Raspberry Pi 2 Basic GPIO with .NET Core

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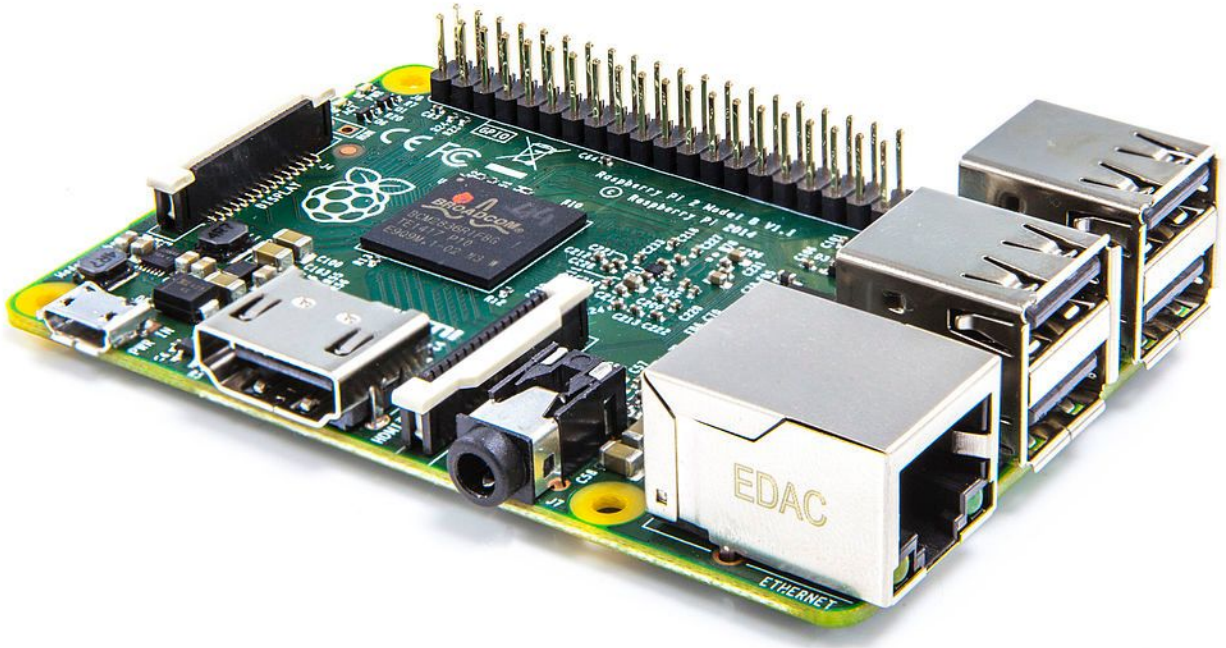
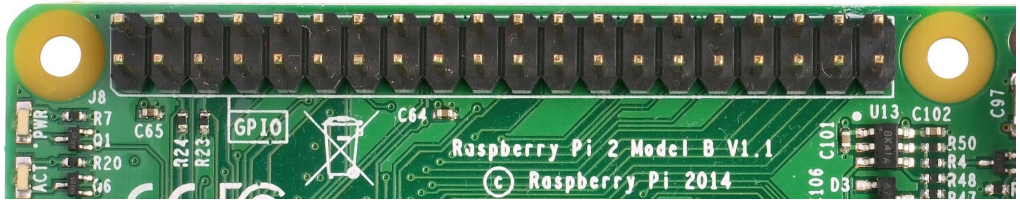
Raspberry Pi 2

Cheap, small ARM-based general computer with usb, ethernet, hdmi output and 40-pin General Purpose Input Output (GPIO).

