Remote Vacation Home Monitor using NXP Rapid IoT

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Overview

This is a Proof-of-Concept (POC) use of the NXP Rapid IoT Prototyping Kit to remotely monitor the environment inside a vacation or elderly parent's home reporting indoor temperature, humidity, air quality and security.

Using the NXP Rapid IoT Remote Home Monitor

Once programmed and configured, place the NXP Rapid IoT device in a central location of the vacation home or other location to be monitored. Connect to the local WiFi using the NXP Gateway, sign up for remote access via web site. Data is then collected and reported on the web site every few minutes. Set notifications if temperature, humidity, air quality, etc. exceed user defined bounds, including if data collection fails (power outage, Internet failure, etc.) Add local security (door open, etc.) detectors based on BLE, Zigbee, etc. as desired. Also using the NXP website https://rapid-iot-studio.nxp.com/ you can display graphs.

NXP Rapid IoT Node Hardware Features:

- Kinetis® K64 MCU based on Arm® Cortex®-M4 Core
- KW41Z Wireless MCU (BLE, Thread, Zigbee)
- NT3H2211 NFC Forum Type 2 Tag
- A1006 Secure Authentication & anti-counterfeit IC
- Multiple sensors (Gyroscope, Acc/Mag., Barometer/Temp., Air Quality, Ambient light and capacitive touch)
- Priced at approx. $50.

Parts List

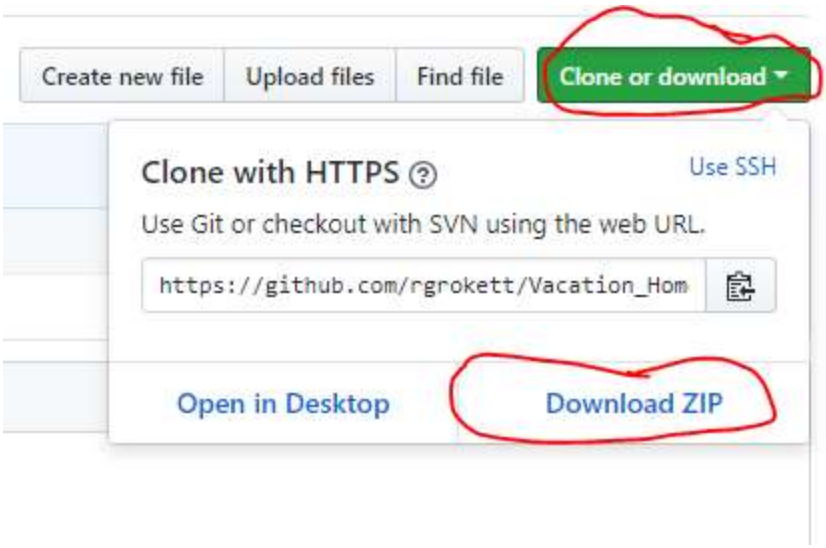
- Rapid IoT Prototyping Kit -- https://www.nxp.com/rapid-iot
- NXP Rapid IoT Studio online IDE (available at above)
- Rapid IoT App for iPhone/Android
  https://itunes.apple.com/us/app/nxp-rapid-iot/id1369731493?mt=8
  https://play.google.com/store/apps/details?id=com.nxp.iot.rapidiot&hl=en_US
- Remote Home Monitor software – Github
  https://github.com/rgrokett/Vacation_Home_Monitor
- NXP Modular IoT Gateway SLN-IOT-GPI (Optional for POC)
  https://www.nxp.com/support/developer-resources/nxp-designs/iot-gateway-solution-sln-iot-gpi:SLN-IOT-GPI

