



RASPBERRY PI + DV4MINI

WHAT THEY ARE AND HOW THEY WORK TOGETHER

WHAT IS A RASPBERRY PI?

- \$5, \$25 OR \$35 CREDIT CARD (APPROX.) SIZE COMPUTER
- CREATED BY SEVERAL ACADEMICS AT THE UNIVERSITY OF CAMBRIDGE TO PROMOTE COMPUTER SCIENCE
- LATER CREATED THE RASPBERRY PI FOUNDATION
- GPIO PINS EXPOSED FOR PHYSICAL COMPUTING
- RUNS A VERSION OF LINUX CALLED RASPIEN
- 3RD PARTY OS'S ARE ALSO AVAILABLE
- DESIGNED PRIMARILY FOR EDUCATION
- ANNOUNCED IN FEB. 2012. WAITED 2 MONTHS BEFORE I RECEIVED MINE
- ORIGINALLY PLANNED FOR 10K UNITS BUT SOLD OUT IN MINUTES
- 100K IN PREORDERS THE FIRST DAY
- 8 MILLION SOLD AS OF FEB 2016

WHAT ELSE IS NEEDED?

- USB power supply, 5 volts 1, 2 or 2.4 amp depending on Pi version
- SD card. Class 10 for Pi 2 and 3 recommended. Watch out for fake cards on Ebay
- Mouse, keyboard, case and monitor
- Wireless dongle for Pi Zero, A+, Original Pi and Pi Model 2.
- HDMI cable or HDMI to DVI/VGA cable
- Pi 3 has wireless and Bluetooth on board
- DV4mini will only run on Model 2 or 3. Needs 4 cpu cores.
- Can run “headless” once set up. Connect with VNC
- So....\$35+\$12+6 = approx. \$53 for minimal configuration

LIMITATIONS

- No real time clock
- No audio input
- Memory shared between CPU/GPU
- USB shared bus

ADVANTAGES

- Most USB devices supported
- Many HATs available (Hardware Attached on Top) – displays, LED indicators, servo/motor controls, development boards
- Raspberry Pi Camera board 5MP, just released 8MP
- A very large and vibrant support groups

