Alternative Heartbeat LED

- Operation confirmed with our ODROID-C2 on **3.14.79-117** kernel.

You can **remap the blue heartbeat LED** to other pin.

Check the default value from the Device Tree Source

The default GPIO pin for the heartbeat signal is **GPIOAO_13**.

Check this out.
https://github.com/hardkernel/linux/blob/odroidc2-3.14.y/arch/arm64/boot/dts/meson64_odroidc2.dts#L777

```
...
        leds: gpio_leds {
                compatible = "gpio-leds";

        pinctrl-names = "led_pins";
        pinctrl-0 = <&led_pins>;

                /* Blue LED */
                heartbeat {
                        label = "blue:heartbeat";
                        gpios = <&gpio_ao GPIOAO_13 GPIO_ACTIVE_LOW>;
                        linux,default-trigger = "heartbeat";
                };
        };
...
```

The **gpios** property in the **heartbeat** child node has 3 parameters, &gpio_ao, GPIOAO_13, GPIO_ACTIVE_LOW.

- **&gpio_ao** indicates a pin bank for a pin that would be used.
- **GPIOAO_13** indicates a pin for a heartbeat LED.
- **GPIO_ACTIVE_LOW** is a flag for when the GPIO pin will be active. If in GPIO_ACTIVE_LOW, this GPIO pin is active when the output signal is 0.

The written pin **GPIOAO_13** by default indicates a blue LED on the board so that the LED is heartbeat-ing as we expected.
So if you want to use the other GPIO pin for an alternative, you can easily achieve that by changing the pin bank and pin number at that line.
A tool, **device-tree-compiler**, can make you do that easier.

Install the package

Install **device-tree-compiler** by the following commands.

```
root@odroid64:~# apt install device-tree-compiler
```

Now you can use **fdtget** and **fdtput** commands which makes us editing DTS without bothersome building a new kernel.

First, find out what is the current parameters in the **gpios** property.

```
root@odroid64:~# fdtget /media/boot/meson64_odroidc2.dtb
/gpio_leds/heartbeat gpios
37 13 1
```

We already know that the parameters of **gpios** property are: **<&gpio_ao GPIOAO_13 GPIO_ACTIVE_LOW>**.
This result shows them in order in number.

How to know the correct number we'd like to use

That result let us know that the pin bank **&gpio_ao** is shown as number **37**.
In the same way, I've found that the **&gpio** pin bank commonly used at the **40 pin header** is shown as number **19**.

And you can refer to include/dt-bindings/gxbb.h file to know the number of a pin.
There're only 3 groups used at the 40 pin header, **GPIOX, GPIOY, GPIODV**. See the table below.
You can't use all of the pins below but just some of them. Please refer to this page: Expansion Connectors

X						Y				DV	
GPIOX_#	**#**	**GPIOX_#**	**#**	**GPIOX_#**	**#**	**GPIOY_#**	**#**	**GPIOY_#**	**#**	**GPIODV_#**	**#**
0	92	**11**	103	**22**	114	**0**	75	**11**	86	**24**	69
1	93	**12**	104			**1**	76	**12**	87	**25**	70
2	94	**13**	105			**2**	77	**13**	88		
3	95	**14**	106			**3**	78	**14**	89		
4	96	**15**	107			**4**	79	**15**	90		
5	97	**16**	108			**5**	80	**16**	91		
6	98	**17**	109			**6**	81				
7	99	**18**	110			**7**	82				
8	100	**19**	111			**8**	83				
9	101	**20**	112			**9**	84				
10	102	**21**	113			**10**	85				

Lastly, GPIO_ACTIVE_{HIGH|LOW} is the only thing you should choose.

If the positive(+) side of the LED is connected to 3.3V via a register, and the negative(-) side of the LED is connected to the GPIO pin you set, you should use **GPIO_ACTIVE_HIGH**.
Or if the positive(+) side of the LED is connected to the GPIO pin you set via a register, and the negative(-) side of the LED is connected to the ground, you should use **GPIO_ACTIVE_LOW**.
Actually it depends on your system, choose the proper one by the environment you're in.
And the number of these options are,

- **GPIO_ACTIVE_HIGH**: 0
- **GPIO_ACTIVE_LOW**: 1

Refer to include/dt-bindings/gpio/gpio.h file to see the actual definition.

Now we know everything we should know.
Finally we can make the other pin at the 40 pin header as a heartbeat LED.

