Raspberry Pi and Hardware

Jon Flanders

@jonflanders

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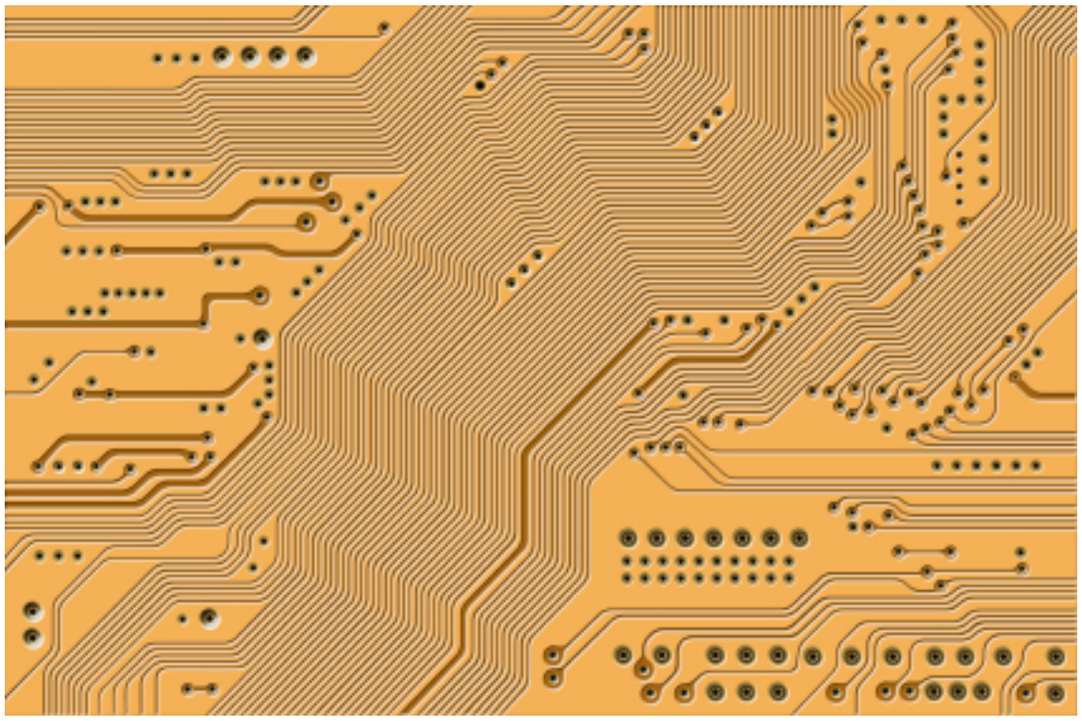

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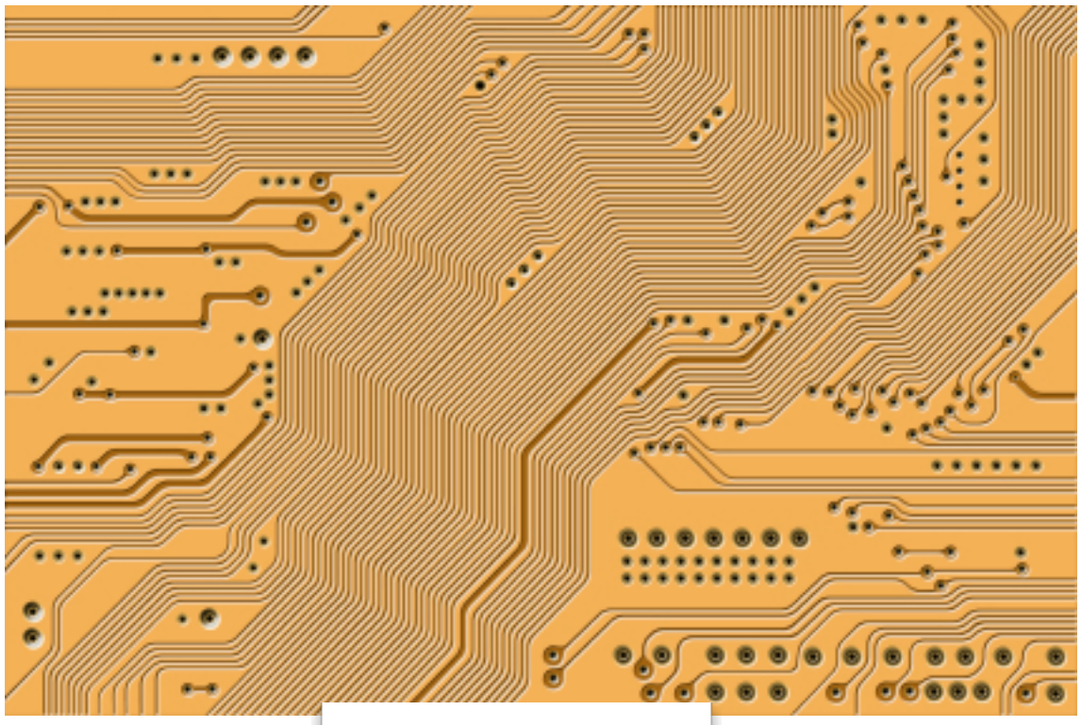

