Table of Contents

1 Overview

1.1 General Information

SensiTHING 1.0 is an ARM-based high-performance System on Module. SensiTHING 1.0 integrates a microcontroller (MCU), a variety of sensors, Bluetooth connectivity, and wireless charging technology. Also, the device contains sensors for smoke detection, humidity and temperature, enabling stand-alone environmental control applications.

The low-power SensiTHING 1.0 design enables months of operation without charging.

SensiTHING 1.0 enables wireless connectivity, eliminating the need for RF experience or expertise. The on-board BLE module is already certified for global markets.

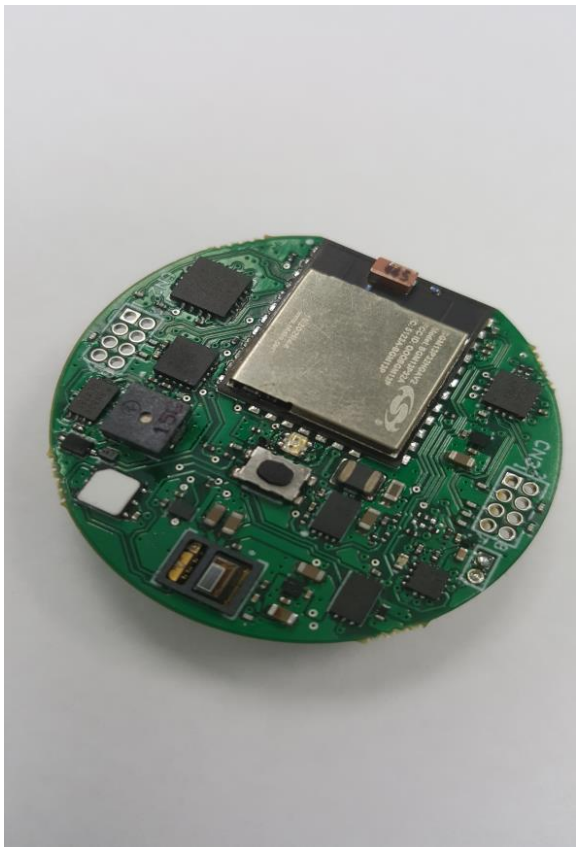


Figure 1 : SensiTHING 1.0

1.2 How to Buy

The SensiTHING 1.0 Dev Kit includes three units:

1. SIBAS-WPR32 : SensiTHING 1.0 module
2. SEDA-10 : Programmer Interface Board
3. SIRWPT-A48 : Wireless Charger

Ordering Dev kit part number : SIBAS-WC-DKL

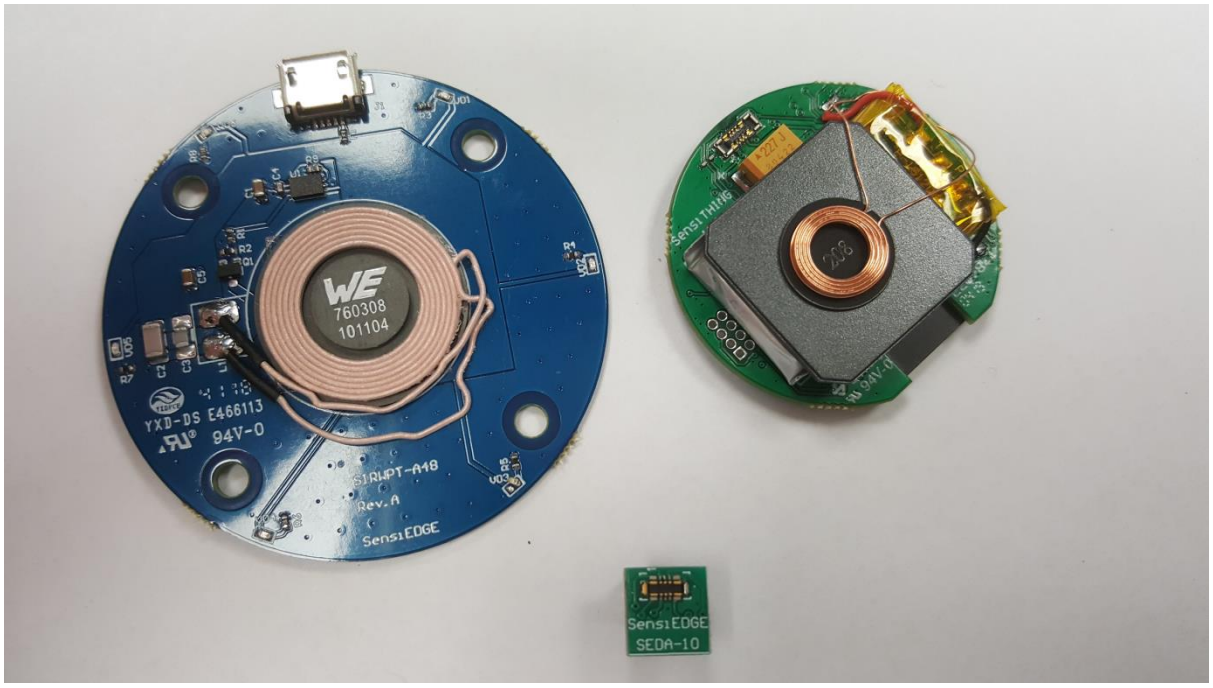


Figure 2 : SensiTHING 1.0 Dev Kit

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 hard power button, it is always in a sleep mode with low power consumption. To start the module, press and hold the button for a long time (~3sec). When the device turns on, you hear a short beep, and Status LED will start blinking with RED Light short flashes at a frequency of 1Hz. The device turns off by the same long pressing (~3sec) of the button. After the SensiTHING 1.0 is turned on, the BLE module starts the advertising process, and it is ready to connect. Demo firmware supports connection to only one device.

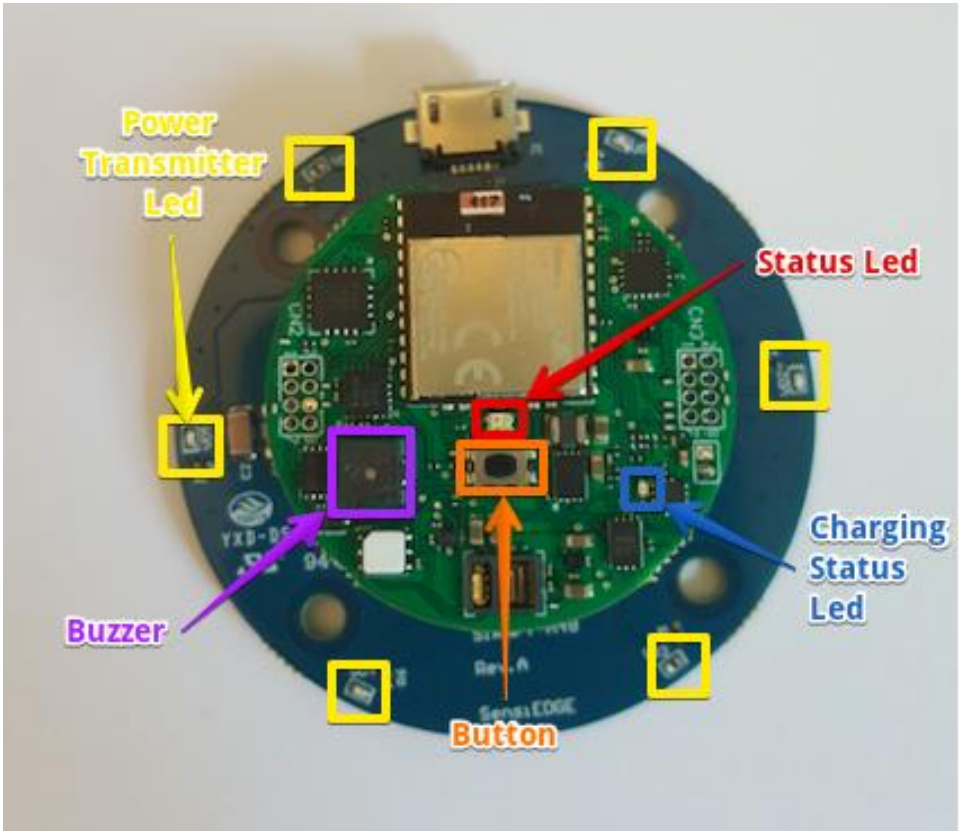


Figure 3 : SensiTHING 1.0 in Advertisement Mode

2.2 Windows Application “SensiEDGE Demo”

For working with SensiTHING 1.0, the “SensiEDGE Demo” application can be used.

