

UrsaLeo RPi Gateway

UL-RP1S2R2, Version 1.5

The UrsaLeo RPi IoT Evaluation Kit is designed to serve as a starting point for connecting sensors to UrsaLeo's 3D modeling demo. When assembled and powered on, data from nine different environmental and motion sensors is immediately sent to and presented on a photorealistic model you can specify using our Getting Started page.

Kit contents

- UrsaLeo RPi Gateway - based on Raspberry Pi 3 model B+
- Silicon Labs Thunderboard Sense 2 sensor board
- Strontronics universal power supply for Raspberry Pi
- 16GB microSD card preconfigured with Yocto Linux and UrsaLeo Gateway demonstration application

Getting started

The Evaluation Kit and demo are easy to assemble - follow instructions at www.ursaleo.com/gettingstarted



Overview

Once you've gone through all instructions on Getting Started, the Gateway software will start sending sensor data for display, processing and triggering actions. The sensor board can be powered using a USB cable (recommended) connected to the Gateway or from a coin cell battery. Note: power consumption of the Silicon Labs TB2 means a coin cell will only last one or two days. Once powered on, the Gateway will boot and connect to the sensor board using Bluetooth Low Energy and begin transmitting data to the specified 3D model through the wired or wireless internet connection.

Wired Ethernet

Connect an Ethernet cable to either ethernet ports - only DHCP is supported at this time. Both hot and cold plug is supported. Also - please note if WiFi AND wired Ethernet are connected at the same time, unpredictable behavior can result. At power-on, the Gateway will retrieve the time/date, establish a connection to the 3D model and begin sampling the

sensors and transmitting data. Readings will start appearing in the model a few seconds later.

Wifi Access

The Gateway supports WiFi Protected Access (WPA) and WiFi Protected Access II (WPA2) 802.11 wireless authentication and encryption standards. Detailed instructions for configuring wireless access is available www.ursaleo.com/gettingstarted. Only wired or wireless access is supported. Once configured the Gateway automatically establishes a connection to the cloud and begins sampling the sensors and transmitting data. Readings will start appearing in the specified 3D model a few seconds later.

LED debug

UrsaLeo provides an LED debug board that can be used to indicate the status of the Gateway.

The following LED conditions are available in code version 1.3

- * LED 1 on - system clock has updated time/date from NTP server
- * LED 2 on - data is being received from the Thunderboard
- * LED 3 on - MQTT link is established with Google Cloud
- * LED 4,5,6 are reserved for future use or for developers
- * All LEDs off - clean shutdown, power can safely be removed

Thunderboard reset

The Thunderboard stops advertising after 30 seconds (before the Gateway finishes booting for example). It is good practice to press the small black reset button on the TB2 after boot-up and at regular intervals.

Hardware specifications (Raspberry Pi 3 Model B+)

- Broadcom BCM2837B0, Cortex-A53 (ARMv8) 64-bit SoC @ 1.4GHz
- 1GB LPDDR2 SDRAM
- 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2, BLE
- Gigabit Ethernet over USB 2.0 (maximum throughput 300 Mbps)
- Extended 40-pin GPIO header

- Full-size HDMI
- 4 USB 2.0 ports
- CSI camera port for connecting a Raspberry Pi camera
- DSI display port for connecting a Raspberry Pi touchscreen display
- 4-pole stereo output and composite video port
- Micro SD port for loading your operating system and storing data
- 5V/2.5A DC power input
- Power-over-Ethernet (PoE) support (requires separate PoE HAT)

Sensor specifications (Silicon Labs Thunderboard Sense 2)

- Relative Humidity and Temperature Sensor Si7021
- UV and Ambient Light Sensor Si1133
- Pressure Sensor BMP280
- Indoor Air Quality and Gas Sensor CCS811
- 6-axis Inertial Sensor ICM-20648
- Digital Microphone ICS-43434
- High brightness LEDs
- Hall-effect Sensor Si7210

Datasheet Overview Version 1.5

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