

IoT pHAT

RedBear IoT pHAT, designed for the Raspberry Pi Zero (other RPi boards with 40-pin header will also work).

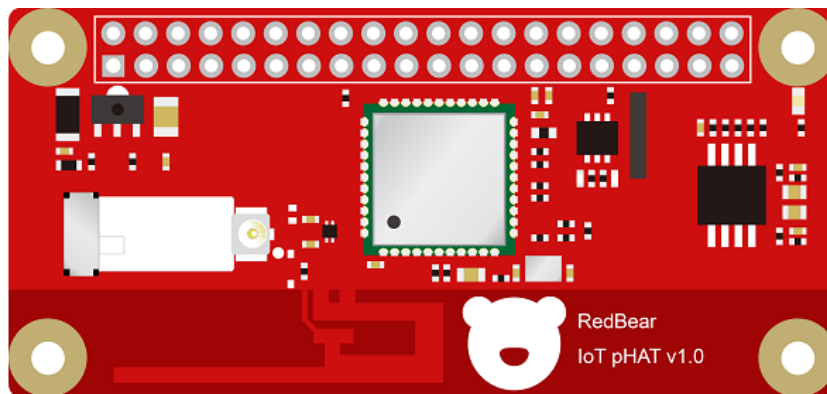
The RPi Zero is a nice board, it is small in size which is very good for developing IoT projects. However, it lacks of wireless features such as WiFi and Bluetooth.

With the IoT pHAT, now, your RPi Zero will get more powerful than before. It adds WiFi and Bluetooth wireless technologies to the RPi Zero.

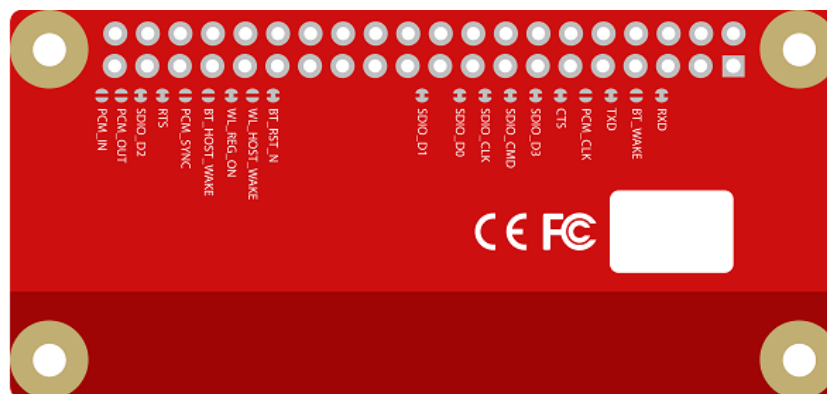
Note for beta testers with older version of the IoT pHAT:

This is for the hardware version 1.0 only, the EEPROM contains the information for automatically starting the WiFi, Bluetooth and other settings.