Contact SensiEDGE support services for further information:

Support@SensiEDGE.com.

2.3 Connecting to SensiTHING 1.0

1. Before turning on the sensor unit (**SIBAS-WPR32**) we recommend charging it using the wireless charger board (**SIRWPT-A48**).
   Approximate charging times from a fully discharged state to the following levels are listed below.
   - 20% - 40 Minutes
   - 50% - 1 Hour 40 minutes
   - 70% - 2 Hours 20 minutes
2. Connect the wireless charger board to a USB power source (i.e. a free USB port on your laptop). The USB cable is not included in the BOX.

   Six blue LEDs should light up on the periphery of the charger platform.

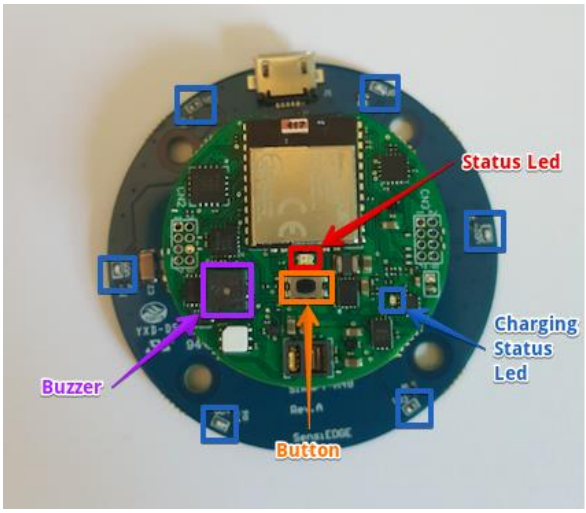


Figure 4 : Wireless Charger Board

3. Place the sensor unit (with its receiver coil at the bottom) on top of the wireless charger as shown on the picture. **Charging Status LED** (1 blue LED) on the sensor unit - while blinking slowly (approximately once per second) - indicate the correct position of the two coils and that the charging process has been started.
4. To activate the sensor unit, press and hold the **button** for 5 seconds until the **Status LED** lights up red.
5. Launch, by double-clicking on the icon, the “SensiEDGE Demo” application. By a default, the device has a Bluetooth name “SensiTHING1.0”. **Status LED** will change from RED to Green light that Indicate Connected to the APP.

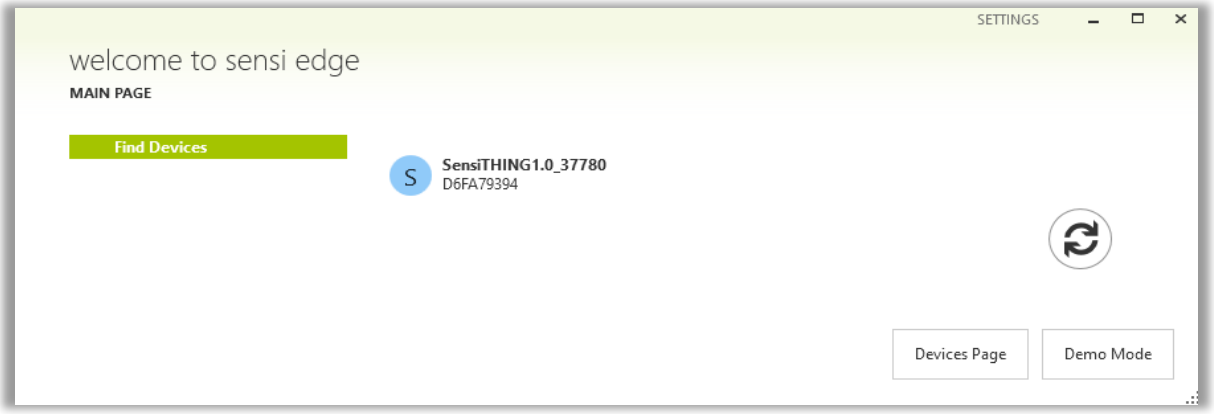
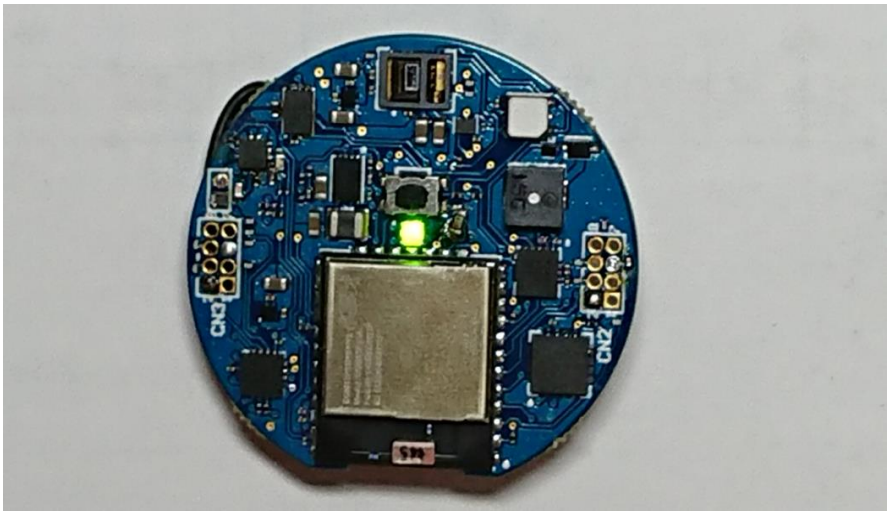


