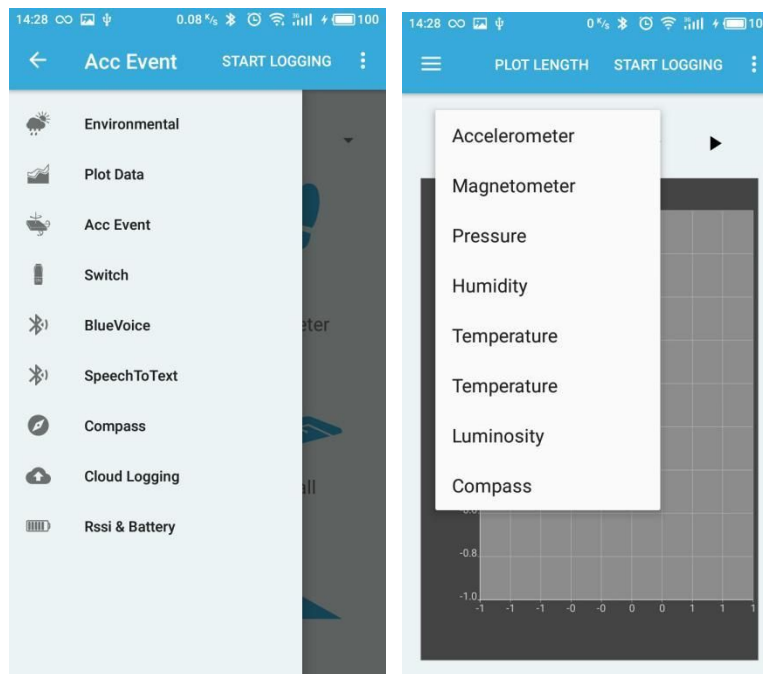

2.5 Charging

The **SensiBLE 2.0** uses rechargeable battery. To know the level of the battery charge you can use the **"STBLESensor"** application, **"**Rssi & Battery" mode. For charging the Power Adaptor (4.25V - 6.5V DC) or the **SED-Base programmer** can be used.

While charging, the red LED is switched on (Figure 8). When the battery is fully charged, the blue LED is switched on (Figure 9).

Figure 8 - Charging SensiBLE 2.0 using SED-Base


Figure 9 - SensiBLE 2.0 fully charged
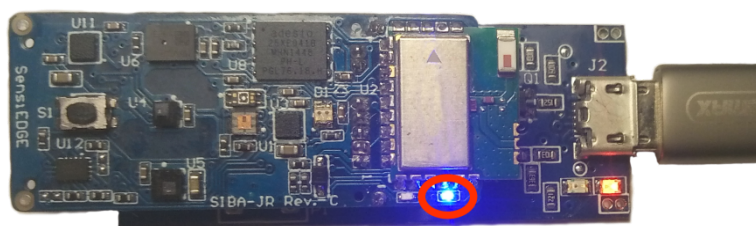
2.6 Firmware Updating

It is possible to update the firmware of the **SensiBLE 2.0** using the **"STBLESensor"** application. The firmware for updating can be found in the GitHub repository in the folder "**bin**" (https://github.com/SensiEDGE/SensiBLE_2.0). The process of updating is shown on the figure 10.

Note: The SensiBLE 2.0 uses external SPI Flash Memory AT25XE041B for updating firmware. This means that if a user uses this memory for saving some information, it will be lost after firmware update. The maximum size of the firmware (for updating over BLE) can be 0x024800 bytes. This means that safe for use are pages of the AT25XE041B, that begin from the address 0x024800.

