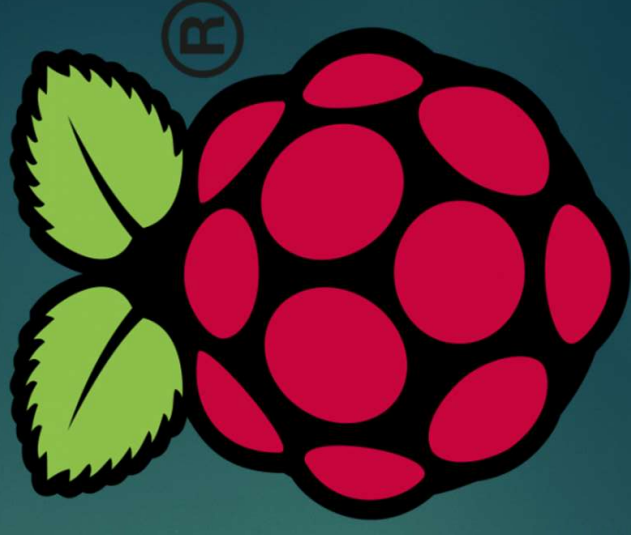


Raspberry Pi in the Ham Shack

MERGING HAM RADIO AND RASPBERRY PI APPLICATIONS

BEN - KM4ODT



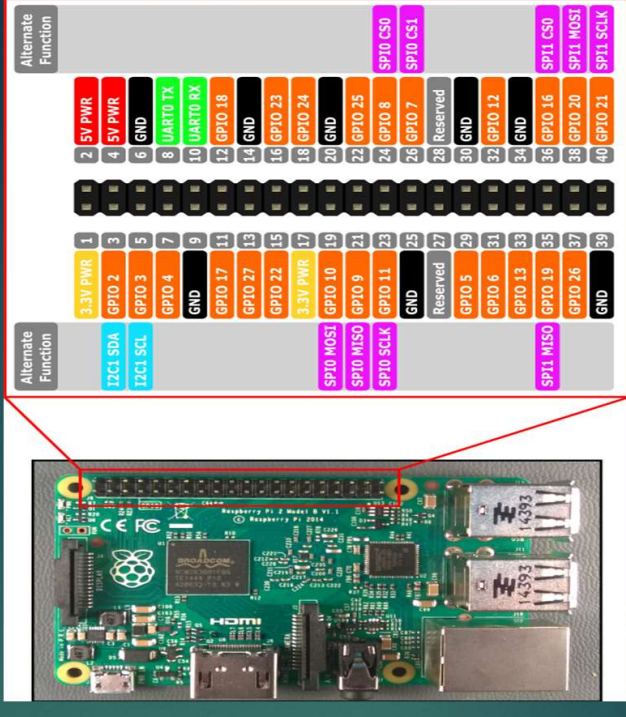
Raspberry Pi – what is it?

- ▶ A general Purpose single-board computer
- ▶ ARM microprocessor based. (1.4GHz 64-bit quad core CPU)
- ▶ Usually runs on a Linux variant
- ▶ Micro SD card is used for storage
- ▶ Micro USB power (5V @ 1W)



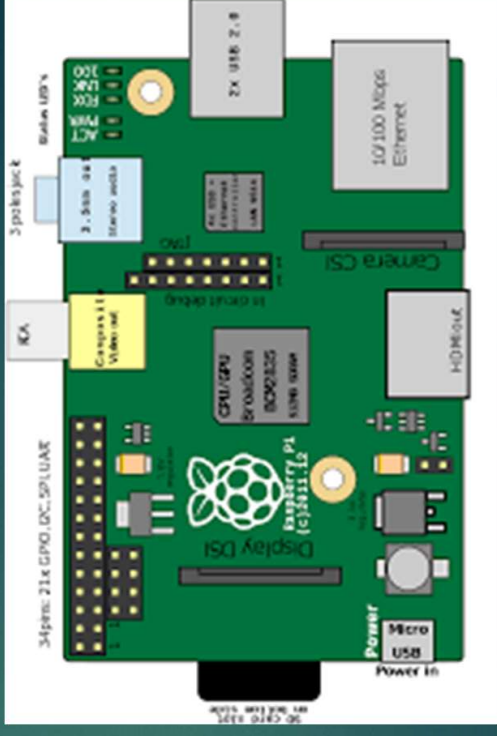
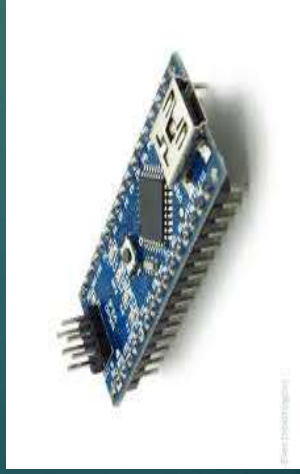
Raspberry Pi – Interface options

- ▶ USB ports: 4
- ▶ HDMI: 1
- ▶ Ethernet 10/100 Mbps (Gigabit over USB 2.0)
- ▶ Wi-Fi (802.11ac)
- ▶ Bluetooth 4.2
- ▶ 4 pole jack Composite A/V Jack 3.5mm
- ▶ GPIO and I2C I/O pins for hardware connectivity