Figure 5 : SensiTHING 1.0 in "SensiEDGE Demo"

6. Click on the "S" icon next to the device name on the "Device Page" of the SensiEDGE Windows App to establish a Bluetooth connection. After a device connects to the



SensiTHING sensor unit, the green LED blinks and the **"SensiEDGE Demo"** Windows App shows sensor information in the "Environment" mode.

Figure 6 : SensiTHING 1.0 in Active Mode

By default, only one sensor unit can be connected at any time to the SensiEDGE Windows App.

Figure 7 : Environment Sensor Information in "SensiEDGE Demo"

2.4 The SensiTHING 1.0 Standard Modes

By default, the SensiTHING 1.0 has five available working modes. Note that additional modes may be shown in the **"SensiEDGE Demo"** but only the following modes are enabled:

1. Environment
2. Accelerometer
3. LED state
4. Battery status
5. Smoke sensor

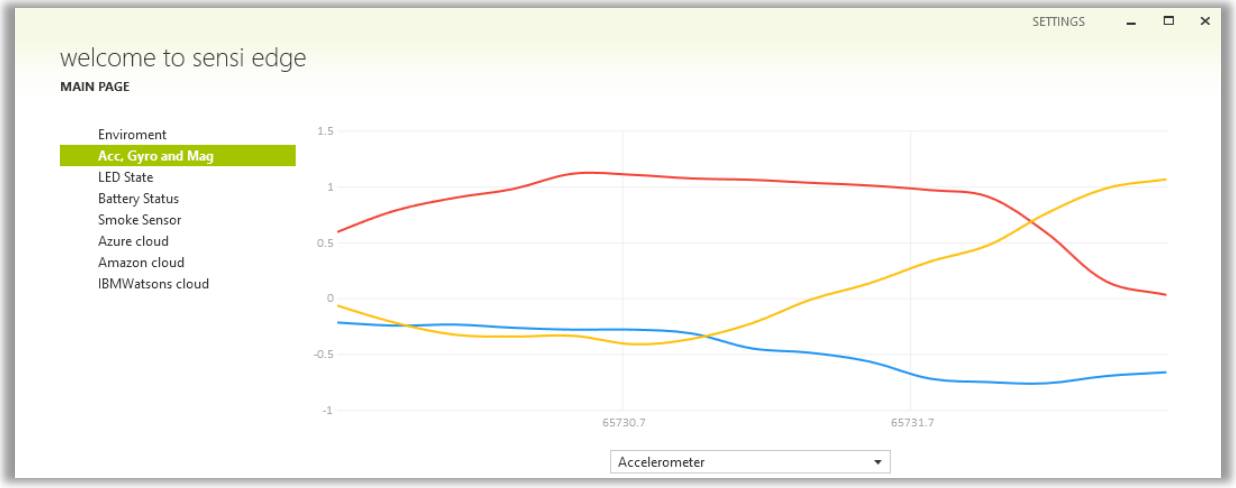


Figure 8 : Available Modes of SensiTHING 1.0

(Note: To disconnect the Bluetooth connection, either close the App or turn off the SensiTHING module by pressing the button and holding for 3 sec.)

