# Robot basic architecture based on SSES Blueprint

# Installation guide

# Exhibit


# V1.2 03/23/2022

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1. Connecting sensor module and gateway(IoT)

① Turn on the power of the sensor module

Turn on the power to the sensor module, either with the USB cable or with the battery (see below). If you use the USB power supply, the sensor module may hang up in rare cases due to the cable or power port, although it is only a power supply. The sensor module may hang up due to the cable or power port.

② Connect to the gateway via Bluetooth (using GUI)

From a PC connected to the network, access the gateway via VNC and pair it with the sensor module. use the Raspy icon in the upper left corner of the RapberryPi4 screen and go to Settings -> bluetooth manager (blueman). You can use blueman to recognize the BT as a serial port. When the pairing is complete, you should see something like the following picture.



By having all the input ports recognized as serial ports, we have increased the versatility of the Node-RED flow described below.

In addition, the command-level connection required for automatic connection of the sensor module at power-on is described below.

1.1 Troubleshooting

Pairing using Blueman does not work as expected, replace the procedure with the bluetootctl command, see Connecting to the gateway via Bluetooth.

③ Check the connection with GTKterm (GUI)

Select and launch GTKterm from the Raspy icon as shown in the following figure.



Once launched, click on the Configuration tab.



Enter the port according to the hardware configuration, such as /dev/rfcomm0 or /dev/rfcomm1. For the baud rate, enter 1000000 bps (1Mbps). Other than that, the defaults are OK.

After completing the settings, click the OK button.

When the text data starts flowing as shown in the following figure, the connection is OK.



④ Starting Node-RED

From the Raspy icon, go to Programming → Node-RED to launch Node-RED.

If you have Node-RED set to auto-start, then this step is not necessary.

This completes the configuration (working via VNC) on the gateway.

⑤ Starting Node-REDGUI
You access http://<address of the repeater>:1880 from a PC connected to the network, the editing screen of Node-RED on the repeater will appear in your browser.

⑥ Editing incoming data reading with Node-RED
This section shows how to read data received via BT port into Node-RED.

Place two nodes [serial in] and [debug] on the canvas where you want to describe the flow, and connect them.
Open the configuration of the serial node and set the port to match the hardware situation, such as /dev/rfcomm1, and set the baud rate to 1000000bps (1Mbps).

The other settings can be left at their default values.

⑦ Executing Node-RED
Finally, click "Deploy" to complete the process. The display of the [serial in] node will change to "Connected", and the data sent from the sensor module will be displayed on the debug screen.
If the operation is unstable, such as repeated connection and disconnection, please reset the sensor module.
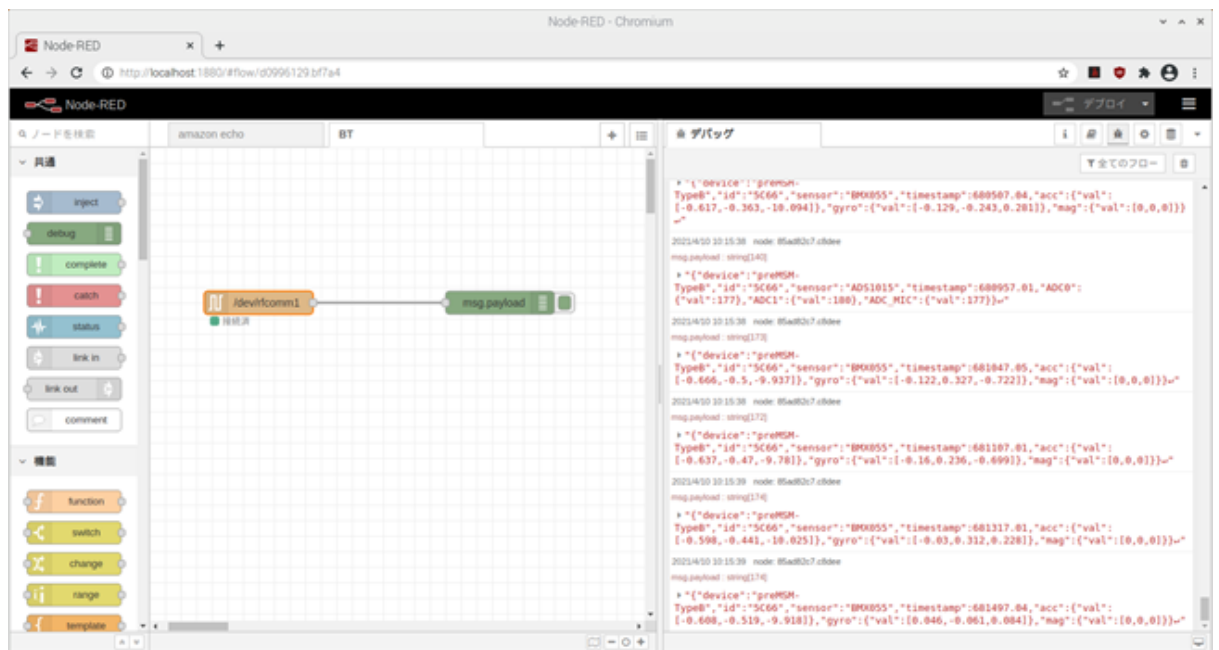
This completes the setup for data transfer from the sensor module to the gateway on the IoT side.