HARDWARE

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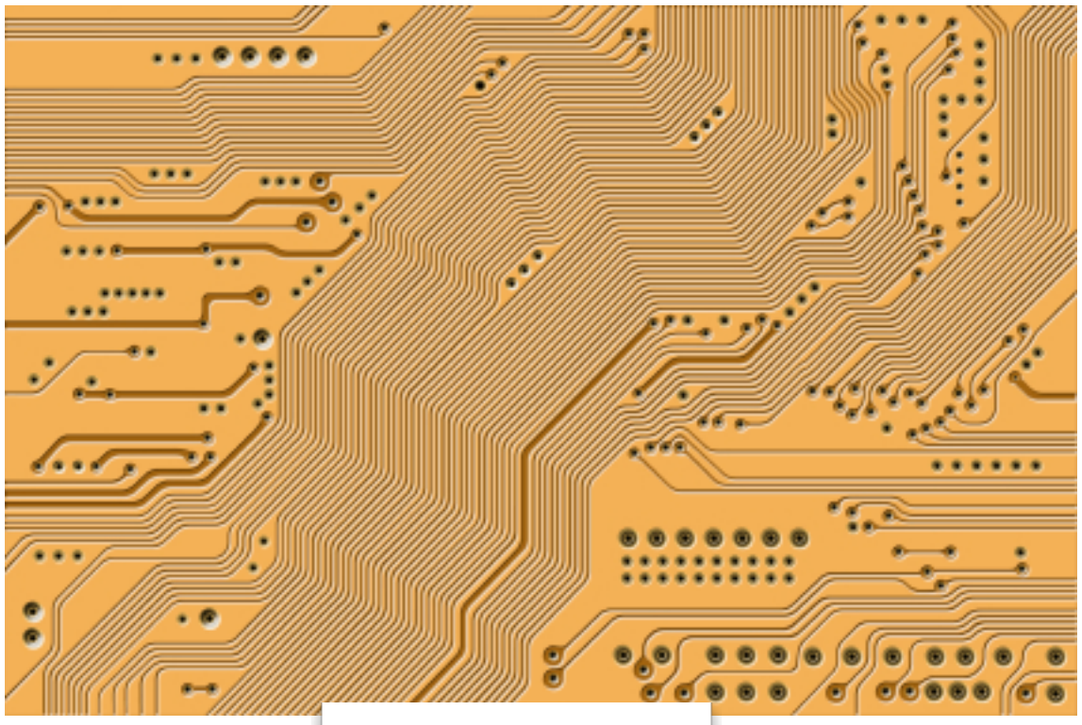

HARDWARE

Warning! It is highly recommended that you use a buffer board (such as the Gertboard) rather than connecting directly to your Raspberry Pi. If you are not careful, you can damage your Raspberry Pi!

