

Raspbian

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Raspberry Pi vs Arduino

Raspberry Pi

- Started in 2012
- 12 devices with similar specs
- A lot of peripherals like HDMI, WiFi and Ethernet
- Usually used with full graphical OS
- Better for beginners

Arduino

- Started in 2005
- Huge range of variations with big differences in specs: 17 devices
- Cheaper on average with weaker specs

Raspberry Pi OS choices

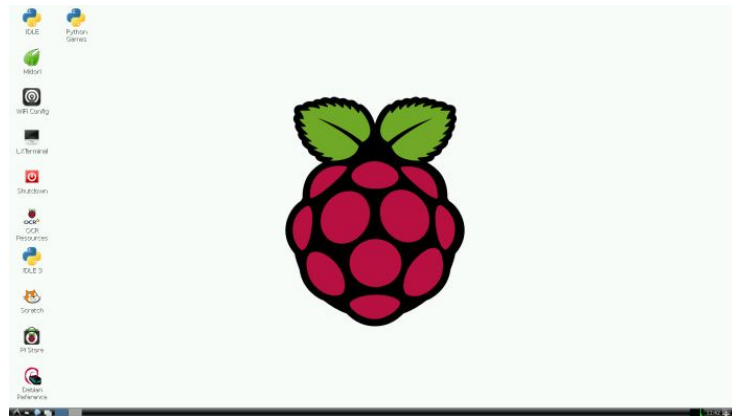
- Raspbian
- Ubuntu MATE
- Snappy Ubuntu
- Pidora
- Linutop
- SARPi
- Arch Linux ARM
- Gentoo Linux
- Windows 10 IoT Core
- Chromium OS
- FreeBSD
- Android
- XBMC (Raspbmc)

Raspberry Pi OS: how to choose?

- Based on properties:
 - Customizability
 - Stability
 - Performance
 - Number and selection of built-in packages
 - Size
- Based on application:
 - Cloud
 - Server
 - Public access device
 - Media center
 - BitCoin miner
 - Penetration tester
 - Wireless router
 - Home automation

Introduction to Raspbian

- Introduced in 2012
 - Officially supported by the **Raspberry foundation**
 - Modified version of Debian
 - Preinstalled with tons of useful software
 - Great community support
 - Easily installed
-
- Ideal for beginners



Raspbian vs Windows 10 IoT Core

Raspbian

- 2012
- Open source
- Huge range of Debian software
- Whole Linux community support
- UK-based (Trump- and Brexit-proof)

Windows 10 IoT Core

- Young (2015)
- Easy to develop GUI
- Easy to connect to Azure

Raspbian demo

Python code examples

GitHub repo:

<http://bit.ly/github-linux>

Full link:

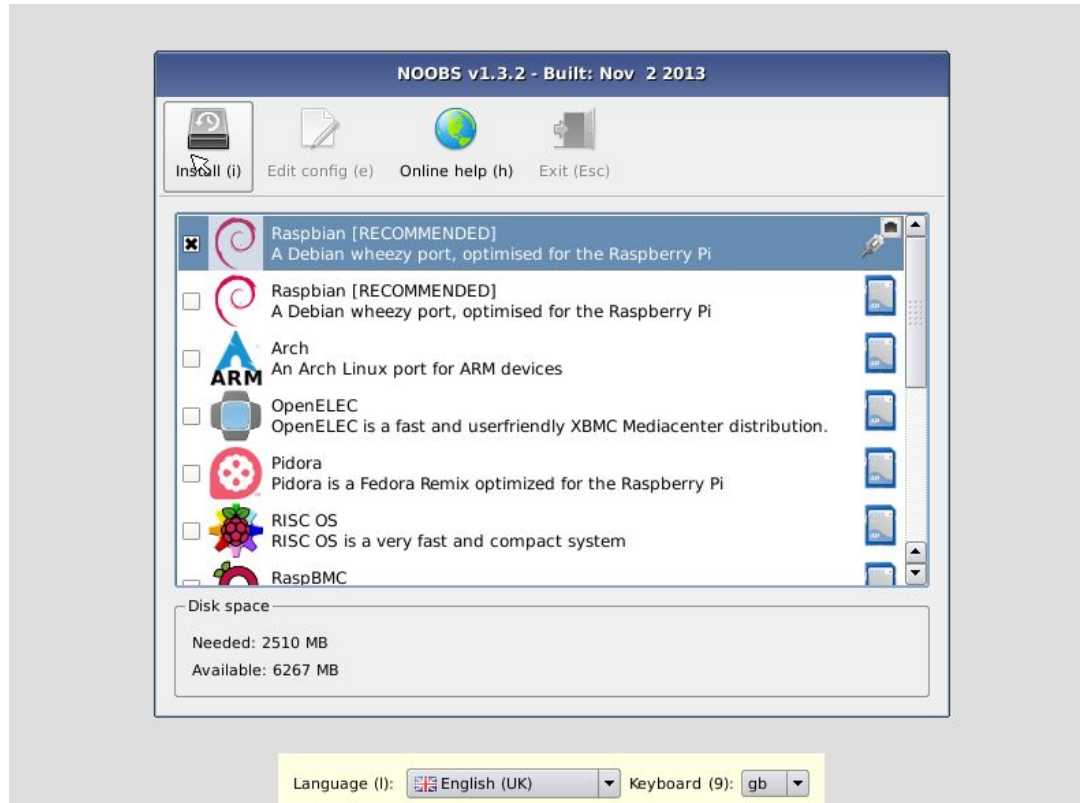
<https://github.com/MicrosoftStudentsEdinburgh/rpi-raspbian>

(Clone repo using git or download zip-archive)

