1 Overview

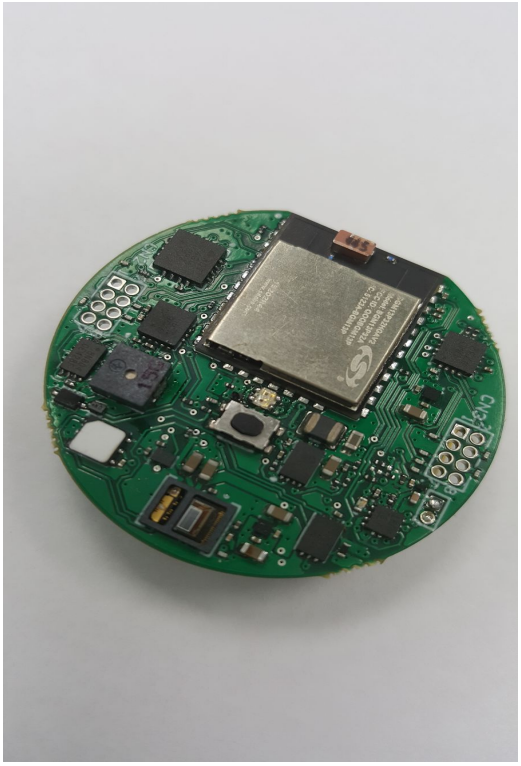
1.1 General Information

SensiTHING 1.0 is a ARM-based high performance System on Module. *SensiTHING1.0* integrates the microcontroller (MCU), variety of sensor, Bluetooth connectivity and wireless charging technology. Also, the device comprises smoke detector sensor enabling stand-alone applications of environment control.

Low-power design provides operation of *SensiTHING 1.0* during months without charging.

SensiTHING 1.0 enables wireless connectivity, not requiring any RF experience or expertise. The on-board module is already certified for wide global markets.

Figure 1 - SensiTHING 1.0



1.2 How To Buy

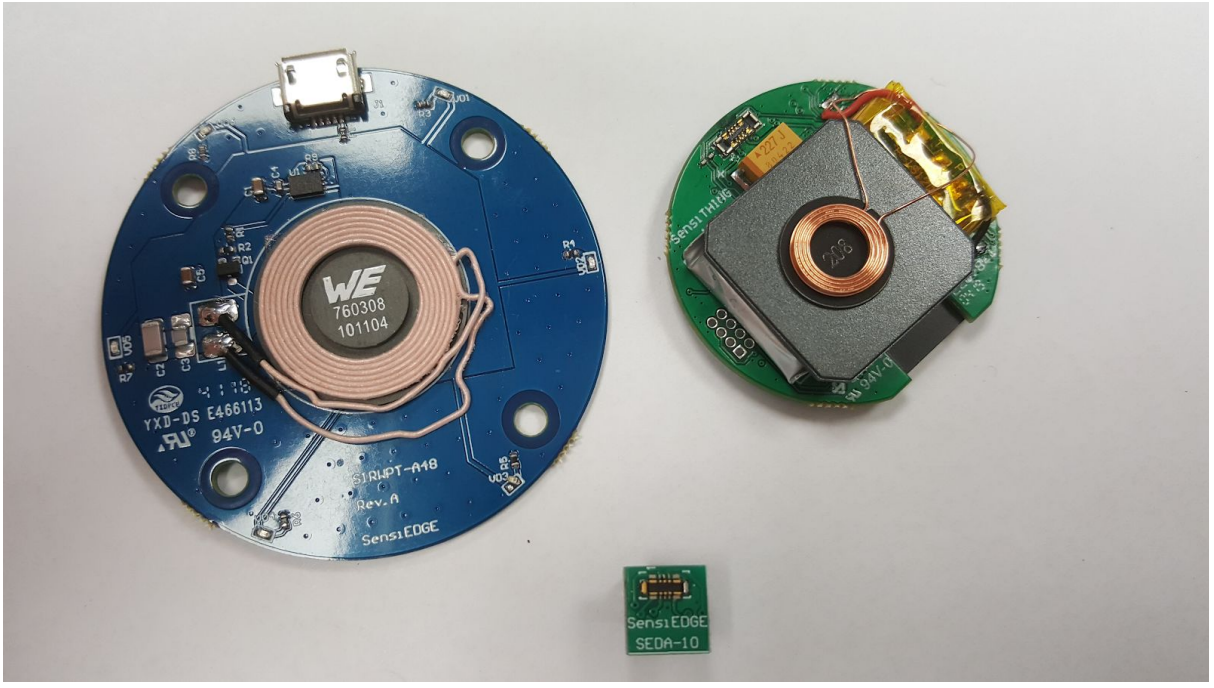
SensiTHING 1.0 Dev Kit includes three units:

SIBAS_WPR32 : SensiTHING module

SEDA-10 : Connector Board for a programmer

SIRWPT-A48 : Wireless Charger

Figure 2 – SensiTHING 1.0 Dev Kit



Contact SensiEDGE support services for further information:

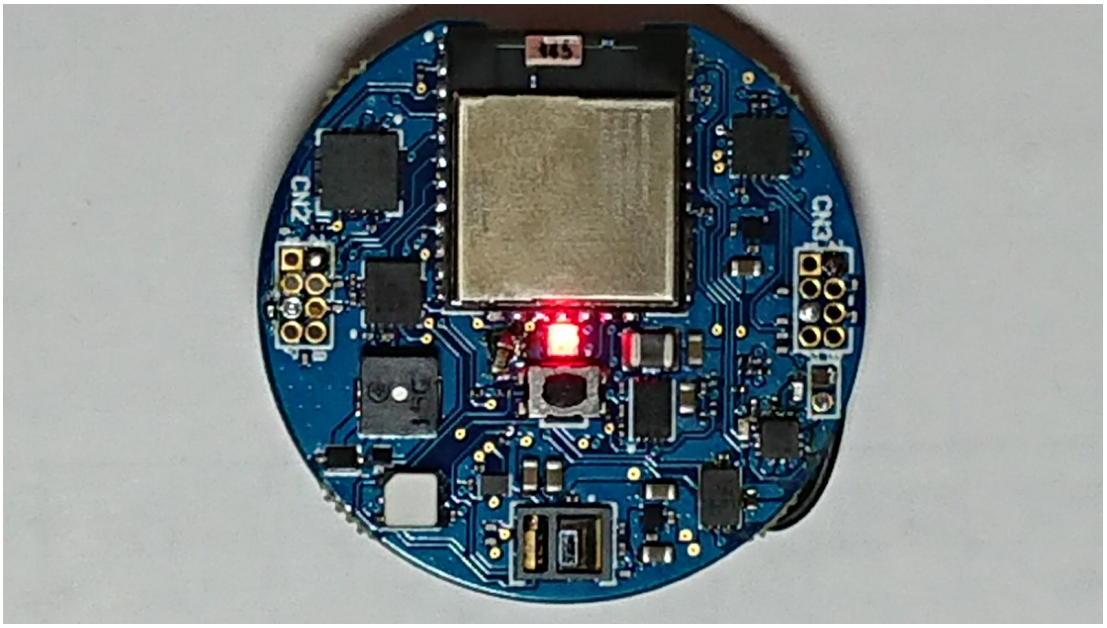
mailto:Support@SensiEDGE.com.

2 Getting Started

2.1 Starting SensiTHING 1.0

Since the *SensiTHING 1.0* module does not have a power hard-button, it is always in a sleep mode with low power consumption. To start the module press the button for a long time (~3s). When the device is on you hear a short beep sound and the red LED starts blinking short flashes at a frequency of 1Hz. The device turns off by the same long pressing of the button. After the *SensiTHING 1.0* is turned on, the BLE module starts the advertising process and it is ready to be connected. Demo firmware supports only one connection.

Figure 3 - SensiTHING 1.0 in advertisement mode



2.2 Windows application “SensiEDGE BLE Demo”

For working with *SensiTHING 1.0*, the “SensiEDGE BLE Demo” application can be used. It is available for downloading at the link [link]