Controlling Hardware

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- Two different options

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  - Hardware that can plug into USB ports

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  - Hardware that can plug into USB ports
  - “Raw” hardware that can be controlled via electrical signals

USB hardware

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- **Remotes**

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SCLK (11)	23	24	GPIO8
GND	25	26	GPIO7

Using a Breadboard

- **Solder-less prototyping board**
  - name is historical from when wooden cutting boards were often used
- **Breadboard + jump-wires makes it much easier to try out different ideas**
  - soldering takes time and is more permanent

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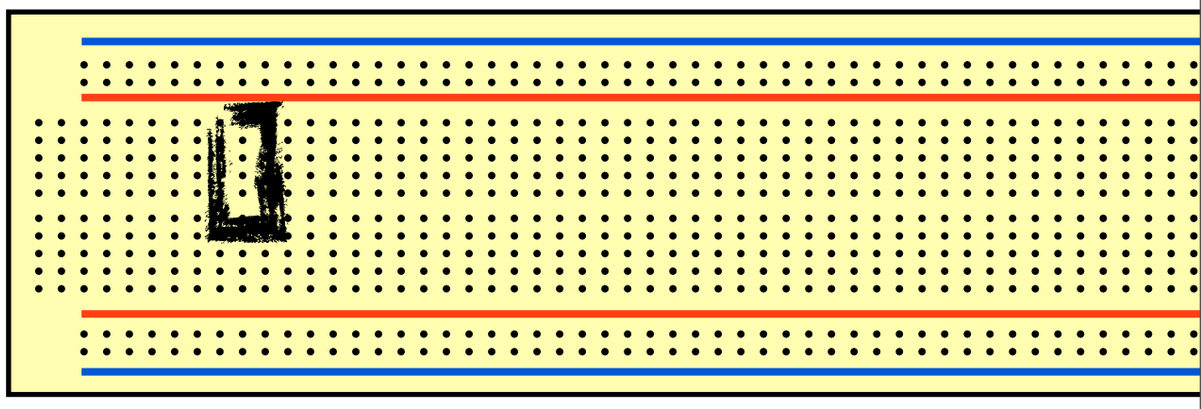

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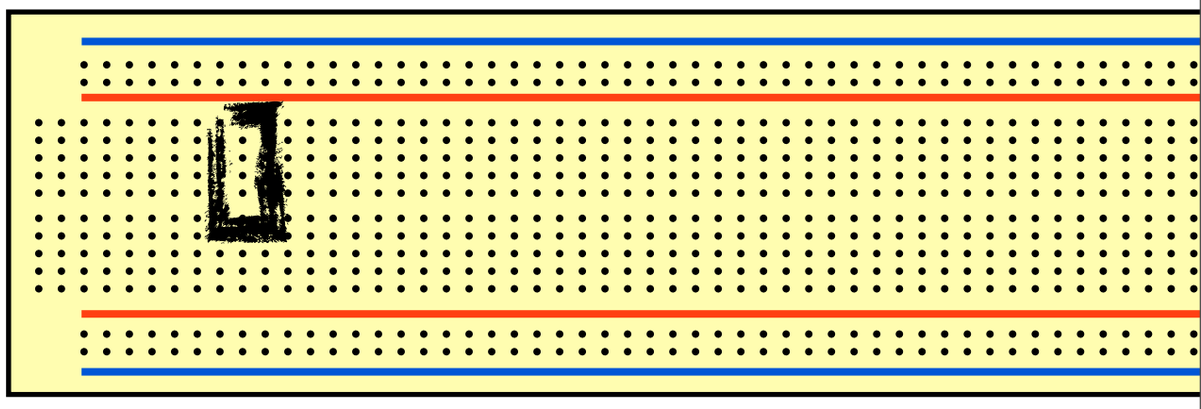

