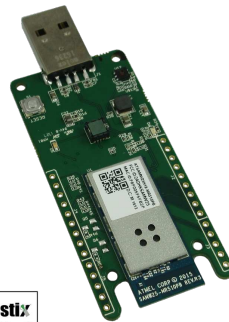




Gumstix® RoomSense Quickstart Guide

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1 Introduction

The Gumstix RoomSense occupancy and air sensor board is an Arduino-compatible IoT device capable of detecting room occupancy via passive IR, and temperature pressure and humidity. It incorporates the ATSAMW25 module, an ARM Cortex-M0+ combined with a WiFi transceiver, a Silicon Labs SI7021 humidity and temperature sensor, a TE MS5611-01 barometric pressure sensor, and a Murata IRS-B210ST01 PIR sensor. The PIR is controlled by an ON Semiconductor NCS36000 PIR detector controller.

The pinout of the board's two GPIO rails matches that of the Arduino MKR1000, and the male USB Type-A jack connects directly to a host PC for programming and power.

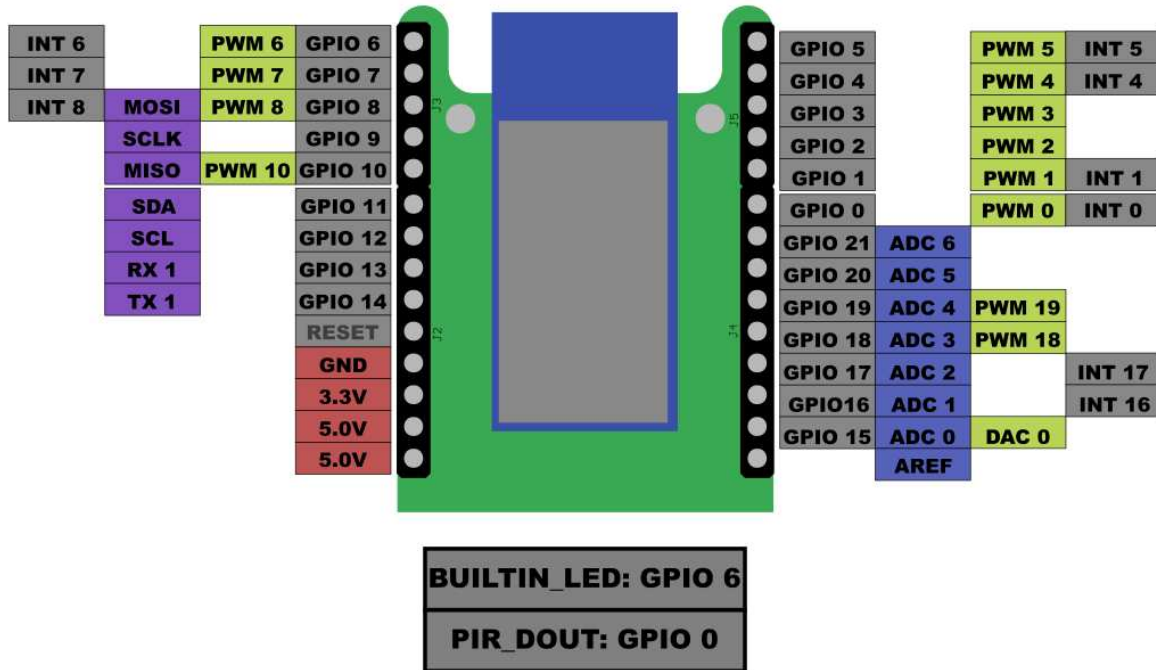
This document provides basic information about the board design and instructions for setting up the RoomSense development board with an example sketch.

2 Pin-Out Diagram

Figure 1 outlines the pin layout and configuration options of the RoomSense's four headers, as well as the GPIO assignment for the green built-in LED and the Passive IR controllers data-out pin.



Figure 1: RoomSense header pin-outs



3 Passive IR Module Features

The passive IR module has multiple elements. The first is the infrared sensor on the top side of the board. For effective operation it is ideal to use a Fresnel lattice lens. A compatible lens will be included with your RoomSense board. It will fit securely around the sensor's housing.

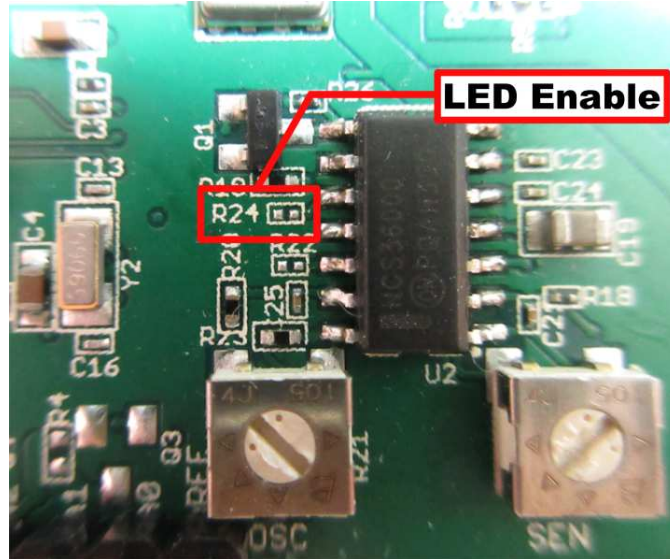
Secondly, there are two potentiometers (pots) connected to the PIR controller on the reverse side of the board. The first, labeled OSC, controls how often the sensor's state is checked. Adjust this pot to increase or decrease this interval. The second pot, labeled SEN, is used to adjust the sensitivity, affecting the range of the device.