If you want to use multiple sensor modules, pair them using blueman and assign a device to each of them.

Example : /dev/rfcomm2, /dev/rfcomm3 ···

2.  Changing sensor module settings from Node-RED

3.  Connecting gateway through command

This section explains how to connect the sensor module and the gateway at the command level. It is assumed that the sensor module and the gateway are each powered on.

① Connecting to the gateway via Bluetooth

Command following.

```
$ bluetoothctl power on
$ sudo rfcomm bind [SerialNumber] [Bluetooth Device Address]
```

At the very least, if these two commands are executed at power-on, the sensor module and gateway will be connected automatically after power-on. In the sample program, we use Node-RED to execute the above two commands. Once the connection is established, it will automatically recover even if the power of the sensor module is turned off and on.

$ bluetoothctl power on

The command to turn on the Bluetooth receiver.

$ sudo rfcomm bind [SerialNumber] [Bluetooth Device Address]

This command is used to bind a Bluetooth device to a serial port. For example The following example shows how to connect a sensor module with Bluetooth Device Address 34:AB:95:5A:6E:42 to /dev/rfcomm0.

```
$ sudo rfcomm bind 0 34:AB:95:5A:6E:42
```

② Checking the connection with GTKterm

To start up GTKTerm from the command line, use the following single command.

```
$ gtkterm -p /dev/rfcomm0 -s 1000000
```

When the measurement results start to flow as shown below, you can confirm that the system is working properly.

File  Edit  Log  Configuration  Control signals  View  Help
{"device":"preMSM-TypeB","id":"6E42","sensor":"BME680","timestamp":175463.01,"temp":{"val":34.94},"humid":{"val":44.17},"press":{"val":1000.29},"gas":{"val":57.12}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":175832.29,"ADC0":{"val":184},"ADC1":{"val":181},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":176063.03,"ADC0":{"val":182},"ADC1":{"val":185},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":176663.04,"ADC0":{"val":180},"ADC1":{"val":183},"ADC_MIC":{"val":310}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":177263.01,"ADC0":{"val":183},"ADC1":{"val":183},"ADC_MIC":{"val":310}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":177863.02,"ADC0":{"val":185},"ADC1":{"val":187},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"BME680","timestamp":178463.03,"temp":{"val":34.95},"humid":{"val":44.16},"press":{"val":1000.28},"gas":{"val":57.2}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":178832.28,"ADC0":{"val":185},"ADC1":{"val":182},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":179063.03,"ADC0":{"val":180},"ADC1":{"val":186},"ADC_MIC":{"val":310}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":179663.04,"ADC0":{"val":181},"ADC1":{"val":183},"ADC_MIC":{"val":310}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":180263.03,"ADC0":{"val":182},"ADC1":{"val":185},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":180863.04,"ADC0":{"val":180},"ADC1":{"val":185},"ADC_MIC":{"val":310}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"BME680","timestamp":181463.03,"temp":{"val":34.97},"humid":{"val":44.13},"press":{"val":1000.29},"gas":{"val":57.39}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":181832.32,"ADC0":{"val":187},"ADC1":{"val":185},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":182063.03,"ADC0":{"val":181},"ADC1":{"val":182},"ADC_MIC":{"val":310}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":182663.01,"ADC0":{"val":183},"ADC1":{"val":183},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":183263.04,"ADC0":{"val":180},"ADC1":{"val":182},"ADC_MIC":{"val":310}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":183863.02,"ADC0":{"val":183},"ADC1":{"val":185},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"BME680","timestamp":184463.04,"temp":{"val":35},"humid":{"val":44.09},"press":{"val":1000.29},"gas":{"val":57.16}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":184832.19,"ADC0":{"val":184},"ADC1":{"val":181},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":185063.03,"ADC0":{"val":180},"ADC1":{"val":183},"ADC_MIC":{"val":310}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":185663.02,"ADC0":{"val":183},"ADC1":{"val":186},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":186263.01,"ADC0":{"val":181},"ADC1":{"val":183},"ADC_MIC":{"val":309}}
{"device":"preMSM-TypeB","id":"6E42","sensor":"ADS1015","timestamp":186863.05,"ADC0":{"val":181},"ADC1":{"val":181},"ADC_MIC":{"val":310}}
/dev/rfcomm0  1000000-8-N-1                                                    DTR  RTS  CTS  CD  DSR  RI

4. References

SIP: https://sip-sses.net/

Data transfer to IoT: https://sip-sses.net/iot_data_transfer/

## 5. Revision history

| Version | Date | Editor | Contents |
| --- | --- | --- | --- |
| 0.1 | 02/08/2022 | Inoue | Draft version |
| 1.0 | 02/08/2022 | Inoue | Review completed and published as first edition |
| 1.1 | 03/23/2022 | Inoue | Add troubleshooting for blueman |
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