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 wireless charger.

While charging, the status is displayed on the blue LED of the top board (Note: LEDs on the bottom board simply glow when charging is connected to the USB):

1. Slow blinking (0.8s) - charging in progress.
2. Fast blinking (0.3s) - charging error.
3. Lit constantly - charging is complete.

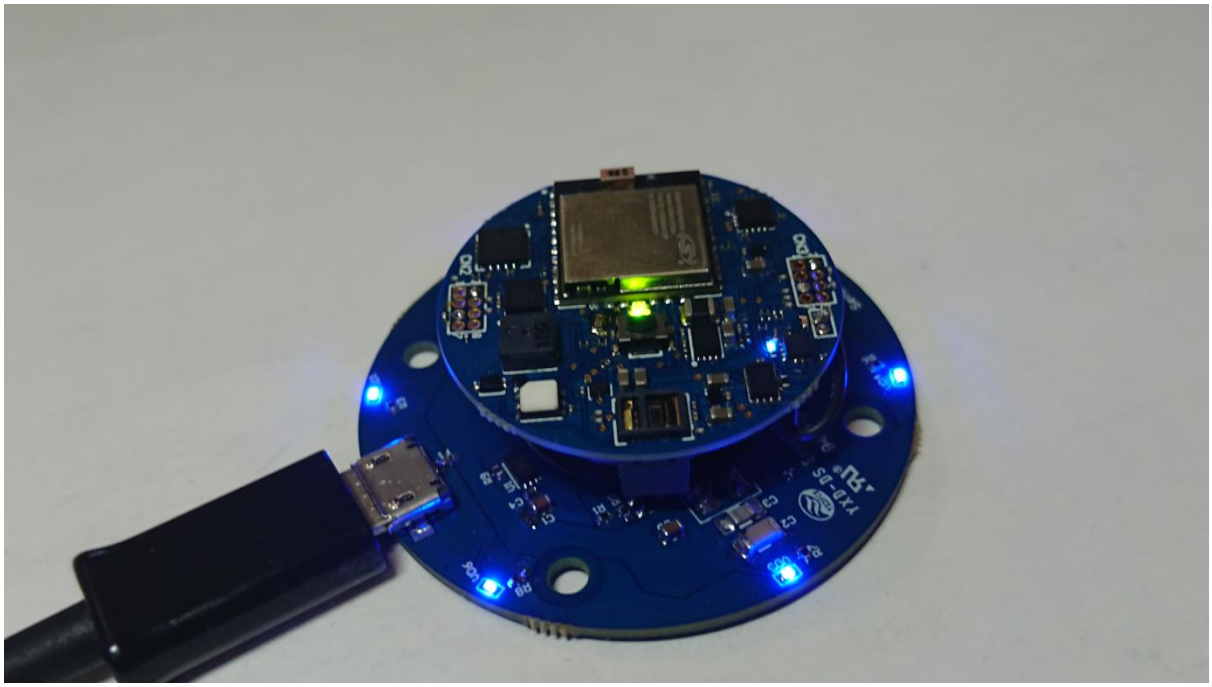


Figure 9 : Charging SensiTHING 1.0 Using Wireless Charger

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: **SensiTHING 1.0 .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 can be found at the following link but a summary of the instructions are included below (https://www.silabs.com/community/wireless/bluetooth/knowledge-base.entry.html/2018/05/30/using_blue_geckoapp-88g7).

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 to download 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.