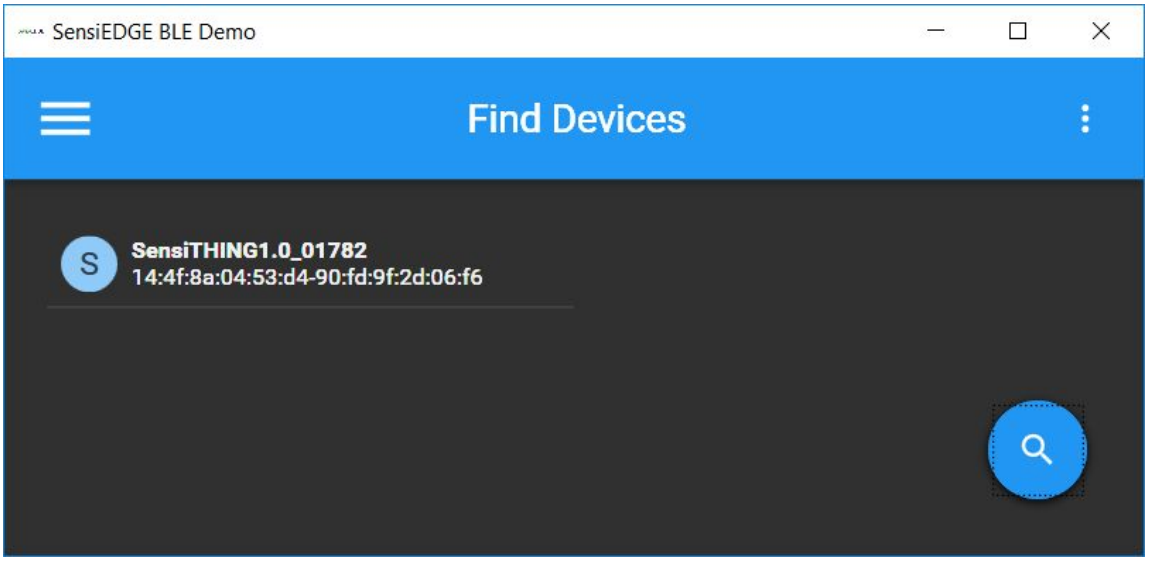
Contact SensiEDGE support services for further information:

mailto:Support@SensiEDGE.com.

2.3 Connecting to SensiTHING 1.0

By a default, the device has a BlueTooth name “SensiTHING1.0”.

Figure 4 - SensiTHING 1.0 in “SensiEDGE BLE Demo”



After connecting to the device, green led blinks and the **“SensiEDGE BLE Demo”** shows Environment sensors information.