Configuring

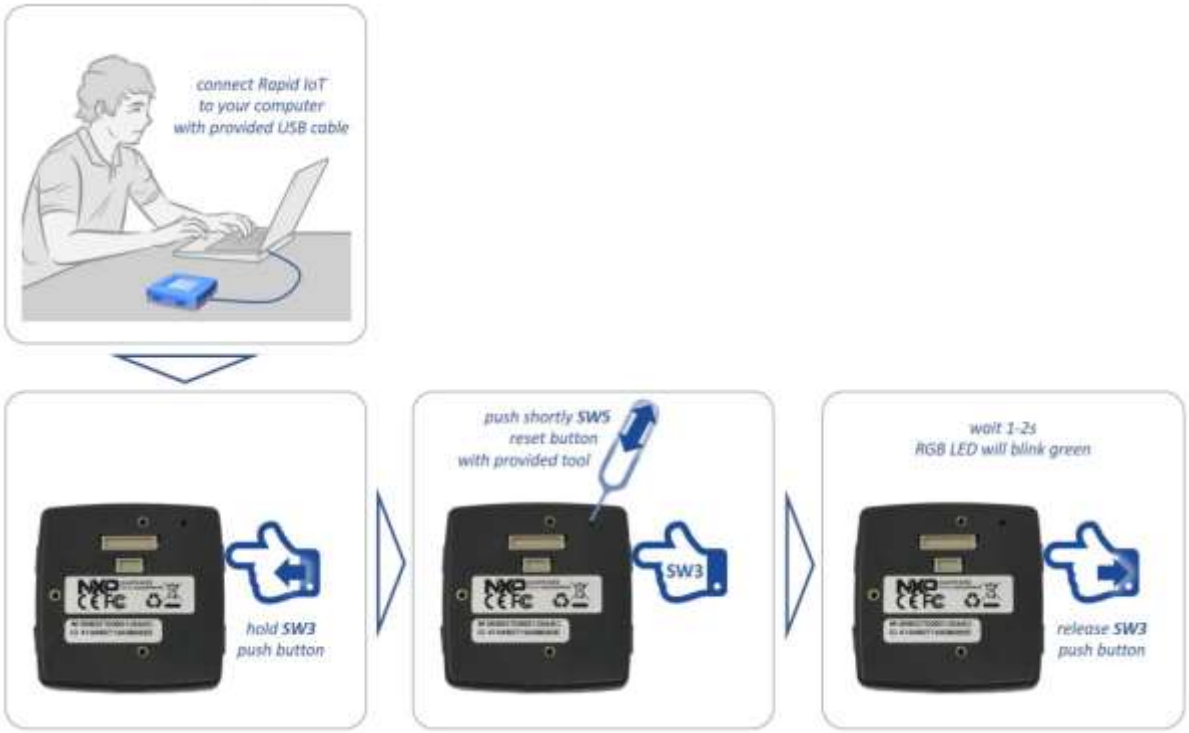
1. Prepare your NXP Rapid IoT device:
   Go to the NXP Rapid IoT Getting Started page to set up your phone/tablet app, web-based IoT app and your NXP device. You only need the free NXP account and phone app installed and logged in.
   https://www.nxp.com/support/developer-resources/rapid-prototyping/nxp-rapid-iot-prototyping-kit:IOT-PROTOTYPING?tab=In-Depth_Tab

   Once you successfully connect your phone and cloud access via Bluetooth as described in Getting Started page, you will need to install the Vacation Home Monitor application to the NXP node:

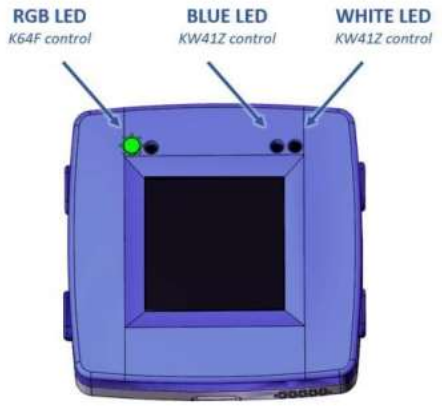
2. Download the Vacation Home Monitor app from Github to your PC or Mac:
   a. Go to https://github.com/rgrokett/Vacation_Home_Monitor
   b. Click on **Clone or Download** then **Download ZIP**



3. Unzip the files to an empty folder on your PC/Mac.
4. Plug in your NXP Rapid IoT device to your PC/Mac.



5. Hold down the SW3 button and press SW5/Reset button
   Wait until the LED blinks GREEN then release the SW3 button.
6. Your computer should now detect the NXP as a new Mass Storage drive.
7. Drag-n-drop (or copy/paste) the **"Vacation Home Monitor.bin"** file into the Mass Storage drive.
   The LED will blink purple during the download, then blue/white during programming and green.
   Do NOT touch until it completes and resets. (up to 1 minute)



8. Once finished, the device will automatically reset.
9. You can now eject the Mass Storage drive.

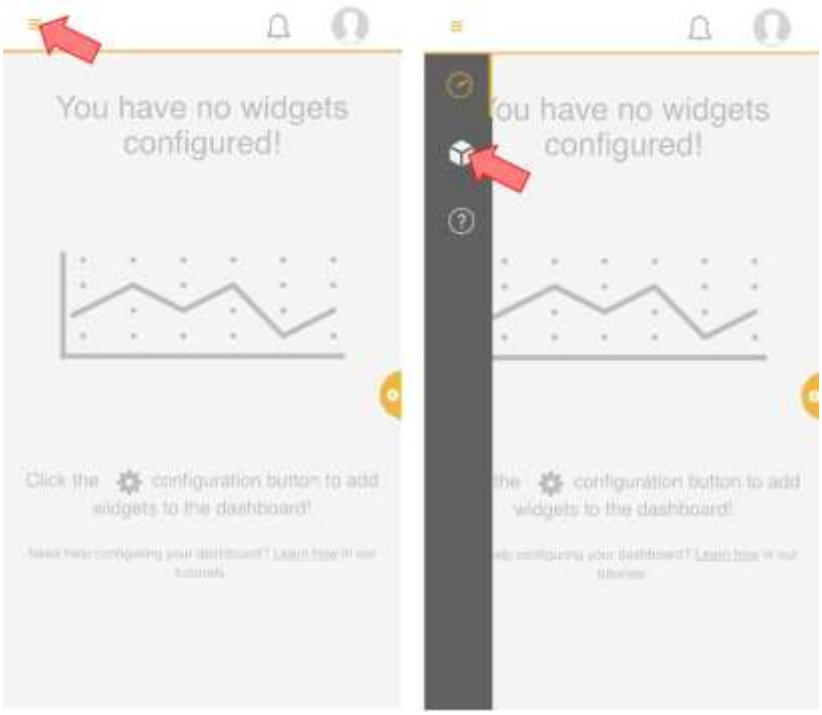
NOTE: if you need to Factory Reset your NXP device, see Appendix, below.