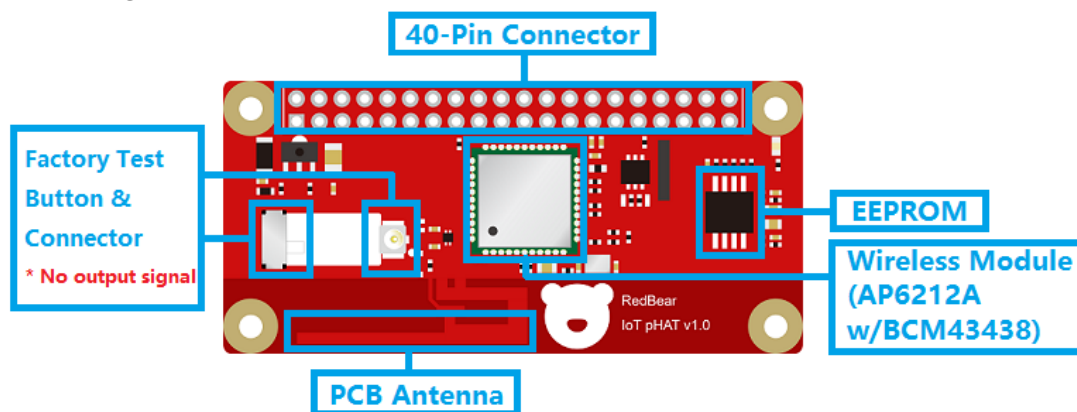
- Front View



- Back View



Block Diagram



Features

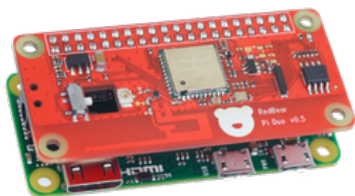
- AMPAK AP6212A Wireless Module (Broadcom BCM43438 A1 chip inside)
 - WiFi (802.11bgn / 2.4GHz)
 - BT4.1 BLE MODE only
- Single antenna for concurrent WiFi and Bluetooth operations
 - Onboard PCB antenna
 - External antenna connector
 - Antenna switch for external antenna
- 32 Kbit (4 KByte) EEPROM for DTOverlay configuration
- 40-pin connector
 - WiFi: SDIO v2.0 - up to 50 MHz clock rate
 - Bluetooth: UART (up to 4 Mbps)
- FCC/CE certified

How to play

Prerequisites

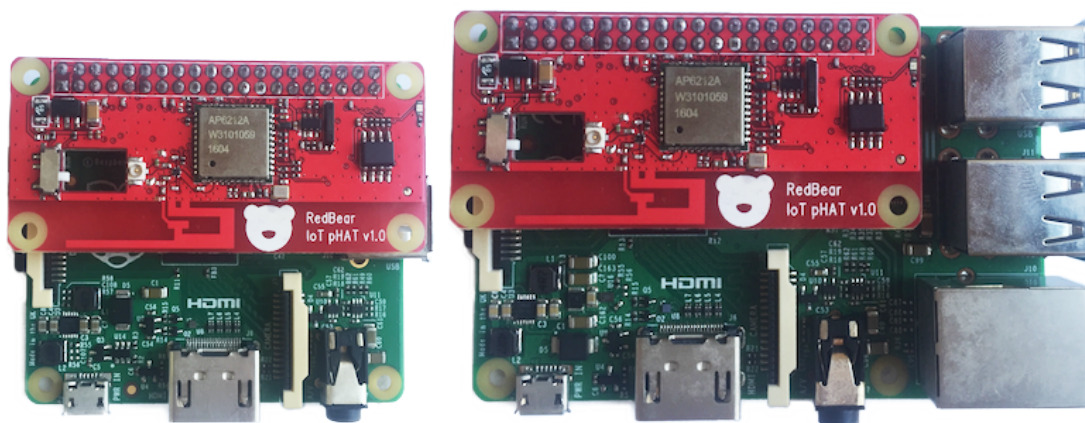
- Raspberry Pi Zero or other models with 40 pin connector header
 - HDMI Cable
 - USB Keyboard
 - Power adpater (5V) with micro USB connector
- SD Card with [NOOBS](#) or [Raspbian](#) installed (tested with NOOBS 1.9.2)
- Additional Items for RPi Zero
 - Mini HDMI to normal HDMI convertor
 - Micro to Type-A USB convertor
- Optional
 - Bluetooth Keyboard
 - Bluetooth Mouse
 - Bluetooth Gamepad

Setting up the boards



- Stack the IoT pHAT on top of the RPi Zero
- Connect the board to your TV or monitor via the HDMI cable
- Connect your RPi with a wired keyboard (For associate WiFi to access point and connect Bluetooth accessories)
- Power on with an micro USB cable with power adpater

The IoT pHAT will also work on other 40-pin RPi boards such as RPi Model A+ and RPi 2.



WiFi

- After booting up, the Linux kernel will read the configuration from the onboard EEPROM, it will turn on the WiFi
- Now you can use the WiFi to connect to your wireless router or access point directly.
- You will see the WiFi driver is up by typing the follow command using the command line,

```
$ ifconfig
```

Bluetooth

- Again, upon booting up the board, the Kernel will read from the EEPROM for all settings for the Bluetooth including the UART.
- You will see the Bluetooth is ready to use by using the Bluetooth manager (the Bluetooth icon) near to the clock (upper-right corner) or using the command line,

```
$ hciconfig
```