Finally, there is a red LED connected to the PIR controller that can be hard wired to indicate when motion is detected. By default, the indicator LED is disabled. In this state, it will blink during startup and will stop when the passive IR sensor is active.

To set it to illuminate when the sensor is triggered, place a 0Ω resistor on the unpopulated 'R24' pad, or short out the connection with wire or some solder. **Figure 2** indicates the location of this resistor pad with respect to the control chip and potentiometers.



Figure 2: Location of 'LED Enable' resistor pad



4 Example Sketch

The following section is an overview of the setup procedure for the 'RoomSense Cayenne Relay Control' example project with Arduino IDE and MyDevices Cayenne. This involves:

- Downloading and installing the Arduino IDE
- Adding the required Arduino libraries
- cloning and configuring the sketch
- Setting up a Cayenne account and adding the device
- connecting the device to a power relay

4.1 Required Materials

- 1x Gumstix RoomSense PIR board
- 1x AC/DC control relay (Eg. Digital Loggers IoT Relay <http://www.iotrelay.com>)
- soldering tools and wire
- small standard screwdriver

4.2 Installing the Arduino IDE

1. Download the Arduino IDE from <https://www.arduino.cc/en/Main/Software> and install it following the instructions for your operating system.



2. Start the IDE and install the required board package

Go to Tools>Board:>Board Manager

Search for 'Arduino SAMD boards', click on the package with that name and click 'install'

3. Select 'Arduino MKR1000' from Tools>Board:

4. Install the required libraries for the sketch by clicking on Sketch>Include Library>Manage Libraries... and searching for the following:

CayenneMQTT

I2C-Sensor-Lib iLib

MS5xxx

SparkFun Si7021 Humidity and Temperature Sensor

WiFi101

Optionally, there is a library for over-the-air sketch updates. 'WiFi101OTA' can be used to upload sketches over the wireless connection. For more information, see <https://www.arduino.cc/en/Reference/WiFi101OTA> for more details.

4.3 Cloning the 'RoomSense Cayenne Relay Controller' Sketch

1. Clone the example sketch from <https://github.com/gumstix/arduino-examples> and enter the 'arduino-examples/roomsense-cayenne-relay-ctl' directory.
2. Change the name of `settings.h.example` to `settings.h`.
3. Open the sketch.
4. Enter your WiFi network's SSID and passphrase into `settings.h` where specified.

4.4 Adding RoomSense to Cayenne Account

1. Go to <https://cayenne.mydevices.com> and login or create a new account.
2. Once you are logged in and are looking at your dashboard, click the 'Add New...' button in the top left corner and select 'device/widget'.
3. Click the 'Bring Your Own Thing' button that appears.
4. Copy the MQTT username and password into the appropriate variable declarations in `settings.h` in the Arduino sketch.
5. Copy the client ID into the `mqttID` variable in `settings.h`.
6. Enter a descriptive name for your device.
7. Cayenne is now waiting for your device to connect



4.5 Upload Sketch to RoomSense

1. Connect the board to a USB port on the host machine
2. Click on Tools>Port>ttyACMx (Arduino MKR1000)
In Windows, the serial port will appear as COMx
3. Compile and upload the sketch onto the RoomSense by clicking on the arrow button on the toolbar or on Sketch>Upload
4. Once the MCU reboots and connects to your WiFi network, Cayenne will detect it and add it to your device sidebar.

4.6 Extra: Add Cayenne Input Widgets

The 'RoomSense Christmas IoTree' sketch includes two input fields, the manual activation button and idle shut-off delay slider. You can add these to your dashboard as follows:

4.6.1 Manual Activation Button

1. Click Add New...>Device/Widget.
2. Select Custom Widgets, and click on Button.
3. Give your new widget a descriptive name ('Christmas Tree On')
4. Select your RoomSense from the Device drop-down
5. Under Sensor set:
Data: Digital Actuator
Unit: Digital(0/1)
Channel: 7
6. Choose an icon for the widget
7. Click Add Widget

4.6.2 Idle Timeout Slider

1. Again, click Add New...>Device/Widget>Custom Widget
2. Click on the Slider control widget
3. Name your slider.
4. Choose the RoomSense device from the Device drop-down
5. Under Sensor set:
Data: Analog Actuator
Unit: Analog
Channel: 4



6. Set the minimum and maximum values of the slider to the time range, in minutes, to which you would like to set the delay timer
7. Click Add Widget.