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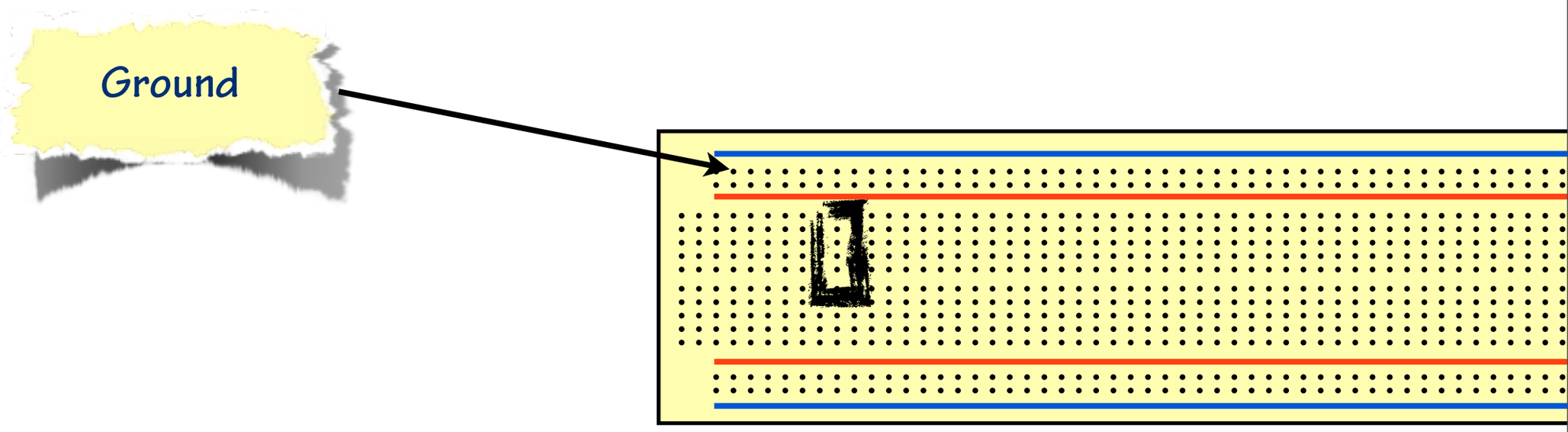

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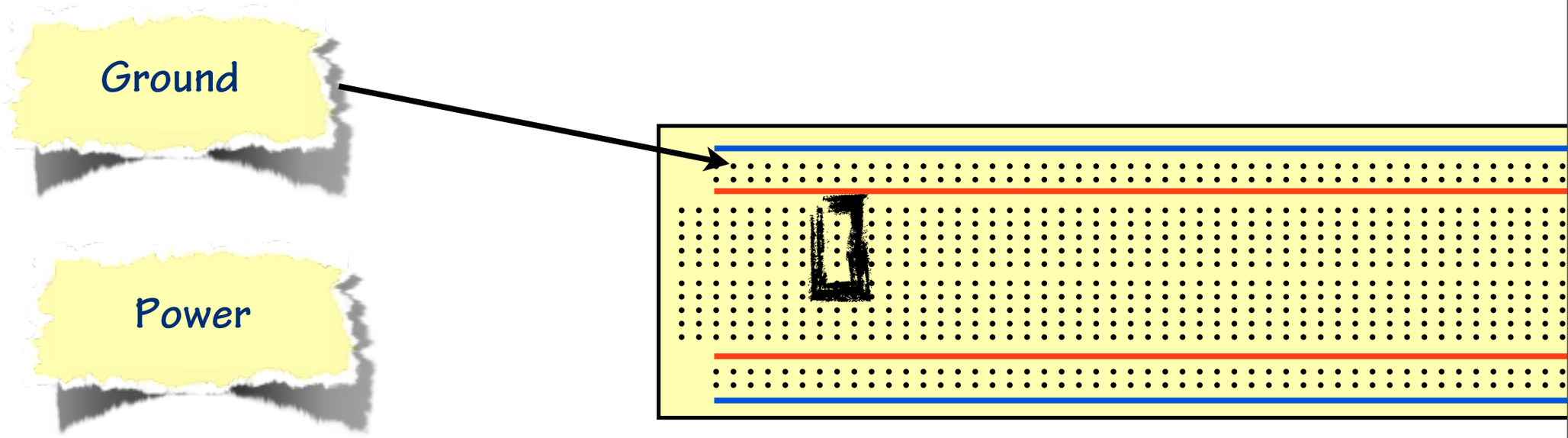