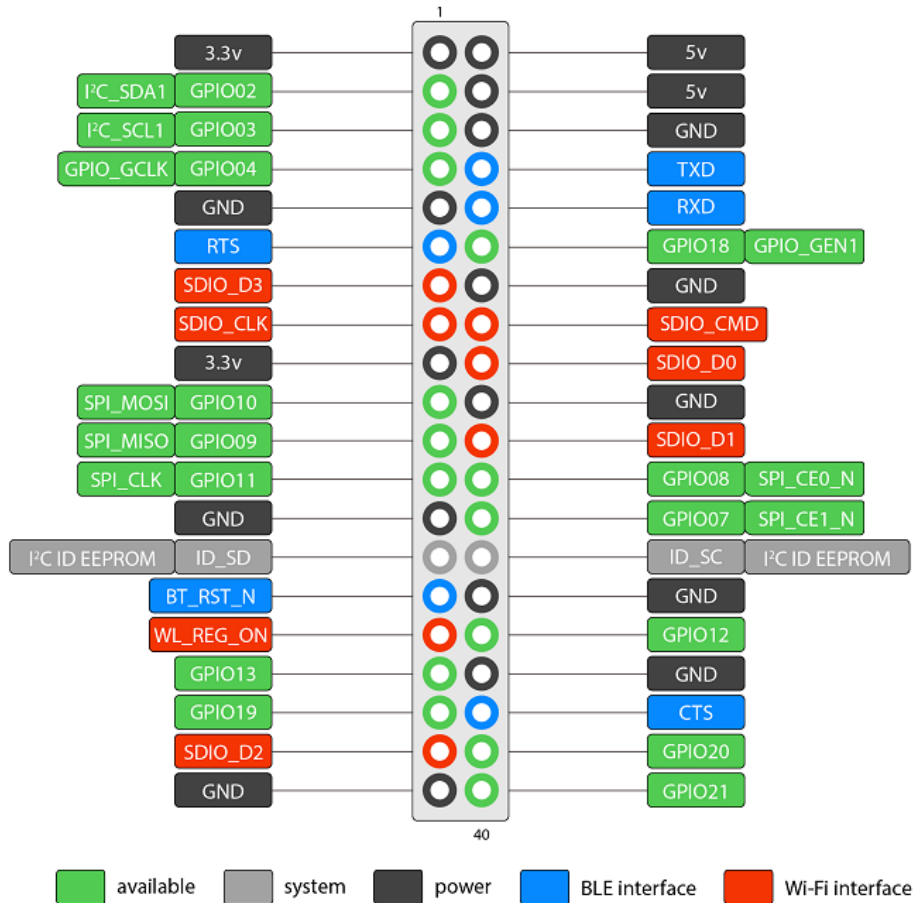
Pair Keyboard/Mouse/Gamepad

You can use the command line tool `bluetoothctl` or the Bluetooth manager to pair your Bluetooth accessories.

Pinout

The following diagram shows the pins of the RPi 40-pin connector occupied by the IoT pHAT board.

Note that, the TXD on the RPi (as shown in the diagram) will connect to the RXD of the IoT pHAT, the same case applied to the RXD, CTS and RTS pins.



Specification

General

- Model Name : IoT pHAT
- Product Description : WiFi and Bluetooth connectivity add-on board for Raspberry Pi Zero
- Dimension : 64 mm x 30 mm

- WiFi Interface : SDIO v2.0
- Bluetooth Interface : UART / PCM
- Operating voltage : 3.3V
- Operating temperature : -30°C to 85°C
- Storage temperature : -40°C to 85°C
- Humidity : Operating Humidity 10% to 95% Non-Condensing

Limitations

- FM is not supported with the board.
- Although the board supports Bluetooth keyboard, you still need to use a wired keyboard to set up for it.

FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: —Reorient or relocate the receiving antenna. — Increase the separation between the equipment and receiver. — Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. —Consult the dealer or an experienced radio/TV technician for help.

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden. FCC Radiation Exposure Statement This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2ABXJ-PHAT-IOT Or Contains FCC ID: 2ABXJ-PHAT-IOT" When the module is installed inside another device, the user manual of the host must contain below warning statements; 1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference. (2) This device must accept any interference received, including interference that may cause undesired operation. 2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. Any company of the host device which install this modular with limit modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C : 15.247 and 15.209 requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 requirement, then the host can be sold legally.