Change the heartbeat LED

To test, I've connected our Tinkering Kit to my C2.
And I've set the test environment with a register and a LED that sets with the positive(+) side of the LED is connected to the GPIO pin #13 via a 330Ω register, and the negative(-) side of the LED is connected to the ground.
Please see the picture below.
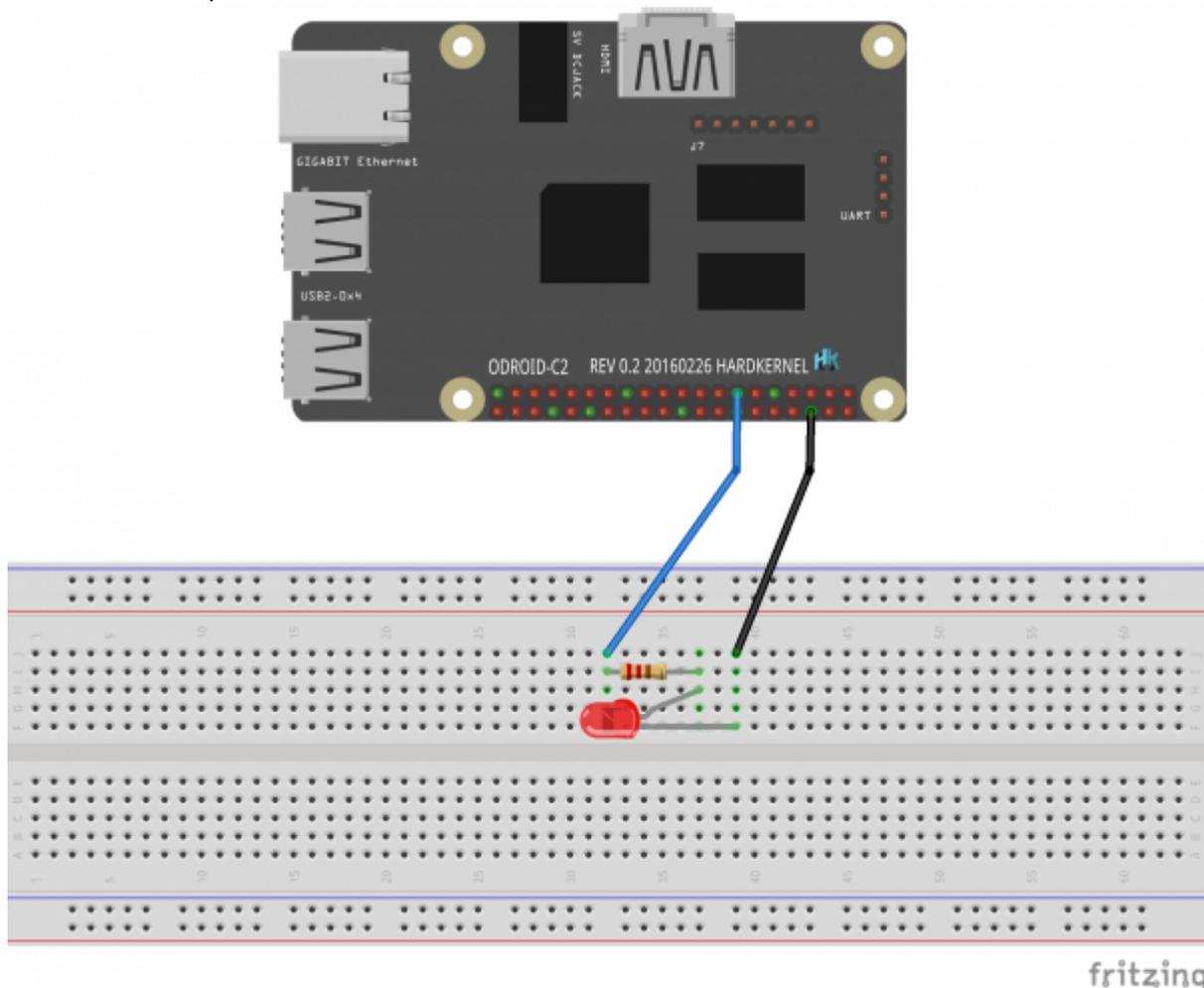
On C2, it does by simply enter the proper command.

Since I've connected the pin at the GPIO pin #13(GPIOX_11), I'll enter **96(pin bank) 103(pin number)** as first two parameters.
And I need to add a parameter **0(GPIO_ACTIVE_LOW)** to show the heartbeat properly.

Don't forget that you should **reboot** to have effect.

```
root@odroid64:~# fdtput /media/boot/meson64_odroidc2.dtb
/gpio_leds/heartbeat gpios 96 103
root@odroid64:~# reboot
```

After the reboot, the LED heartbeats like a blue LED on the board before.

You can check whether the changes written in Device Tree well or not.

```
root@odroid64:~# fdtget /media/boot/meson64_odroidc2.dtb
/gpio_leds/heartbeat gpios
96 103
```

To back to the default, enter the following commands.

```
root@odroid64:~# fdtput /media/boot/meson64_odroidc2.dtb
/gpio_leds/heartbeat gpios 37 13 1
root@odroid64:~# reboot
```

Surely you can use the other pin you want by following this guide.

References

[1] https://forum.odroid.com/viewtopic.php?f=135&t=22525#p151227
[2] https://www.kernel.org/doc/Documentation/gpio/gpio.txt
[3] https://www.kernel.org/doc/Documentation/devicetree/bindings/gpio/gpio.txt
[4] https://www.kernel.org/doc/Documentation/devicetree/bindings/leds/leds-gpio.txt

From:
http://wiki.odroid.com/ - **ODROID Wiki**

Permanent link:
http://wiki.odroid.com/odroid-c2/application_note/external_connector/alternative_heartbeat_led

Last update: **2020/03/31 07:44**