GPIO on the Raspberry Pi

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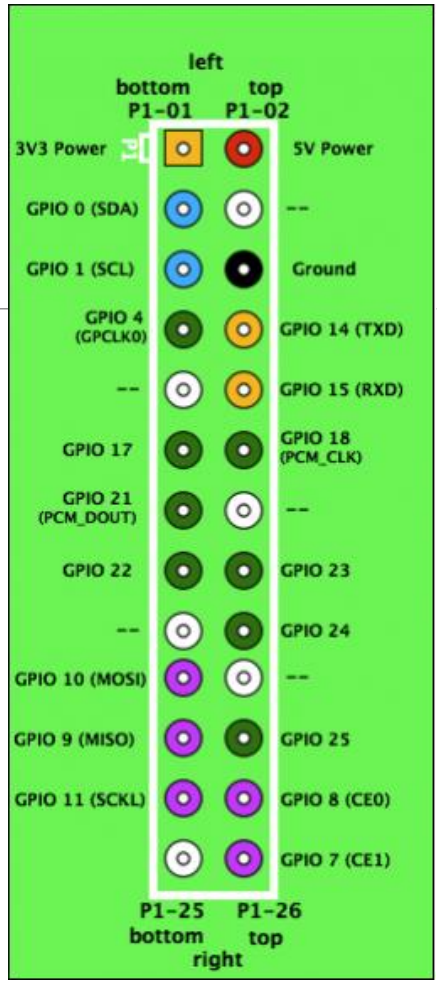
General Purpose Input/Output

- No dedicated purpose
- Programmable
- Commonly found on multipurpose platforms
- Often grouped as ports

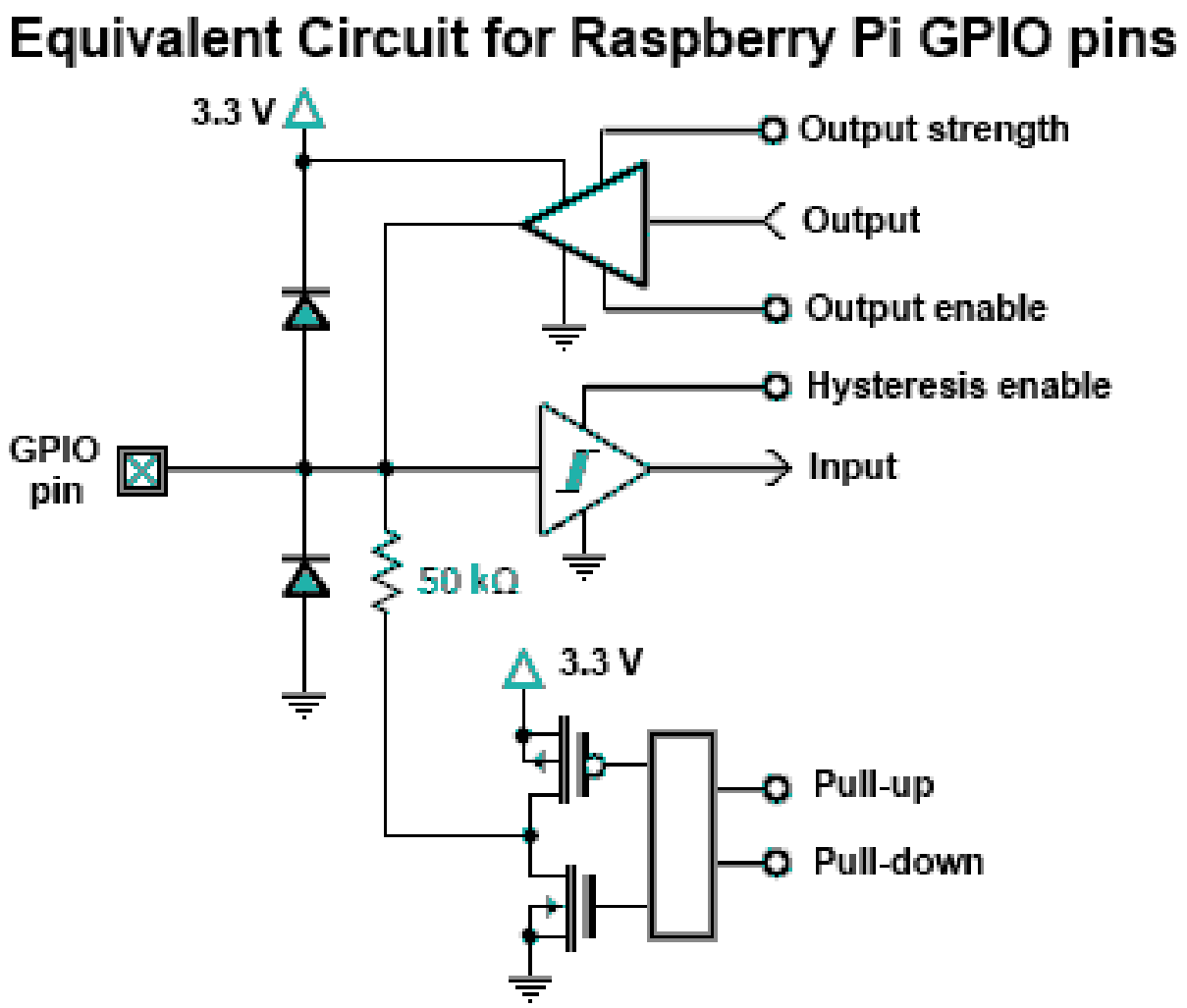
Raspberry Pi Model B

- 26 pins
  - 17 actually GPIO
- 3.3 V
- 16 mA
- Configurable pull-up/pull-down
- Configurable purpose
  - I2C
  - UART
  - SPI



source

For electrical characteristics: http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/raspberry-pi/gpio-pin-electrical-specifications