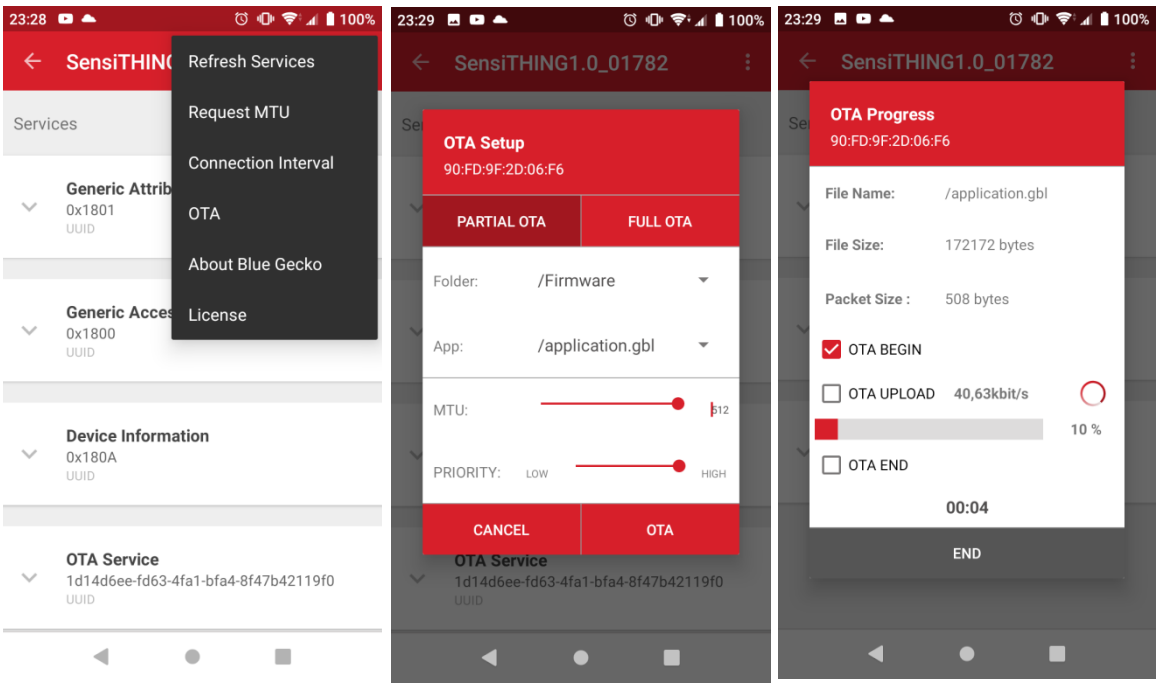


Figure 10 : Updating SensiTHING 1.0 Firmware

3 Firmware Demo

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 also supports debugging. Figure 11 shows the SensiTHING 1.0 connected to the J-Link programmer.