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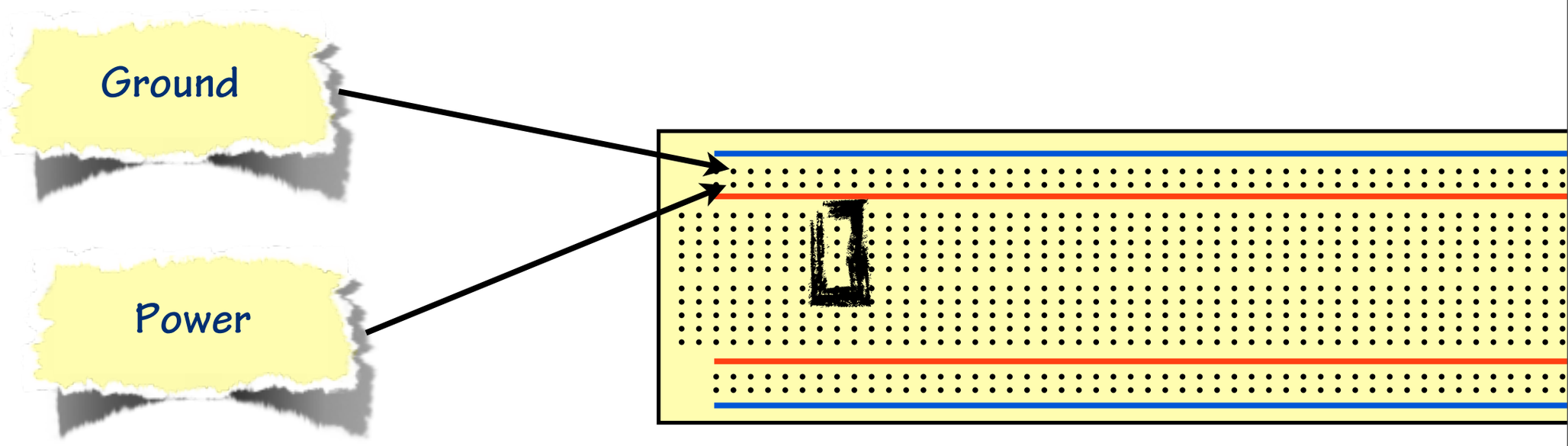

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- **One way to control the hardware on the Raspberry Pi is to use a script**
  - You need an open-source library https://projects.drogon.net/raspberry-pi/wiringpi/
  - git clone git://git.drogon.net/wiringPi && cd wiringPi && ./build
- **You can then use gpio from a bash script**

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```
gpio mode 0 out
gpio write 0 1
gpio write 0 0
```

gpio

Demo

- bash script to take picture every *N* seconds

From Python

- **Included in Raspbian is the Python RPi.GPIO library**
  - must run as root
- **Import RPi.GPIO**
- **Use the library**

```
import RPi.GPIO as GPIO
channel = 7 #using BOARD numbering
GPIO.setmode(GPIO.BOARD)
GPIO.setup(channel,GPIO.OUT)
GPIO.output(channel,GPIO.HIGH)
GPIO.output(channel,GPIO.LOW)
GPIO.cleanup()
```

gpio

Demo

- LED blinking
- Button – take picture

Raspberry Pi with Arduino

- **Arduino is another inexpensive hardware prototyping platform**
  - Specific computer platform – only runs one program at a time
- **Raspberry Pi is a general-purpose computer**
  - Raspbian is a multi-purpose/multi-threaded OS
  - Might not respond in real-time to hardware commands incoming or outgoing
- **Combining the two means you can get the power of a Raspberry Pi with the precision of Arduino**

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Demo

- control arduino from raspberry pi
- $ sudo apt-get install git
- $ git clone http://people.csail.mit.edu/hubert/git/pyaudio.git
- $ sudo apt-get install libportaudio0 libportaudio2 libportaudiocpp0 portaudio19-dev
- $ sudo apt-get python-dev
- $ sudo python pyaudio/setup.py install

Summary

- The Raspberry Pi can serve as a powerful hardware control platform