UNDERSTANDING THE GPIO PINS

Connecting electronic components to the Pi is done via one or more of the pins in the so-called header. The number of pins has “grown” between the different Raspberry Pi board versions, but all recent ones have a 40-pin header. It’s of course important to be aware of the correct numbering to not correct components the wrong way.

Type of pins

The pins have different uses

Power and ground

Both 5V and 3.3V are available as power pins and, of course, also ground pins. Anytime the board is powered you have a fixed power supply available for your components. You have to take into account not to connect devices that need a lot of current, otherwise the Raspberry Pi itself will not behave as expected and reboot for instance.

Digital GPIO

The other ones are “General-Purpose Input/Output” (GPIO) pins. These pins can be addressed with software to act as input or output for an application. They use 3.3V,

meaning an output pin will be set to 0V (low) or 3.3V (high) and an input pin will read 0V as low and 3.3V as high.

Most of the GPIOs have an internal pull-up or pull-down resistor which can be enabled in software.

Overview

The following image gives you an overview of the pins and types of a typical 40-pin header. Note the different numbers being used:

1. **PIN**: 1 to 40 logical order of the pin
2. **BCM**: the number to be used in your Java code to specify the GPIO to be used. BCM refers to the “Broadcom SOC channel” number, which is the numbering inside the chip which is used on the Raspberry Pi. These numbers changed between board versions as you can see in the previous tables for the 26-pin header type 1 versus 2, and or not sequential.
3. **WPI**: WiringPi number which was used by V.1 of Pi4J. The WiringPi numbering has a “historical reason”. When development for the very first Raspberry Pi’s was ongoing, only 8 pin-numbers were foreseen. But, when the designs further evolved and more pins were added, the numbering in WiringPi was extended to be able to address the extra pins.

Board PIN

BCM	WPI		PIN		PIN		WPI	BCM
		3.3 VDC	1		2	5.0 VDC		
2	8	SDA1 (I2C)	3		4	5.0 VDC		
3	9	SCL1 (I2C)	5		6	Ground		
4	7	GPCLK0	7		8	UART TxD	15	14
		Ground	9		10	UART RxD	16	15
17	0		11		12	PCM_CLK/PWM0	1	18
27	2		13		14	Ground		
22	3		15		16		4	23
		3.3 VDC	17		18		5	24
10	12	MOSI (SPI)	19		20	Ground		
9	13	MISO (SPI)	21		22		6	25
11	14	SCLK (SPI)	23		24	CE0 (SPI)	10	8
		Ground	25		26	CE1 (SPI)	11	7
0	30	SDA0 I2C ID EEPROM	27		28	SCL0 I2C ID EEPROM	31	1
5	21	GPCLK1	29		30	Ground		
6	22	GPCL2	31		32	PWM0	26	12
13	23	PWM1	33		34	Ground		
19	24	PCM_FS/PWM1	35		36		27	16
26	25		37		38	PCM_DIN	28	20
		Ground	39		40	PCM_DOUT	29	21

- Power
- Ground
- Digital
- Digital and PWM
- Digital without pulldown