Figure 5 - SensiTHING 1.0 in active mode

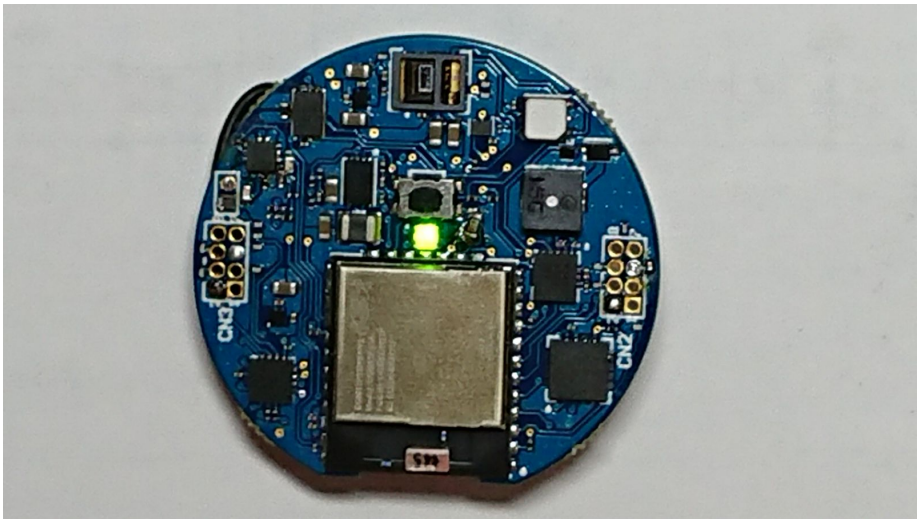
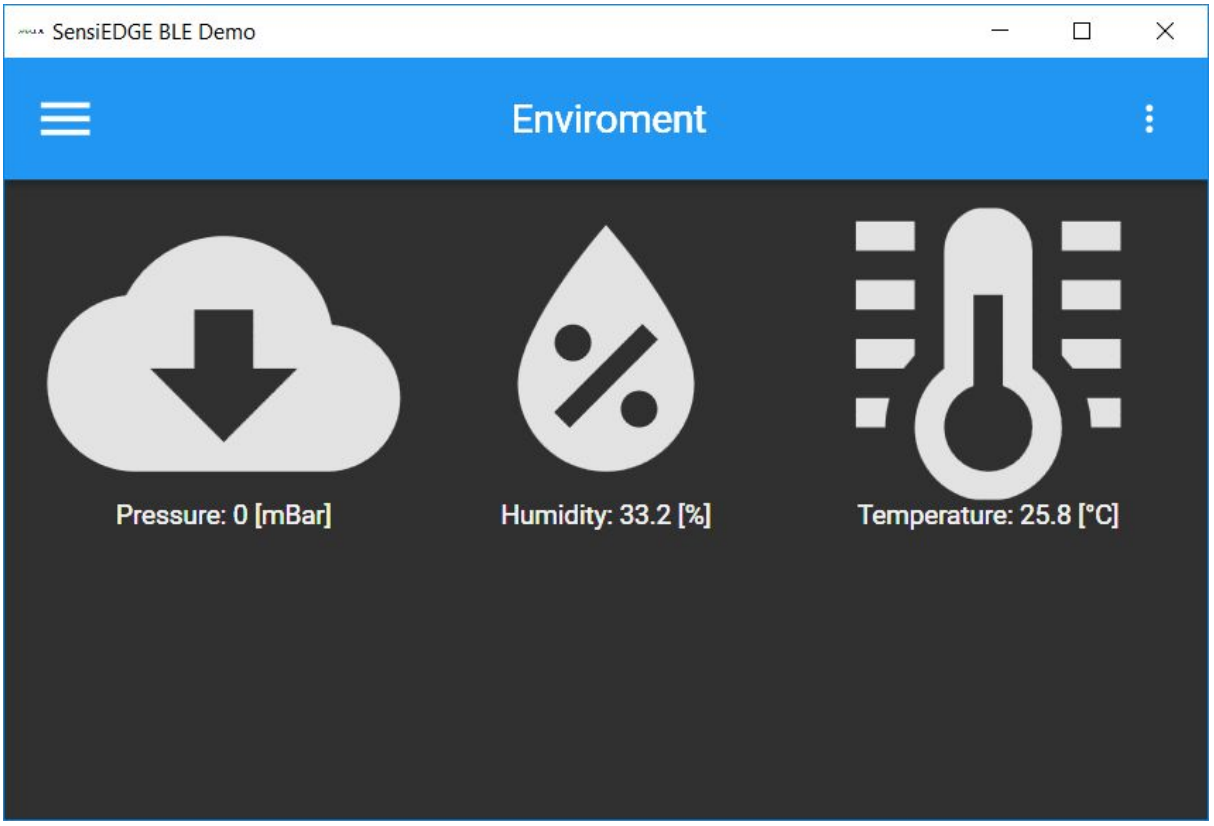


Figure 6 - Environment sensor information in "SensiEDGE BLE Demo"



2.4 The SensiTHING 1.0 Standard Modes

By default the *SensiTHING 1.0* has 5 available working modes:

- Environmental

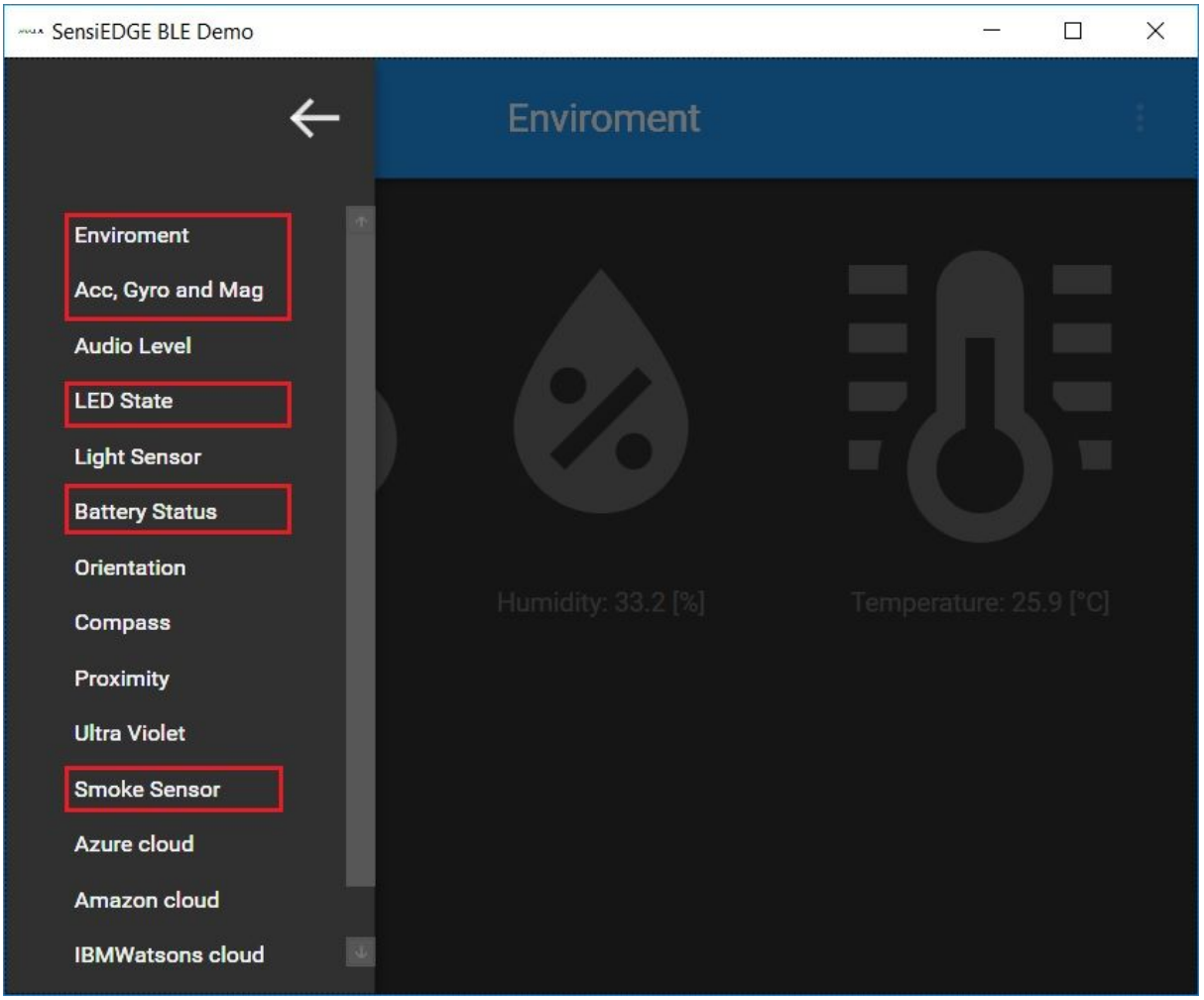
- Accelerometer

- LED state

- Battery status

- Smoke sensor

Figure 7 - Available modes of SensiTHING 1.0



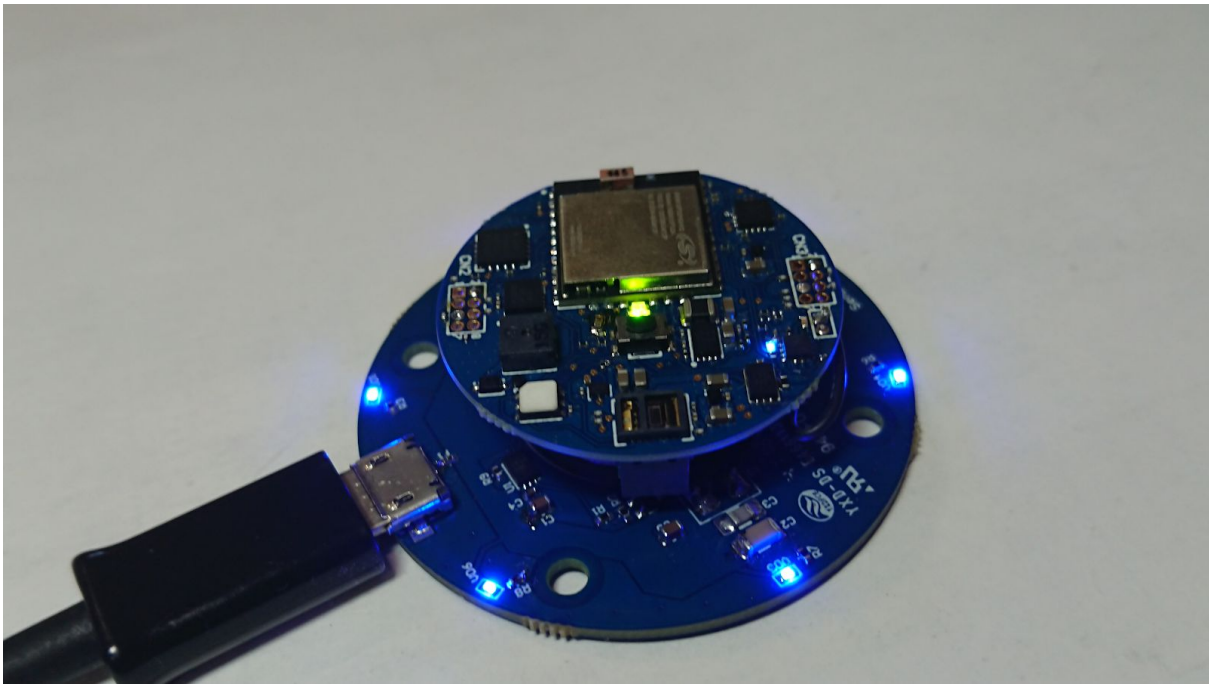
2.5 Charging

The *SensiTHING 1.0* device is powered by a Li-Ion battery with a capacity of 100 mAh. The battery is charged using the wireless charger. Connect the wireless charger to a 5V power source (USB port PC) using a micro USB cable. Place the *SensiTHING 1.0* module on top of the charger.

Charging status displays blue LED:

- Slow blinking (0.8s) - charging in progress.
- Fast blinking (0.3s) - an error.
- Lit constantly - charging is over.

Figure 8 - Charging SensiTHING 1.0 using wireless charger



2.6 Firmware Updating

It is possible to update the firmware of the *SensiTHING 1.0* using the "Blue Gecko" application from Silicon Labs. The application is available for Android (https://play.google.com/store/apps/details?id=com.siliconlabs.bledemo&hl=en) and iOS (https://itunes.apple.com/us/app/silicon-labs-blue-gecko-wstk/id1030932759?mt=8).