OPERATING SYSTEMS FOR THE PI

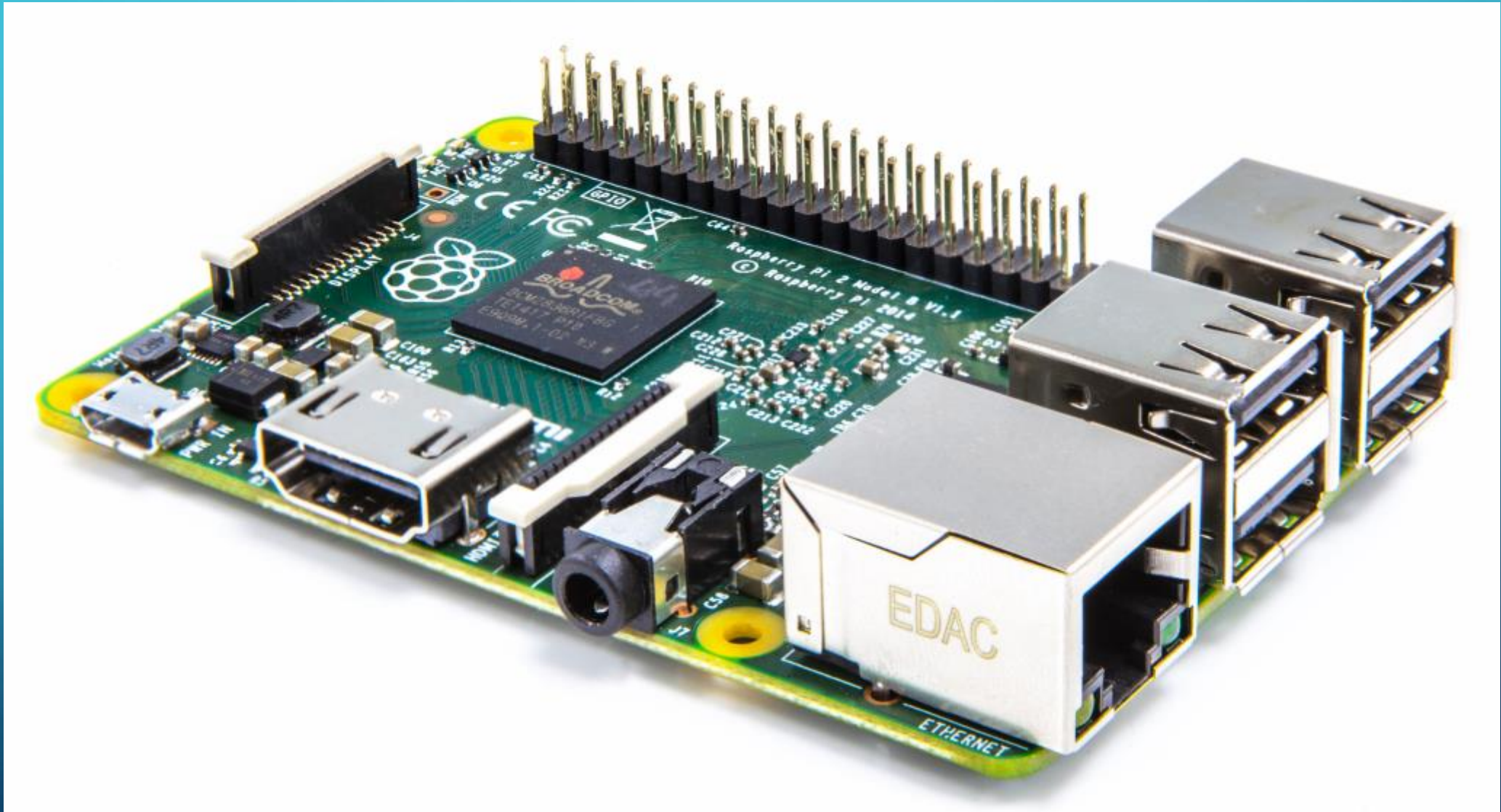
- Chromium OS
- Arch Linux ARM
- Angstrom Linux
- Debian ARM
- Pidora, a Fedora Remix
- Gentoo
- IPFire
- Meego MER + XBMC
- OpenELEC + XBMC
- PiBang
- Nard SDK (Embedded systems)
- QtonPi
- Risc OS
- Raspbian
- Raspbmc
- Slackware ARM
- SliTaz
- Void Linux
- And the list keeps growing
<http://en.Wikipedia.org/wiki/RaspberryPi>

Model	Idle consumption	Busy consumption
Pi Zero	~90mA	~150mA
Pi2 Model B	~230mA	~300mA

Type	Capacity	Pi Zero idle	Pi Zero busy
4x AA	2400mAh	26 hours	15 hours
4 x AAA	1000mAh	11 hours	6 hours
4 x C	6000mAh	90 hours	40 hours
4 x D	13000	144 hours	86 hours

PI MODEL 2 TECHNICAL DETAILS

- Broadcom BCM2836 Arm7 Quad Core Processor powered Single Board Computer running at 900MHz
- 1GB RAM
- 40pin extended GPIO
- 4 x USB 2 ports
- 10/100 Ethernet Port
- 4 pole Stereo output and Composite video port
- Full size HDMI
- CSI camera port for connecting the Raspberry Pi camera
- DSI display port for connecting the Raspberry Pi touch screen display
- Micro SD port for loading your operating system and storing data
- Micro USB power source



The Hardware

Two models (A and B)

Processor - Broadcom BCM2835 system on a chip (SoC), [3] which includes an ARM1176JZF-S 700 MHz processor, VideoCore IV GPU