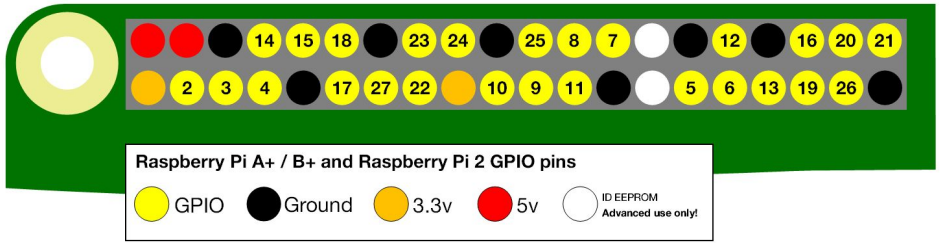


Pin-layout

Actual Pins



BCM Pin numbering and GPIO ports



1 **+3.3V**	**2** **+5V**
3..13	**4..14**
15 **GPIO22**	**16** **GPIO23**
17..37	**18..38**
39 **GND**	**40** **GPIO21**

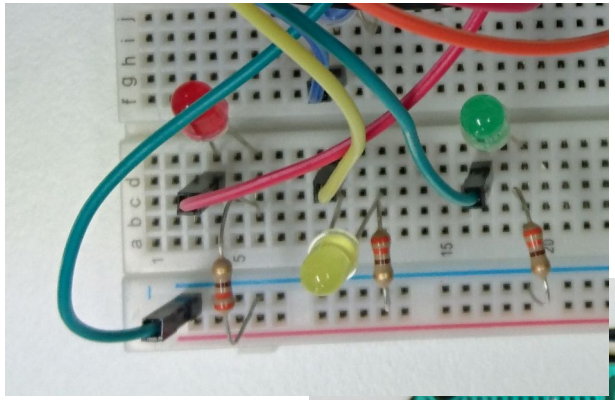
Some basic circuitry

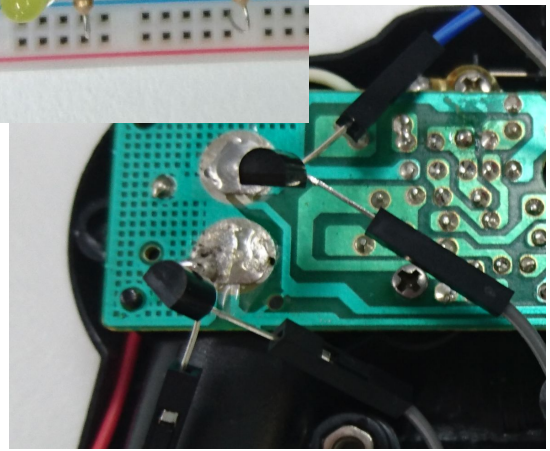
LED
V=IR
$R=(V_S-V_{LED})/I$
(3.3-2)/18mA = 72Ω

Transistor
http://elinux.org/RPi_GPIO_Interface_Circuits

http://www.petervis.com/GCSE_Design_and_Technology_Electronic_Products/transistor_base_resistor_calculator/transistor_base_resistor_calculator.html

(But I just used what's in the kit!)
(Breadboard makes things a lot easier!)





Check the Circuits

```
$> sudo python

%>> import RPi.GPIO as GPIO
%>> GPIO.setmode(GPIO.BOARD)
%>> GPIO.output(31, True)
%>> GPIO.output(31, False)
```

- Test an LED with just the 3.3V and ground (GND) direct, flat side is negative
- Make sure you run as **`sudo`** to get access to GPIO ports
- 31 is the pin number of the red LED in this case
- Grounded back to one of the many ground pins, eg 39.

DNX with Mono on Raspian

- **DNX** (commandline tool): .NET Execution Command. The command line tool controls various app operations, primarily launching.
- **DNVM**: .NET Version Manager. This is a tool for acquiring and managing DNX distributions.
- **DNU**: .NET Utilities. The NuGet client for DNX. NuGet.exe is not used.

Installing:

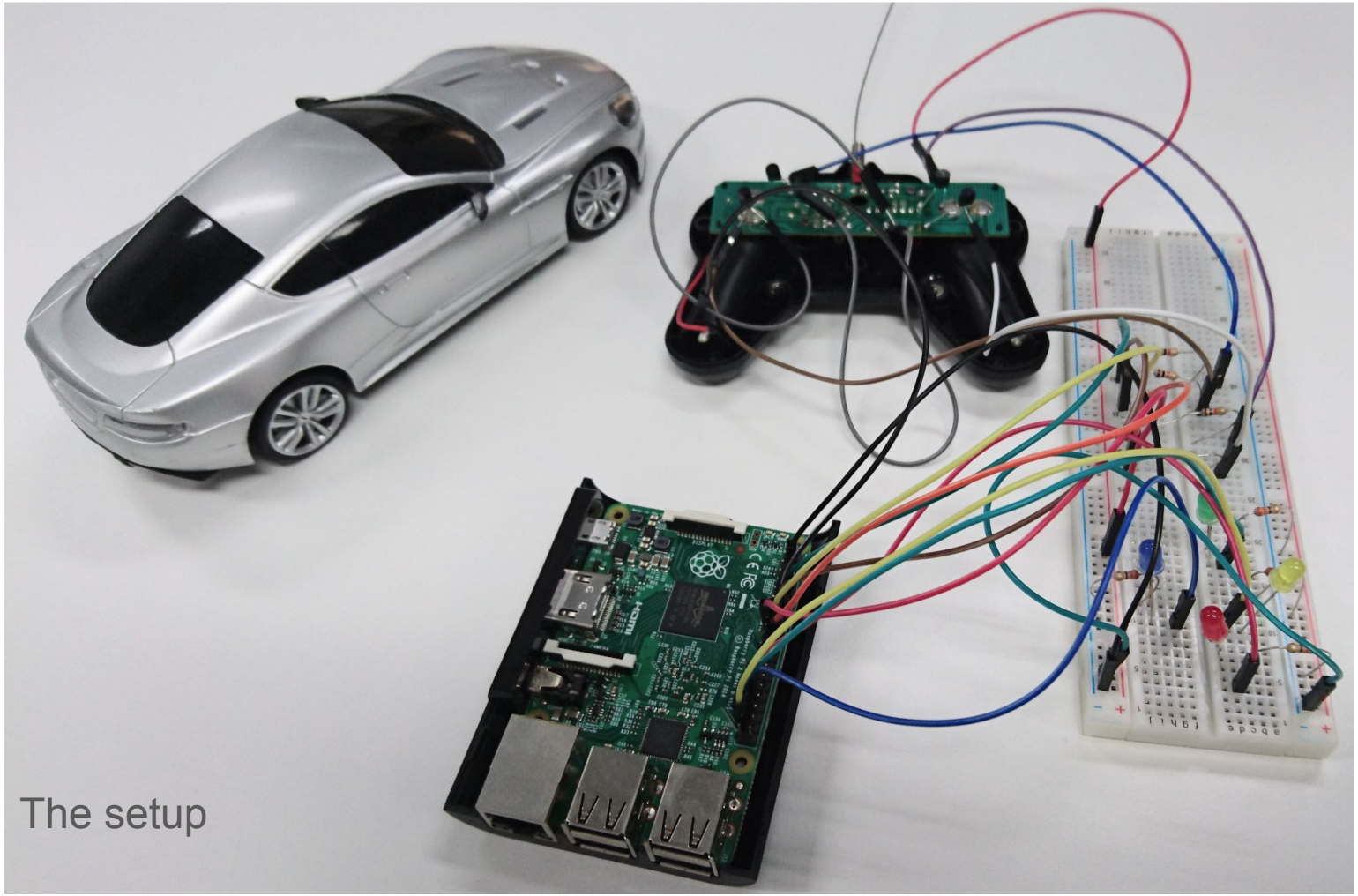
```
sudo apt-key adv --keyserver keyserver.ubuntu.com --recv-keys 3FA7E0328081BFF6A14DA29AA6A19B38D3D831EF
echo "deb http://download.mono-project.com/repo/debian wheezy main" | sudo tee /etc/apt/sources.list.d/mono-xamarin.list
sudo apt-get update
sudo apt-get upgrade
sudo apt-get install mono-complete

curl -sSL https://raw.githubusercontent.com/aspnet/Home/dev/dnvminstall.sh | DNX_BRANCH=dev sh && source ~/.
dnx/dnvm/dnvm.sh

dnvm upgrade -r mono
```

Make a little console app to test - https://docs.asp.net/en/latest/dnx/console.html
Then to restore all packages and run

```
dnu restore
dnx run
```



The setup

Demo Time

- Can use VS2015 and then SCP across the .cs and .proj files and run dnu restore can use winscp.exe to copy across
- Template available https://visualstudiogallery.msdn.microsoft.com/3a23d0cc-d6b6-4873-bf8d-e4313353419a but may have to manually remove the Core 5 framework
- For access to GPIO always have to run everything as root, ie use `sudo` and for `dnu restore` etc. The easiest way to make sure is either install dnx as root (dangerous) or use `which dnu` and `which dnx` to work out the path and then `sudo` that.

Final Thoughts

Questions?

Credits

- https://upload.wikimedia.org/wikipedia/commons/thumb/3/3d/Raspberry_PI.jpeg/1024px-Raspberry_PI.jpeg
- https://www.raspberrypi.org/documentation/usage/gpio-plus-and-raspi2/images/gpio-pins-pi2.jpg
- https://www.raspberrypi.org/documentation/usage/gpio-plus-and-raspi2/images/gpio-numbers-pi2.png