The original firmware for updating can be found on GitHub: **SensiTHING1.0.gbl** (https://github.com/SensiEDGE/SensiTHING1.0/tree/master/Firmware), or in the "**output_gbl**" directory in project folder, after build the project and running the file "**create_bl_files.bat**". (\SensiTHING1.0\Projects\SensiTHING1.0\output_gbl\application.gbl).

The process of updating the standard for BLE devices from SiLabs. Description of the process can be found at the link (https://www.silabs.com/community/wireless/bluetooth/knowledge-base.entry.html/2018/05/30/using_blue_geckoapp-88g7).

There is a short instruction here.

1. Download Blue Gecko mobile app (Android / iOS).
2. Transfer the application.gbl file to your smartphone for the mobile app to find.
    a. Android users can use any transfer method e.g. Dropbox. Android users need to navigate to SiliconLabs_BGApp/OTAFiles directory in their phone's file system and create a new subfolder for storing the .gbl files. This is where the Blue Gecko App can find them.
    b. iOS users can upload the files to iCloud. The app will prompt you to bring the files from iCloud.
3. Launch the Blue Gecko mobile app.

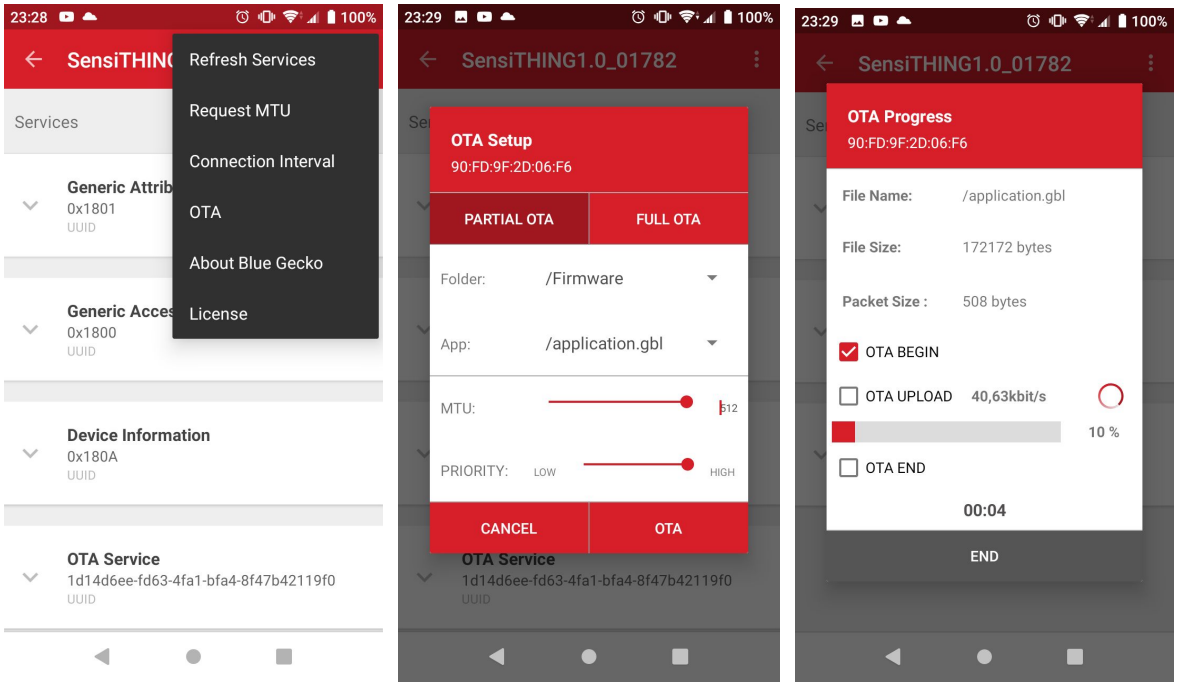
    In the Blue Gecko App.