Keyboard/Mouse – USB

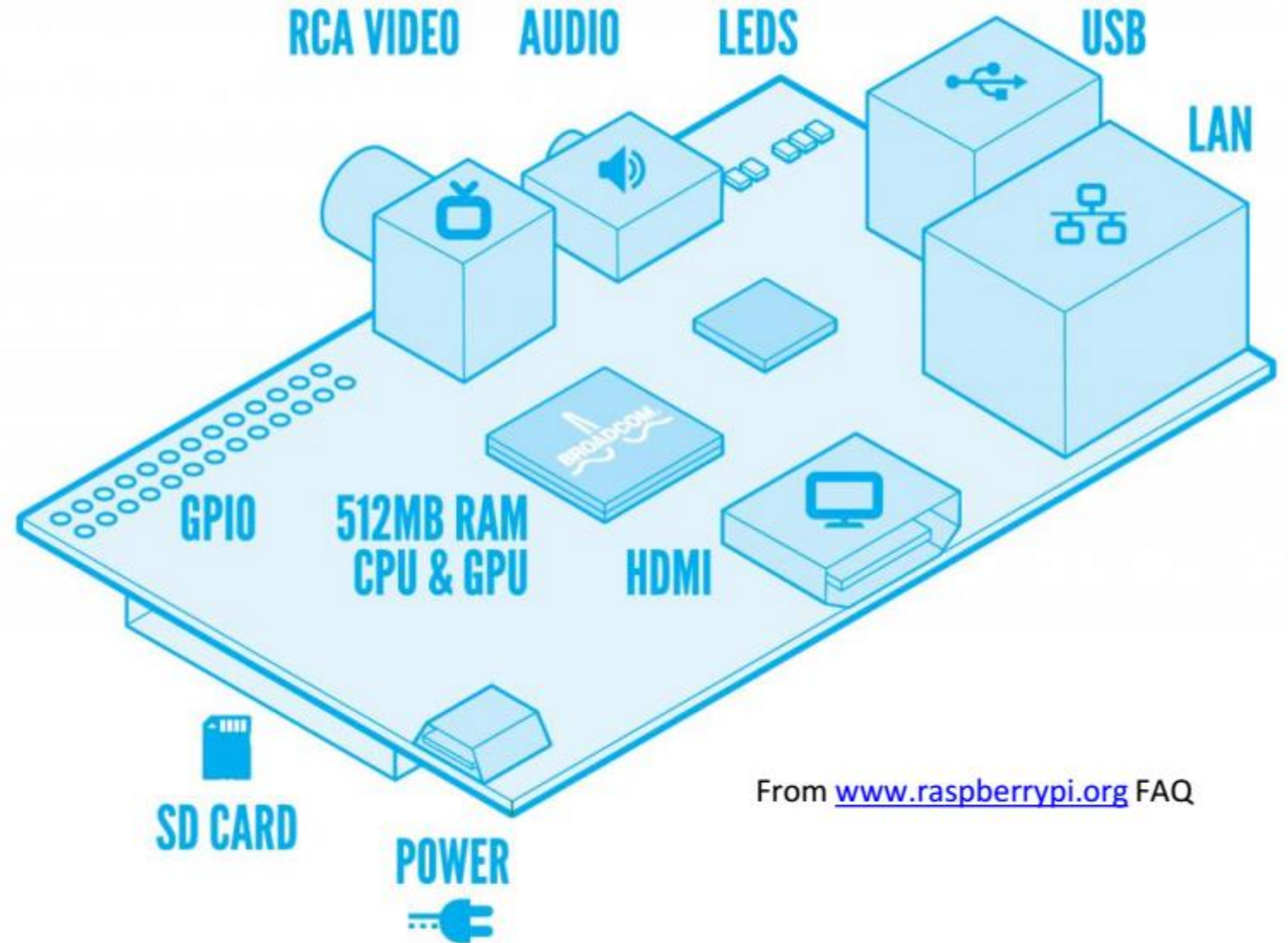
Video/Audio – HDMI or composite to display on a television