Raspberry Pi – what it isn't

- ▶ How does it differ from an Arduino?
- ▶ Arduino is a microcontroller
- ▶ Programmable, can control external devices and circuits through analog and digital I/O pins
- ▶ **Usually controls one function**



Raspberry Pi - Uses

General Radio Usage

- ▶ SDR (RTL-SDR, SDR Play)
- ▶ ADS-B Aircraft Transponder reception (dump 1090)

Amateur Radio Usage

- ▶ Inexpensive PC for logging, QRZ look-ups etc. (Web browser)
- ▶ Weak Signal Propagation Transmitter (WSPR/WSprryPi)
- ▶ DSTAR and Fusion Access points (DVAP)
- ▶ Packet Radio (Pi TNC)

Raspberry Pi - Uses

- ▶ Decoding Data Modes : FLDigi - RTTY, PSK and CW
- ▶ Amateur Satellite Tracking (Gpredict)
- ▶ Packet DX cluster (DX Spider)
- ▶ APRS I-Gate / Digipeater
- ▶ DIY Projects: Remote Antenna rotator, antenna switches etc.
- ▶ Media Center (Kodi)

Raspberry Pi - Getting Started

- ▶ Download the OS from <https://www.raspberrypi.org/downloads>
- ▶ PC, MAC and Linux
- ▶ NOOBS, RASPBIAN
- ▶ Third Party: UBUNTU MATE, OSMC, WINDOWS 10 IOT CORE...
- ▶ Imaged must be burned onto a Micro SD Card (multiple preconfigured OS images available-menu driven)

Raspberry Pi - Set up

- ▶ HDMI
- ▶ Keyboard and Mouse
- ▶ Once the OS is up and running you can operate remotely through SSH or putty (remote desktop)
- ▶ Operating system is intuitive and extremely user friendly.
- ▶ Standard PC or MAC Graphic User Interface (GUI)

Raspberry Pi - Set up

Available installs for logging:

- ▶ sudo apt-get install xlog
- ▶ sudo apt-get install carlog

- ▶ FLDigi

- ▶ Various preconfigured OS images available



Raspberry Pi - RTL dongles

- ▶ RTL USB TV receiver (RTL-SDR)
- ▶ Install osmocom SDR software:
- ▶ <http://sdr.osmocom.org/trac/wiki/rtl-sdr>
- ▶ ADS-B Reception (1.090 GHz) Aircraft Flight following
- ▶ Needs rtl-sdr installed first
- ▶ <https://github.com/MalcomRobb/dump1090>

Raspberry Pi - WSPR (WsprryPi)

Weak Signal Propagation Reporting

- ▶ WsprryPi software:
 - ▶ <https://github.com/JamesP6000/WsprryPi>
- ▶ TARP QRP shield (\$29)
 - ▶ http://www.tapr.org/kits_20M-wspr-pi.html
- ▶ Antenna



Raspberry Pi - DSTAR Access Point

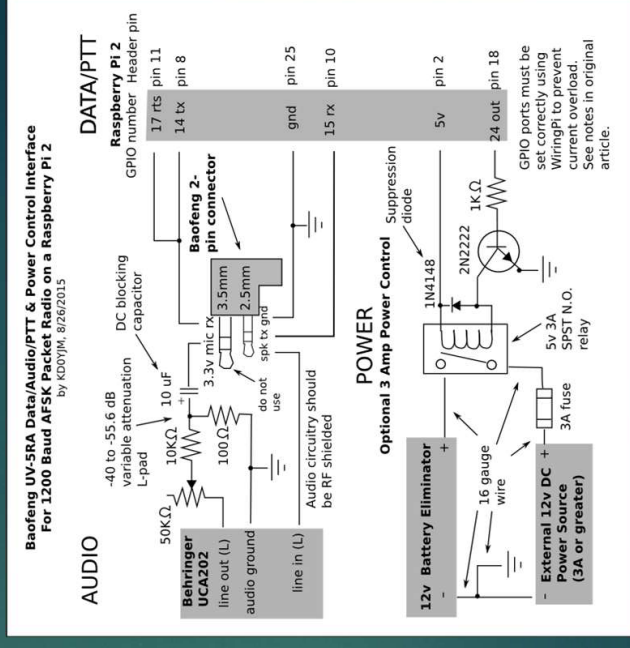
- ▶ DVAP Dongle (\$29)
- ▶ http://www.dvapdongle.com/DV_Access_Point_Dongle/Home.html



Raspberry Pi - Packet Radio

- ▶ Support APRS beacons, iGates (OS images available)

- ▶ TNC boards



Raspberry Pi - Benefits

General Radio Usage

- ▶ Lightweight
- ▶ Mobile
- ▶ Quick Start OS
- ▶ Low Power 5VDC @ 1W
- ▶ Software availability is growing
- ▶ Pre-configured OS to meet various functions and applications

Raspberry Pi – References

- ▶ Product Website
- ▶ <https://www.raspberrypi.org>
- ▶ <http://www.hamblog.co.uk/top-10-amateur-radio-uses-for-raspberry-pi/>
- ▶ Antenna rotator
- ▶ <https://jkry.org/ouluhack/PiRotator>
- ▶ Satellite Predictor
- ▶ <http://gpredict.oz9aec.net/>

Raspberry Pi – Questions?