4. Go to Bluetooth Browser and find and connect to your device (default name "SensiTHING1.0").
5. Open the pop-up menu in the upper right corner and select OTA.
6. Select Partial OTA and look for your newly created folder in the Folder dropdown menu. iOS users can select from iCloud at this stage.

7. Once you have selected the folder, you can select your .gbl image from the App dropdown. Use the application.gbl image.

8. Finally, press OTA and your upgrade should start.

Figure 9 - Updating SensiTHING 1.0 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:

1) **Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.**

2) **Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.**

3) **Neither the name of SensiEDGE nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.**

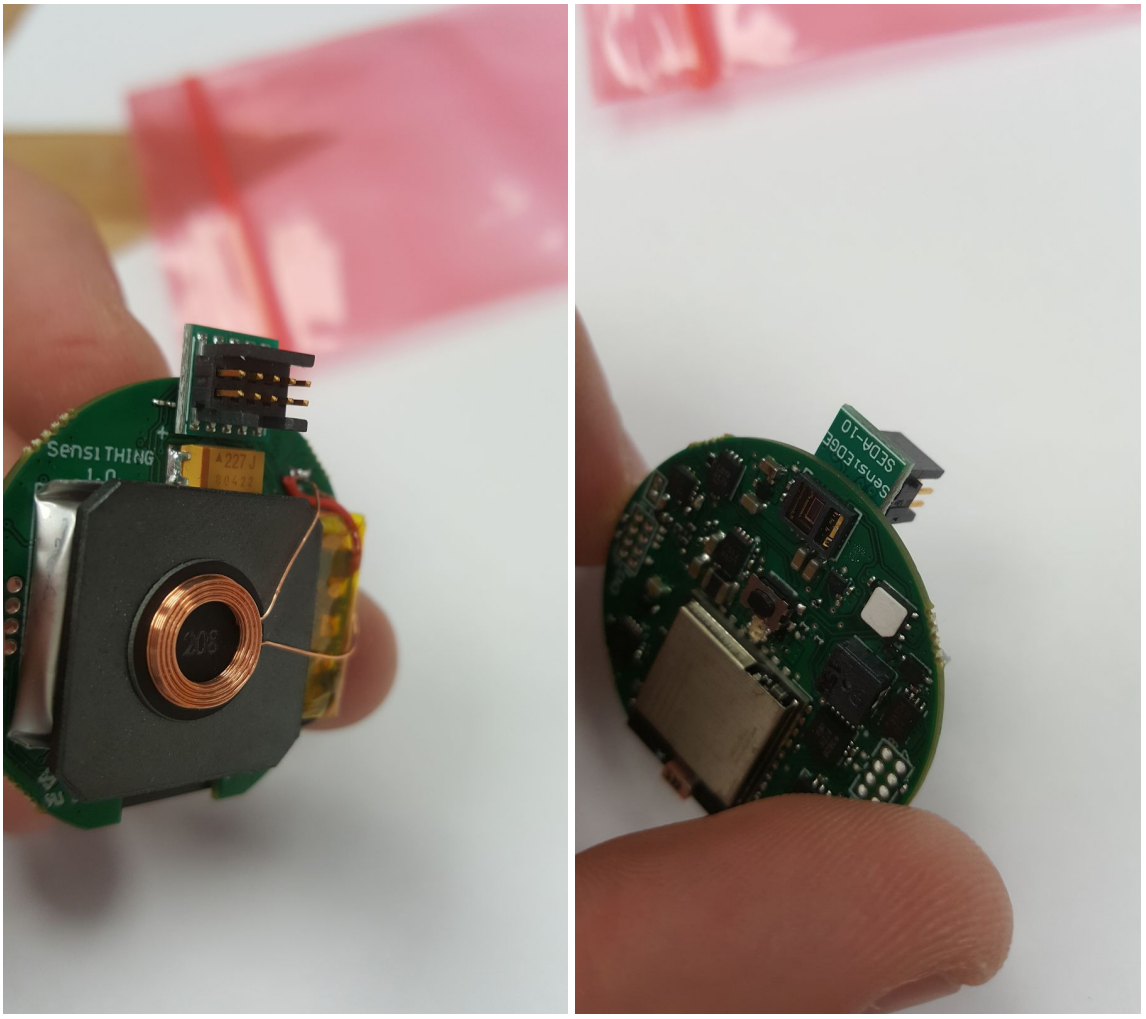
THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR 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.