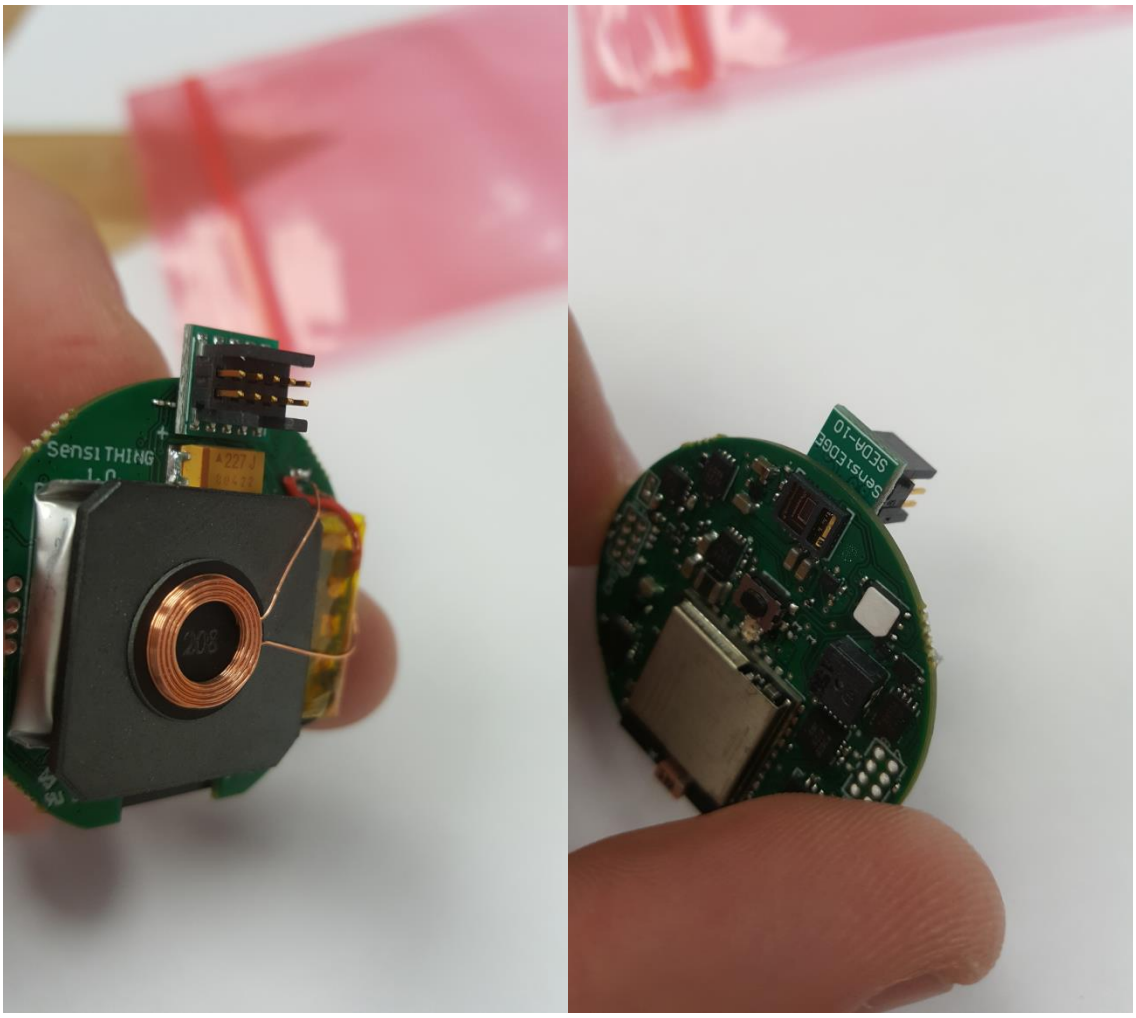


Figure 11 : SensiTHING 1.0 Connected to the J-Link Programmer

3.1 The Project Structure

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

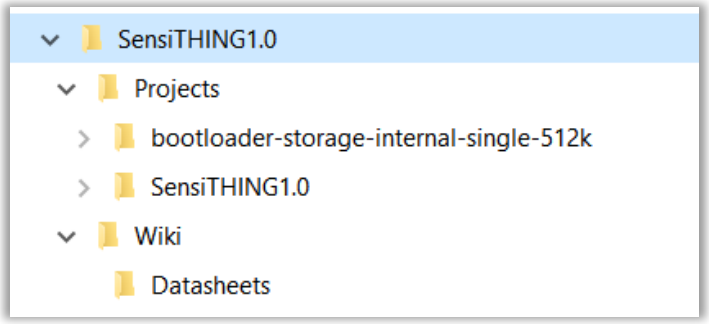


Figure 12 : SensiTHING 1.0 Package Folder Structure

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

The project directory (**\Projects\SensiTHING 1.0**) contains the file and folder structure created by the Simplicity Studio launcher. This directory also contains the folder "Libs", which contains the user project files.

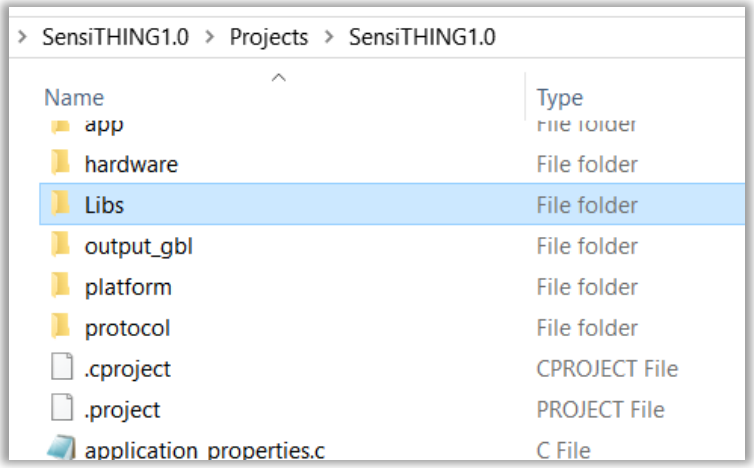


Figure 13 : SensiTHING 1.0 Project Folder Structure

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

Contact SensiEDGE support services for further information:

Support@SensiEDGE.com.

3.2 Software Dependencies

The project was built using the development environment Simplicity Studio v4.

Compiler:

1. GNU ARM v7.2.1 Gecko SDK Suite:
2. Bluetooth 2.10.1.0, MCU 5.6.1.0, Micrium OS Kernel (v2.4.1)

The user can change the used components to newer ones.

To do this, click on the tab "Project -> Properties", open the tab "C/C++ Build -> Board/Part/SDK"

To solve possible issues when migrating to newer versions of an SDK, please refer to the Silabs website.