Network – Ethernet (on Model B) or WIFI via USB

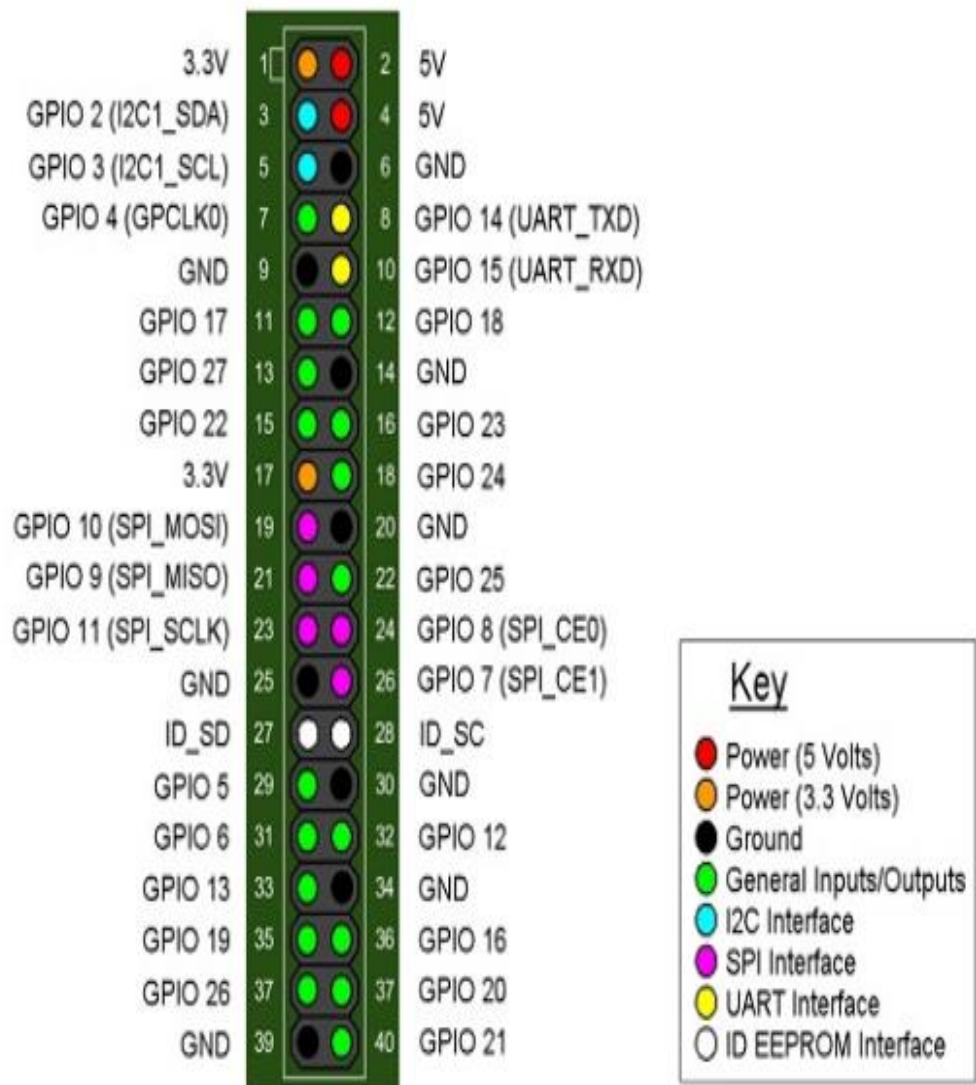
Operating Software – SD Card

Sensors, motors, relays, etc. – Analog/Digital ports on GPIO

RASPBERRY PI MODEL B



From www.raspberrypi.org FAQ



- Headers come in 26 or 40-pin GPIO depending on model.
- First 26 pins are the same.
- General purpose input and output via Broadcom BCM2836.
- **I2C** is a standard that can talk to other I2C chips (also used in the ID EEPROM).
- **SPI** is the Serial Peripheral Interface (sensors, LCD).
- **UART** is Universal asynchronous receiver/transmitter (Serial port).

from: [Wikipedia](#)

RASPBERRY PI MODELS

RPi Model A



RPi Model B (Rev 2)