The source of the standard firmware can be downloaded from the GitHub repository:

https://github.com/SensiEDGE/SensiTHING1.0/tree/master/Firmware

The firmware can be downloaded to the *SensiTHING 1.0* using the “Blue Gecko App” (see 2.6 Firmware Updating), but it is better and easier to use the J-Link programmer, which allows to perform the debug. The *SensiTHING 1.0* connected to the J-Link programmer is shown on the figure 10.

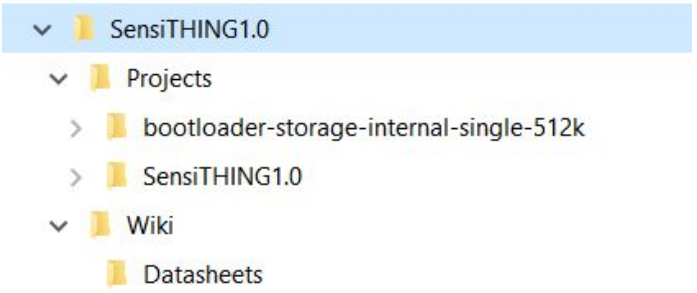
Figure 10 - The SensiTHING 1.0 connected to the J-Link programmer



3.1 The project structure

The SensiEdge Team used Simplicity Studio v4 for building the project, but a user if free to port the project to some other IDE. The project *SensiTHING 1.0* is based on the demo project "SOC-Empty" from SiLabs.

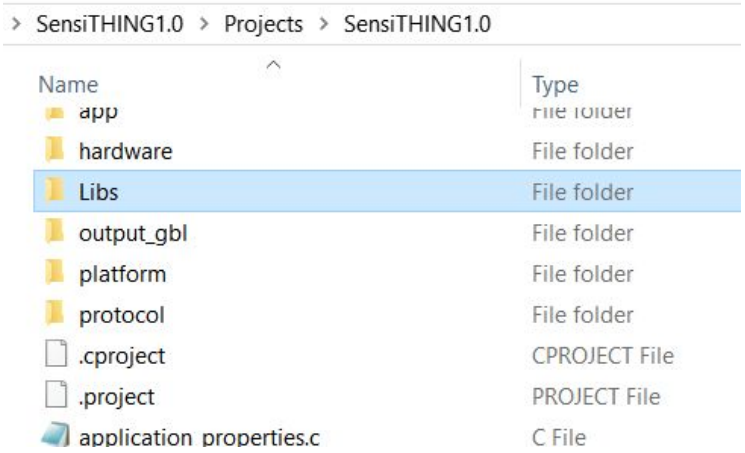
Figure 11 - SensiTHING 1.0 package folder structure



- **\Projects\bootloader-storage-internal-single-512k**: bootloader project for demo application. This is the original bootloader from SiLabs for chips with flash size 512k.
- **\Projects\SensiTHING1.0**: contains project and user files.
- **\Wiki:** contains datasheets, schematic and other additional information.

The project directory (**SensiTHING1.0**) contains the file and folder structure created by the Simplicity Studio launcher. This directory also contains the folder "Libs" - it contains the user project files.

Figure 12 - SensiTHING 1.0 project folder structure



The entry point of the application is in file \Projects\SensiTHING1.0\main.c.

Contact SensiEDGE support services for further information:

mailto:Support@SensiEDGE.com.

3.2 SensiTHING 1.0 Block Diagram