Latest documentation: https://docs.silabs.com/bluetooth/latest/

Support: https://www.silabs.com/community/wireless/bluetooth/knowledge-base.entry

3.3 SensiTHING 1.0 Block Diagram

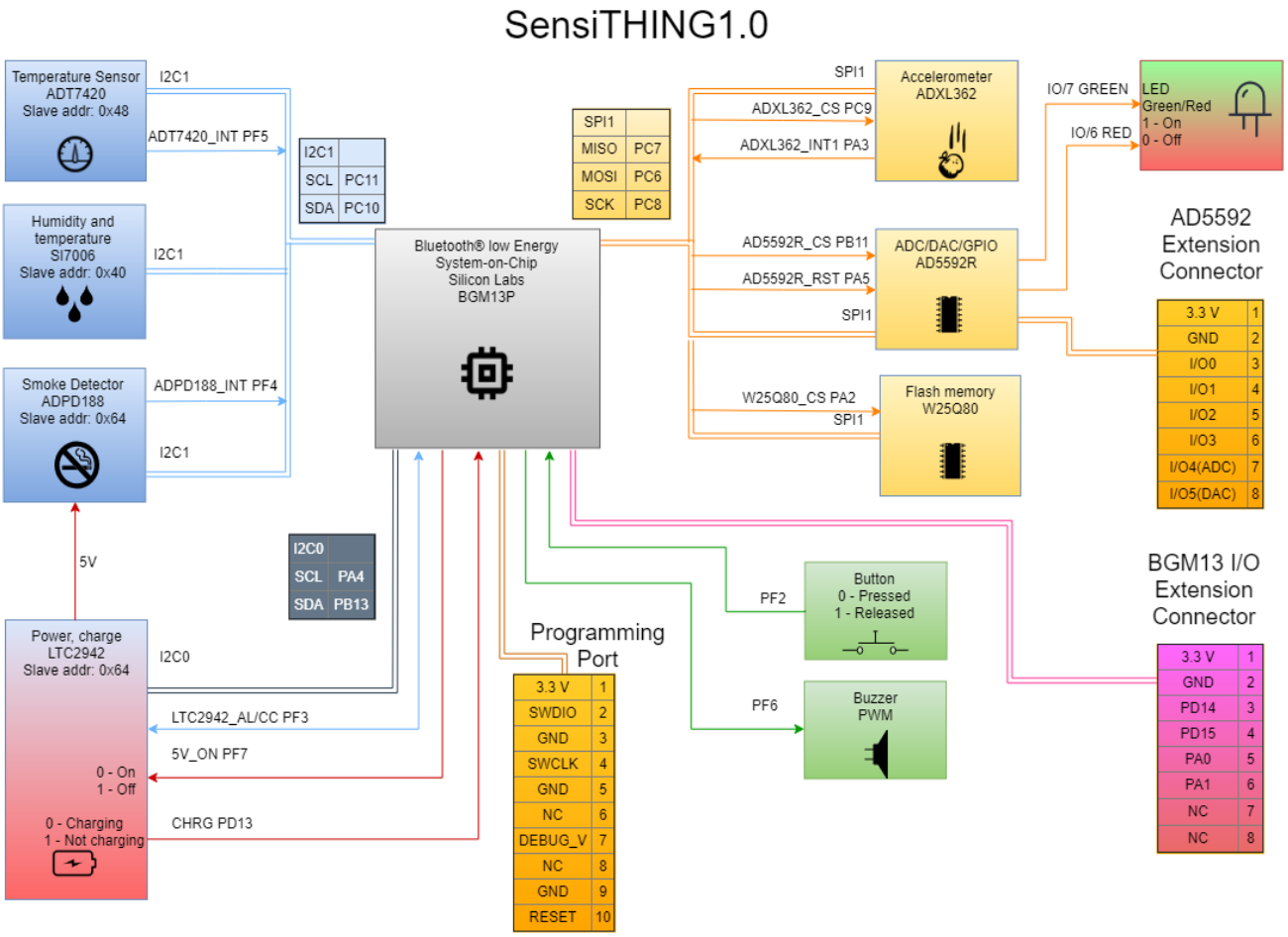


Figure 14 : SensiTHING 1.0 Block Diagram

3.4 Disclaimers

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