4.7 Connecting Board to Relay

Completing the connection between the RoomSense board and the Digital Loggers relay will require a soldering kit and a small standard screwdriver. If you are powering the RoomSense from the relay, you will also require an AC-to-USB 5V converter, such as a cellphone charger.

Figure 3: RoomSense with wires connected to screw-terminal plug



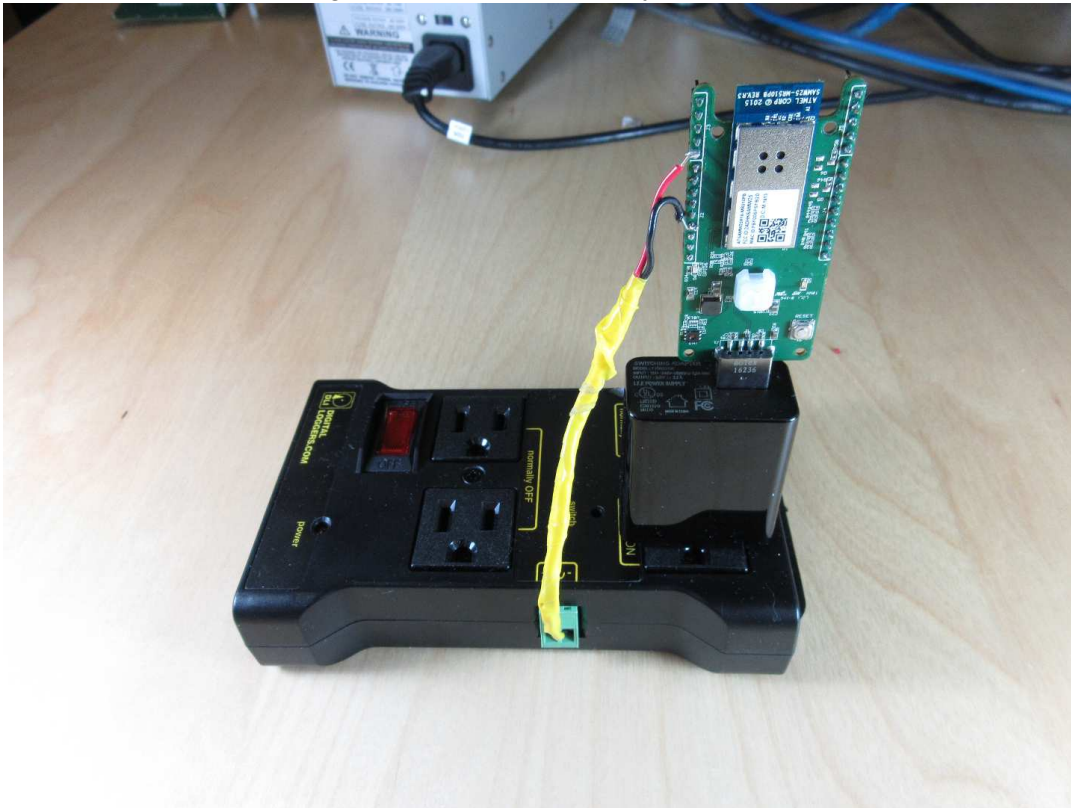
1. Solder a length of wire (minimum 16cm in length) to the GND through-hole and one to that of GPIO 10
2. Remove the green 2-pin screw terminal from the relay's side port
3. Loosen the two top screws and insert the ground wire into the right-hand terminal and the GPIO wire into the left-hand one (**Figure 3**)
4. Connect the RoomSense to the USB power supply and plug it into the relay's 'Always On' outlet and the screw terminal back into it's port (**Figure 4**)
5. Plug in the relay and connect the device you would like to control into one of the switchable plugs on the relay

For example, plug your Christmas tree lights into a 'Usually Off' outlet to light up the tree when someone is in the room

The red indicator light on the RoomSense will begin to blink and the sketch will connect to Cayenne over the Internet after a few moments. You will then be able to trigger the relay through the button added to the Cayenne dashboard earlier. Once the indicator light stops blinking, the passive IR motion detection sensor will also trigger activation of the relay. When the PIR sensor has been idle longer than the adjustable timeout, the RoomSense will deactivate the relay switch.



Figure 4: RoomSense and relay connected



5 Geppetto Design-to-Order

Geppetto[®]D20, is a free online design and production tool for creating custom expansion boards. A hardware design can be completed in hours, and ready to ship in fifteen business days. As they design, users can compare alternatives for features and costs, create multiple projects, and go straight from a design to an order in one session. Gumstix engineers verify all Geppetto-manufactured devices before shipping.

The RoomSense IoT development board was designed by Gumstix engineers in Geppetto. To design your own hardware with Geppetto, go to <https://geppetto.gumstix.com>

External Links

- <http://www.iotrelay.com>, 3
- <https://cayenne.mydevices.com>, 4
- <https://geppetto.gumstix.com>, 7
- <https://github.com/gumstix/arduino-examples>, 4
- <https://www.arduino.cc/en/Main/Software>, 3
- <https://www.arduino.cc/en/Reference/WiFi1010TA>, 4

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