

GPIO Usage and LED Blinking

GPIO Usage (mini/nano-OEM)

Mini and Nano -OEM Mesh Rider radios based on the 2023 updated hardware have three GPIOs which can be accessed.

Important notes

1. The mini and nano -OEM GPIOs are 0-V to 2.8-V TTL.
2. The GPIOs will only be accessible after bootup is complete.
3. GPIO0 is logic-level high by default.

Below is an example of how GPIO2 can be used.

1. Prepare GPIO2. Replace "2" with the GPIO number (0, 1, or 2)

```
echo "2" > /sys/class/gpio/export
```

2. Set GPIO2 as an output

```
echo "out" > /sys/class/gpio/gpio2/direction
```

3. Set the output to high

```
echo "1" > /sys/class/gpio/gpio2/value
```

4. Set GPIO2 to low

```
echo "0" > /sys/class/gpio/gpio2/value
```

To make GPIO2 an input, use

1. Set GPIO2 as an input

```
echo "in" > /sys.class/gpio/gpio2/direction
```

2. Read current GPIO2 status `cat /sys/class/gpio/gpio2/value`

GPIO Usage (Wearable and Embedded)

In hardware versions J and K (OEM only), GPIOs are available for programming through an on-board MCU which is interfaced to the Operating System over USB HID. A program `sr-ctrl-usb` is pre-installed in the system and is used to access the GPIOs. The general syntax for accessing the MCU is

```
root@smartradio:~# sr-ctrl-usb <r/w> <param #> <value>
```

r/w is either `0` for read or `1` for write. The parameter numbers for the three GPIOs are tabulated below. The possible values which can be read or written are `0` and `1` and correspond to 0-V and 3.3-V. Tables 1 and 2 summarize GPIO parameters.

Table 1: GPIO Parameters for -J hardware

Param #	Function
6	Logic level of GPIO1, 0 is GND and 1 is 3.3-V
7	Logic level of GPIO2, 0 is GND and 1 is 3.3-V
8	Logic level of GPIO3, 0 is GND and 1 is 3.3-V
11	Direction of GPIO1, 0 is Output and 1 is Input
12	Direction of GPIO2, 0 is Output and 1 is Input
13	Direction of GPIO3, 0 is Output and 1 is Input

Table 2: GPIO Parameters for -K hardware

Param #	Function
5	Logic level of GPIO1, 0 is GND and 1 is 3.3-V
4	Direction of GPIO1, 0 is Output and 1 is Input

As an example, if we want to write a level 1 to GPIO2, we first set the direction of GPIO2 to 0 and then we set the logic level to 1.

```
root@smartradio:~# sr-ctrl-usb 1 12 0
root@smartradio:~# sr-ctrl-usb 1 7 1
```

We can read the logic level of GPIO3 with,

```
root@smartradio:~# sr-ctrl-usb 1 13 1
root@smartradio:~# sr-ctrl-usb 0 8
```

Note that the GPIO directions are reset to input when the MCU is reset. When the MCU is reset, a reset flag is raised at param # 13 and it should be reset to zero by the user.

Wake-Up Timer

For very low power monitoring applications, the Mesh Rider Radio can be configured to completely shut down and wake up on a timer. In order to conserve power, the CPU itself shuts down and it requires around 30 seconds to boot up again. The command to shutdown the system is,

```
root@smartradio:~# sr-ctrl-usb 1 2 <time in seconds>
```

where `<time in seconds>` is the amount of time that the CPU should shut down for. This feature is only available in -J hardware variants.

LED Blinking

A simple LED blinking script is available in the Mesh Rider Radio which will cause one of the GPIOs to toggle ON/OFF. This script only applies to Embedded, External, and mini/nano-OEM hardware. Wearable models (-K) have a built-in LED blinking function which works separately. By default, LED blinking is disabled, but it can be enabled by running

```
root@smartradio:~# uci set led_blink.general.enable='1'
root@smartradio:~# uci commit led_blink
root@smartradio:~# /etc/init.d/startup_blink restart
```

For mini/nano-OEM models, GPIO0 blinks for single-band radios, and GPIO2 blinks for multiband radios. On External/Embedded radios, GPIOs 1 and 2 can blink. You can see a full list of configuration parameters by running

```
root@smartradio:~# uci show led_blink
led_blink.general=led_blink
led_blink.general.inactive_thres='1000'
led_blink.general.blink_rate='0.3'
led_blink.general.gpio_selected='2'
led_blink.general.enable='0'
```

The `blink_rate` is measured in seconds, and the `inactive_threshold` is the time since hearing from another station, after which the LED will start to blink.