Figure 10 - Updating SensiBLE 2.0 firmware
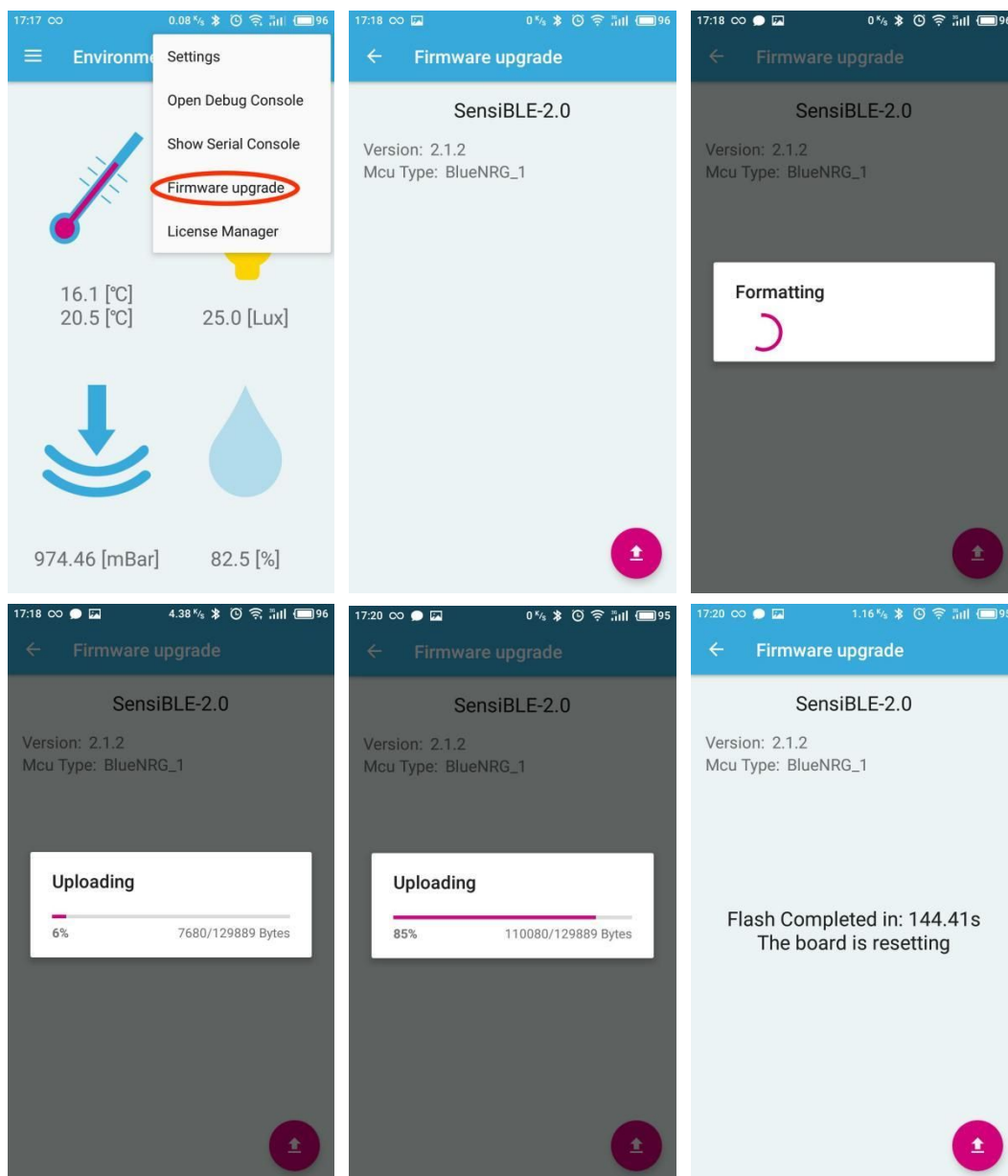
3 Firmware Demo

The proposed software is not intended for the final version of the product and is distributed as a demo. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

The source of the demo can be downloaded from the GitHub repository: https://github.com/SensiEDGE/SensiBLE 2.0.

The firmware can be downloaded to the **SensiBLE 2.0** using the **"STBLESensor"** (see 2.6 Firmware Updating), but it is better and easier to use the **SED-Base programmer**, which allows to perform the debug. The **SensiBLE 2.0** connected to the **SED-Base programmer** is shown on the figure 11.

Figure 11 - The SensiBLE 2.0 connected to the SED-Base programmer
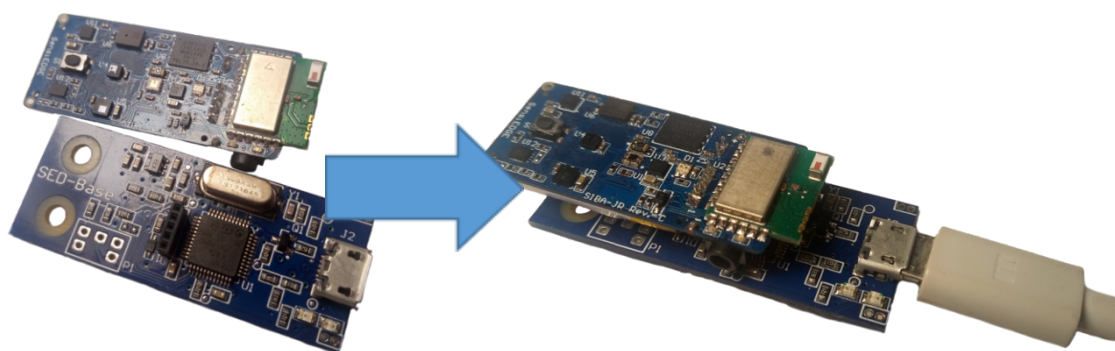
3.1 The project structure

The SensiEdge Team used IAR8 for building the project, but a user if free to port the project to some other IDE.

The package folder structure is shown on the figure 12.

Figure 12 - SensiBLE 2.0 package folder structure

- − **binary:** contains bootloader, used in this project and ready-to-use firmware for downloading using the **"STBLESensor"** application and **"BlueNRG-1 ST-Link Utility"**
- − **Drivers:** contains drivers to the all used components and some specific drivers
- − **Library:** contains the HAL drivers, CMSIS drivers, BLE stack library and BlueNRG peripheral driver
- − **Middlewares:** contains pre-compiled BlueVoice library and MotionMC library
- − **Project:** contains project and user files.

To know more about used BlueVoice library and MotionMC library, please see UM2196 and UM2192 on www.st.com.

The entry point of the application is in file Project\SensiBLE 2.0_SW\src\main.c.

When the device is switched on, it is in Advertisement mode, waiting for connection. In this mode the device sends advertisement message every 300ms. When the device is in the advertisement mode, it goes to sleep mode every 300 ms, that's why it may be a problem with the connection to the device using debugger. By default in the advertisement mode the device doesn't enter sleep mode while the user button is pressed.

Contact SensiEDGE support services for further information:
mailto:Support@SensiEDGE.com.

3.2 SensiBLE 2.0 Block Diagram