Installing Raspbian

- Format the SD card
- NOOBS (New Out Of Box Software) - an OS installer
 - Raspbian is inside
 - Download ZIP archive: <https://www.raspberrypi.org/downloads/noobs/>
 - Unzip it into SD card
 - Start Raspberry with SD card

Installing Raspbian



Setting up: accelerating mouse

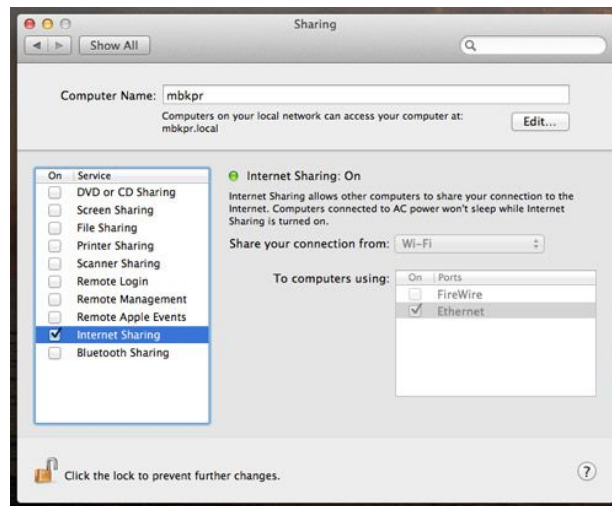
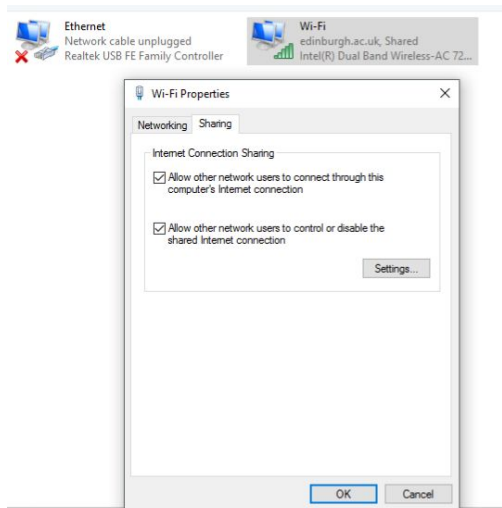
- If your cursor moves very slow in RPi, the fix is following:
 - On RPi, in a text editor (Terminal > **leafpad** or **vi**), open **/boot/cmdline.txt**
 - At the end of the line, insert whitespace and “**usbhid.mousepoll=0**”
 - Restart RPi

Setting up: fixing resolution

- If your resolution is initially very small, fix it as follows:
 - On RPi, in a text editor (Terminal > **leafpad** or **vi**), open **/boot/config.txt**
 - Depending on the monitor, try setting and/or uncommenting the following:
`hdmi_safe=0`
 - For black borders:
`overscan_left=0`
`overscan_right=0`
`overscan_top=0`
`overscan_bottom=0`
 - For resolution:
`framebuffer_width=1280`
`framebuffer_height=1024`
(adjust to your screen)

Setting up: networking

- Share laptop's network connection
 - Connect via Ethernet cable
 - In laptop Wireless settings, turn on Internet sharing



Setting up: networking

- Share laptop's network connection
 - Connect via Ethernet cable
 - In laptop Wireless settings, turn on Internet sharing
 - From Raspberry Pi, request IP from laptop:
 - In Raspberry's terminal, enter "`sudo dhclient eth0`" (it might take a while)
 - From laptop, check connection to RPi
 - In CMD, ping "`raspberrypi`" (hostname) or "`raspberrypi.mshome.net`" or RPi's IP (obtain it using `ifconfig` on RPi)
 - From RPi, check Internet connection
 - In terminal, `ping www.google.com`

Setting up: remote control

- RPi can be controlled remotely from PC using VNC (Virtual Network Computing)
 - Gives you access to the screen
 - Lets you use laptop's keyboard and mouse to control RPi
- Other option is SSH
 - Console-only request, no screen
 - Easier to set up
 - Faster connection

Setting up: remote control

- Menu > RPi configuration > Interfaces > Enable VNC
- Right click on VNC logo in the top right corner > Options
 - Authentication: VNC password
 - Users & Permissions > Standard user > Password > Enter “1234”
- On the laptop, install a VNC client
 - UltraVNC or RealVNC or TightVNC
- Connect to RPi
 - VNC Server: `raspberrypi.mshome.net` or your RPi's IP

Setting up: network drive

- Install **samba** on RPi. In terminal, enter:
 - `sudo apt-get update`
 - `sudo apt-get install samba samba-common-bin`
- Follow instructions in black boxes on <http://bit.ly/sambainstall>
 - Create networked samba folder
 - Map the folder to your laptop as network drive
 - `\\raspberrypi.mshome.net\PiShare`
 - `username: raspberrypi\pi; pass: 1234`
- In Visual Studio (or VS Code), create new project locating files in the networked folder

Setting up: network drive

- Now every time you save the file in Visual Studio, it gets updated on RPi momentarily
- To run the code on RPi, navigate to the source code file in the terminal and type “`python source_file.py`”

Setting up: enable i2c

- Before running the code, ensure that i2c communication protocol is installed on RPi:
 - Follow instructions here: <http://bit.ly/install-i2c>
`sudo apt-get install -y python-smbus`
`sudo apt-get install -y i2c-tools`

Useful resources

- Python tools for VS (for smarter code highlighting and autocompletion)
 - <https://www.visualstudio.com/vs/python/>
- Official Raspberry Pi tutorials
 - <https://www.raspberrypi.org/help/>
- AdaFruit tutorials and libraries
 - <https://learn.adafruit.com/category/raspberry-pi>

Challenges

- Try to repeat the same challenges as on IoT Core:
 - Weather station
 - Ping Pong game