Circuit Diagram for RPi GPIO pins

Controlling the Pins

With Bash

- First export the pin
  - echo “4” > /sys/class/gpio/export
- Then set input/output
  - echo “out” > /sys/class/gpio/gpio4/direction
- Read/write
  - echo “1” > /sys/class/gpio/gpio4/value
  - cat /sys/class/gpio/gpio4/value
- Clean up
  - echo “4” > /sys/class/gpio/unexport

With C

- Use this library
- Example code

```
#include <bcm2835.h>
// Blinks on RPi pin GPIO 11
#define PIN RPI_GPIO_P1_11
void main()
{
    // Set the pin to be an output
    bcm2835_gpio_fsel(PIN, BCM2835_GPIO_FSEL_OUTP);
    // Blink
    while (1)
    {
    // Turn it on
    bcm2835_gpio_write(PIN, HIGH);
    // wait a bit
    delay(500);
    // turn it off
    bcm2835_gpio_write(PIN, LOW);
    }
}
```

With Python!!!

- Use RPi.GPIO
  - Included in Raspbian
- Great for:
  - I/O
  - PWM
  - Edge detection
  - Interrupts
  - Software debounce

```
# sample RPi GPIO code
import RPi.GPIO as GPIO
import sleep

GPIO.setmode(GPIO.BOARD)
GPIO.setup(24, GPIO.IN) # sets CE0/pin24 to input

if GPIO.input(24):
    print "Pin 24 is HIGH"
else:
    print "Pin 24 is LOW"

GPIO.cleanup() # return all channels to input w/out pull up or down
```

Here are some easy to follow examples: http://sourceforge.net/p/raspberry-gpio-python/wiki/Examples/

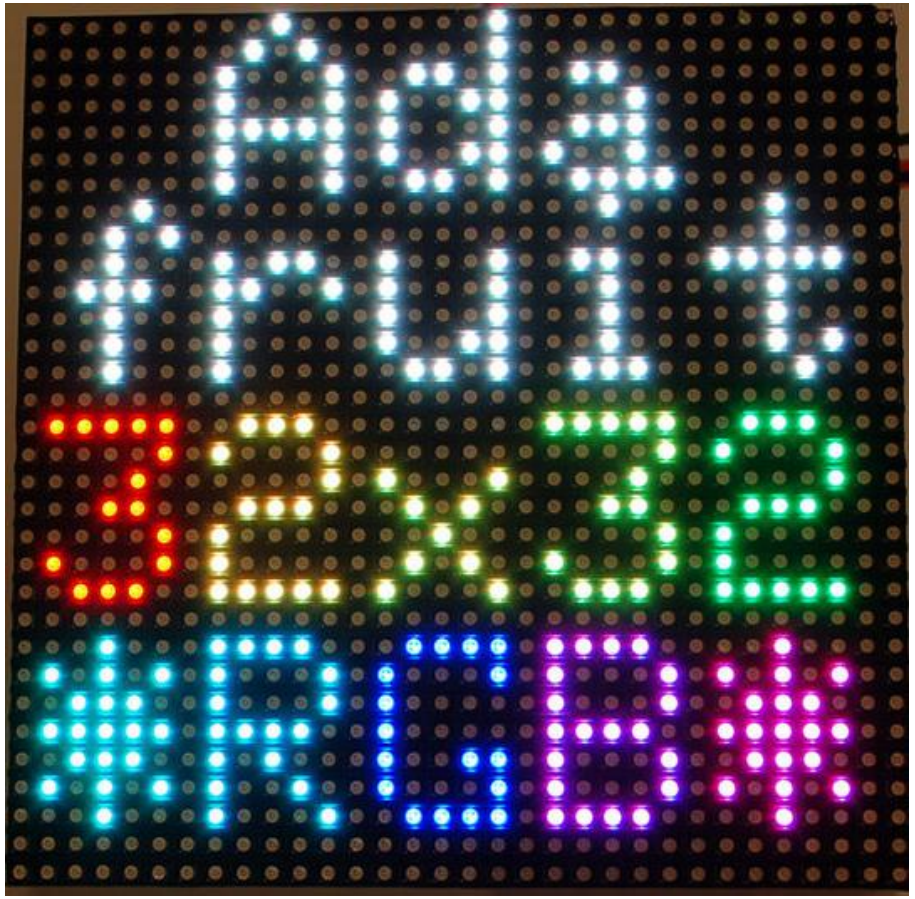
With Other Languages?

- Perl
- Ruby
- Java
- BASIC
- Etc…

Everything you might want is here: http://elinux.org/RPi_Low-level_peripherals#General_Purpose_Input.2FOutput_.28GPIO.29

Applications

- Peripheral sensors
  - Must communicate digitally, no analog
- Control motors
- Control external displays



Questions?