You should now see a Temperature display in the NXP's screen.

Connect Phone/Tablet to NXP Vacation Home Monitor App

Once your NXP device is programmed, you need to set up the phone for this application.

1. On your phone/table, start the NXP Rapid IoP app.
2. Log in with the account you created previously in the Getting Started web page.
3. Click the Menu icon in the upper left corner and then click the Box icon for the Device screen.



4. Click the other box icon in the upper right corner

5. You should now see a screen with the “Vacation Home Monitor” application listed.
   (If not, be sure your phone’s Bluetooth is turned on)
6. Select Vacation Home Monitor application and click Provision. It will download to your phone.
7. If you see a “You have no widgets…” screen, click the widgets dashboard icon.

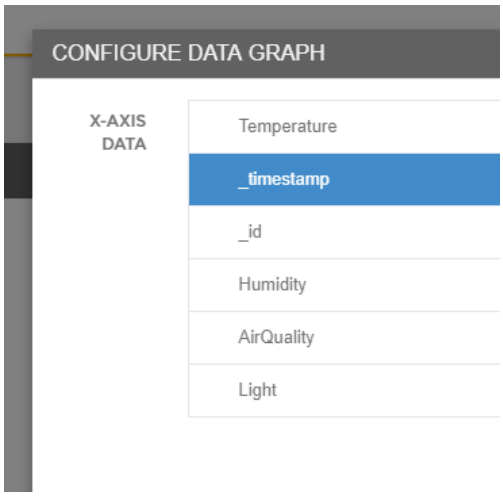
After a few seconds, you should get a data display on your phone. This data should update every 60 seconds or so.

Usage

1. Position the NXP node in a central room, such as living room, and place on a table near an A/C power outlet.
2. Plug the NXP node into A/C power. It contains a battery backup in case of power failure.

3. Note that the NXP node's LCD backlight will automatically turn off to conserve power. Touch the node device anywhere on its frame to turn the backlight back on for a few seconds.
4. For Proof-of-concept, you will need to leave your cellphone running the NXP app to act as the NXP Hub. If you have the SLN-IOT-GPI Hub, you can connect the NXP node to the hub and use it instead of the phone as the hub. This is the standard solution.
5. Watch for data update once per minute. Or check the Bluetooth icon on the bottom right corner of the screen. If it is **blinking**, then you have lost Bluetooth signal!
6. You can add chart graphs using either the phone or website https://rapid-iot-studio.nxp.com

   a. Select the Dashboard icon (looks like a speedometer)
      You should see "You have no widgets configured"
   b. Click the gear icon on the right side of the screen,
      or where it says "Click the * configuration button…"
   c. The Configuration Dashboard will appear.
   d. Click on the Data Graph icon and a window will appear.
   e. In the Data Graph window, click gear icon above "Widget is not configured"
   f. Title: Is It Fresh
   g. X-Axis: Select Vacation Home Monitor-> Sensor Data->_timestamp



h. Y-Axis: Select Temperature & Humidity

The graph should start populating. You can add separate graphs for Air Quality and the Motion detector by repeating above steps, selecting the other data. (These need separate graphs to allow proper scaling to occur.)

As long as the phone/tablet is within Bluetooth range (~30 ft) of the NXP node, and the NXP program left running in the background, the graphs should update.

To replace the phone, you will need a compatible Hub such as the NXP SLN-IOT-GPI kit
https://www.nxp.com/part/SLN-IOT-GPI

Under the Hood

If you use the NXP Rapid IoT Web IDE https://rapid-iot-studio.nxp.com/ , you can load the .atmos file and view or modify your copy.

This app takes temperature, humidity, ambient light and air quality readings every 60 seconds. The data it relayed via Bluetooth Low Energy (BLE) to your NXP Hub (or phone/tablet) running the NXP app. The app relays the data to the NXP cloud for web graphs.

Appendix - Troubleshooting

If your NXP hangs and nothing seems to work, you may need to reset the device:

First try a reboot:

1. Using a paperclip, push and release the Reset button
2. The NXP node will reboot and rerun the current application.

Factory Reset NXP Rapid IoT Node:

1. Plug in your NXP device to your PC/Mac
2. Hold down the SW1 button and press the SW5/Reset .
3. Continue holding the SW1 button for another couple seconds until Green LED starts flashing.

4. The LEDs will go through a cycle of Green, Purple, Blue and/or White and then resets automatically.
5. The factory application will automatically be installed from internal flash memory and run once it reboots.