RPi 2 Model A+

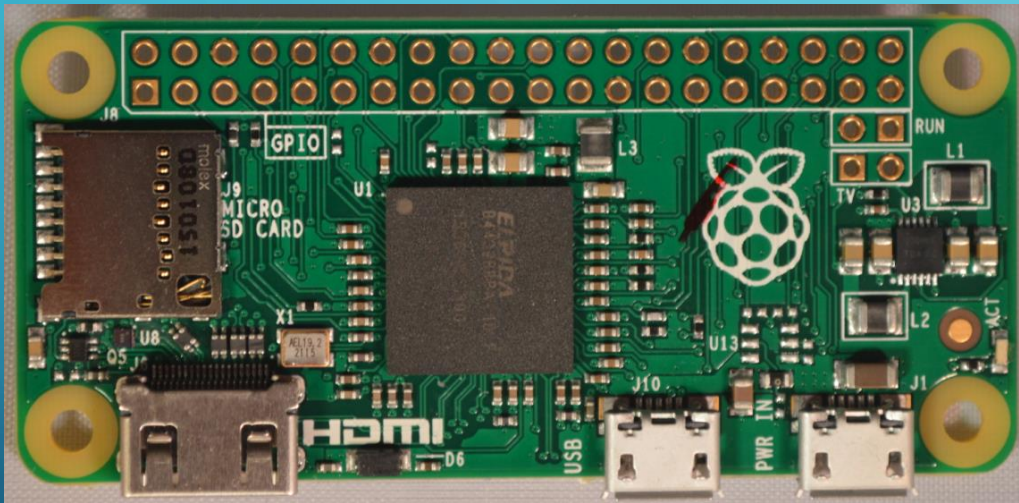


RPi 2 Model B+









Model	SoC	Speed	RAM	USB	GPIO
Pi 1 Model A	BCM2835 / ARMv6	700MHz	256MB	1	26
Pi 1 Model B	BCM2835 / ARMv6	700MHz	512MB	2	26
Pi 1 Model A+	BCM2835 / ARMv6	700MHz	256MB	1	40
Pi 1 Model B+	BCM2835 / ARMv6	700Mhz	512MB	4	40
Pi 2 Model B	BCM2836 / ARMv7	4 x 900MHz	1GB	4	40
Pi 3	BCM2837 / ARMv8	4 x 1.2GHZ	1GB	4	40
Pi Zero	BCM2835 / ARMv6	1GHz	512MB	1	40

\$5 PI ZERO: IF YOU CAN FIND IT!



Where is my #PIZERO?
Monitoring stock...

 Pi Supply	 PIMORONI	 Pi Hut
OUT OF STOCK	OUT OF STOCK	OUT OF STOCK
 adafruit	element14	Did you find this useful? Help me buy a #PiZero and I make more giveaways:  
OUT OF STOCK	No Info Found	

DV4MINI



WHAT IS DV4 MINI?

- Digital voice device that turns your computer or Raspberry Pi 2 into a digital voice hot spot for Yaesu C4FM, Icom D-Star, DMR and P-25 digital modes
- Low power 70cm transceiver into a USB stick
- Adjustable transmitter outputs from 1 to 12 mW
- Must have an ID Number for DMR registration for recognition of DV4mini hardware
- Mike Moore got me interested in DMR early Nov. 2015 – no local DMR activity!
- Received TYT-380 radio end of Nov, ordered DV4mini end of Nov. 2015
- Received DV4mini in early Dec 2015
- Already had CCS7 ID needed for the DV4mini because had ID for the radio
- LED activity monitor changes color

MORE INFO ON DV4MINI

- The DV4mini doesn't require any firewall port forwarding, -perfect hot spot. The software work on any Windows PC and Linux.
- For developers: The interface between the PC and the DV4mini is disclosed. With the DV4mini one can transmit and receive digital data in the 70cm band, transfer digital voice but also data. The interface between the GUI and the DV4mini software is also documented and available.
- Sensitivity: -120dBm Modulation types: GMSK, 4FSK Operating modes: D-Star, DMR, Fusion C4FM, P25 and DPMR
- Data rates: 9600 or 4800 Baud, TCXO: long term stability: better than 2.5 ppm TCXO: short term stability: better than 1 ppm
- USB plug type A to connect direct, no cable needed Power supplied via USB Antenna SMA-socket, 50 Ohm, you will need an external antenna

HOW DOES IT WORK?

- Great! ---But....
- Took me a long time to get the DMR radio to work with the DV4mini. Could not find a guide on internet, lots of trial and error. My code plug has been used to help others. Then lots of fine tuning with frequency offset.
- Fusion sounds just like it does on the repeater or simplex. Call signs and GPS data are passed through. AS mode will switch between DN and VW modes but most are using DN mode for more efficient use of bandwidth.
- DMR audio is ok but required lots of experimentation to get sync errors down. Improved in version 1.64 (sometimes audio is missing and have “goat bleeps”)
- P-25 audio is good, but no comparison to repeater or simplex
- D-Star sounds just like it does on repeater or DVAP module
- You are only a node or access point, unlike Wires-X
- Sporadic activity on P25. Fusion use seems to be increasing
- Still using version 1.62. Need to upgrade to version 1.64 soon. Windows version is ahead of Pi version


Personal Settings

DMR/CCS7 ID:

Hotspot Callsign: KA1CNF

Location (City):

QTH Locator:



DV4mini Settings

D-Star C4FM

DMR+ P25

Power:

RX-QRG: MHz

TX-QRG: MHz



SIMPLEX

C4FM Fusion

USA - Nationwide

CONNECT **DISC.**

Web Browser <http://www.qrz.com>

NOJRD: no picture found

Message Calls Picture

S-Meter: ██████████ -101 dBm

```

19:56:34,125643 (0002): DSTAR ... Set RX-QRG:446274800 - TX: 44627480
19:56:34,126199 (0001): DSTAR ... Set System Call KA1CNF D
19:56:34,126354 (0000): DMR ... Set Dongle ID:#3136610/KA1CNF
19:56:34,149343 (0023): DSTAR ... Connect CCS7
19:56:34,149539 (0000): DSTAR ... Set QTH Locator FN13HD
19:56:34,149746 (0000): DSTAR ... Set town Walworth
19:56:35,192625 (1043): DV4mini ... Connect request to C4FM/P25 FCS00106
19:56:35,193056 (0001): C4FM ... Connect to C4FM/P25 Reflector FCS00106
19:56:35,318720 (0125): C4FM ... Connected to C4FM Reflector: FCS00106
  
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SCREENSHOT OF DV4MINI CONTROL PANEL ON RASPBERRY PI CONNECTED TO C4FM STATION

REFLECTORS UPDATED SHOWING CALLS

75.151.47.162

This page has been translated from German to English Show original Options

DMR+ MASTER 9.25-Linux 64Bit

Version 9.25-Linux 64Bit Build:1 -000

HOME	No	Ctry	Call	Name	ID	Group / Info All OK	Slot TS1+2	via All	ID	Last Heard	QTH - City, State, Country	Type
SYSTEM	1		DL3HSU	Uwe	2622220	5057 - GPS -7	TS 2	DM0HMB	262200	14 s	Hamburg - Hamburg / Germany	
LOGFILE	2		KA1CNF	Steven	3136610	4639 USA - Nationwide	TS 2	DONGLE		25 s	Macedon - New York / United States	
	3		DG1GDW	Detlef	2627083	4012 Software TEST	TS 2	DB0SKF	262780	58 s	Endingen - Baden-Wuerttemberg / Germany	
GPS-USER	4		DL0BBL	Sebastian	2628534	5056 - GPS -6	TS 2	DM0ET	262890	1 m 21 s	Frensdorf - Bayern / Germany	
DONGLE	5		DL5MEL	Sigmund	2625136	262 - Germany DMR	TS 1	DB0UX	262799	2 m 5 s	Jockgrim - Rhineland-Palatinate / Germany	
	6		DO2RS	Christian	2627234	5000 - Read Repeater Status	TS 2	DB0RV	262711	2 m 29 s	Weingarten - Baden-Wuerttemberg / Germany	
RPT-GEO	7		OZ7KMO	Martin	2383004	4700 Denmark - All	TS 2	DONGLE		2 m 31 s	Oerbaek - / Denmark	
	8		OZ1BV	Brian	2385079	4700 Denmark - All	TS 2	OZ0REC	238540	2 m 51 s	VORDINGBORG - Sjælland / Denmark	
RPT-MAP	9		DD1GO	Joerg	2623732	Talk to (16777215)	TS 1	DB0WO	262390	3 m 4 s	Ostrhauderfehn - Lower Saxony / Germany	
	10		DO1YAC	Axel	2624436	4006 Ruhrgebiet	TS 2	DB0DOS	262492	3 m 12 s	Greven - Nordrhein-Westfalen / Germany	
DMR-LIVE	11		DG3JKB	Jan	2624220	4006 Ruhrgebiet	TS 2	DONGLE		3 m 12 s	Bochum - Nordrhein-Westfalen / Germany	
	12		DG1HGB	Heinz-Georg	2623429	5000 - Read Repeater Status	TS 2	DB0WO	262390	4 m 2 s	Rhauderfehn - Lower Saxony / Germany	
USER	13		DB7MJ	Peter	2628028	5057 - GPS -7	TS 2	DB0ESS	262860	4 m 7 s	Sonthofen - Bayern / Germany	
USER+	14		OZ1KDG	Ole Steen	2381034	5057 - GPS -7	TS 2	OZ8EVA	238105	4 m 12 s	Frederikshavn - Nordjylland / Denmark	
	15		DL2GCW	Wilhelm	2627046	2 -	TS 1	DB0BH	262760	4 m 25 s	Rheinau-Helmlingen - Baden-Wuerttemberg / Germany	
REF-LIST	16		DL4KBP	Heinz	2624384	4045 Rheinland-West	TS 2	DONGLE		5 m	Huerth - Nordrhein-Westfalen / Germany	
	17		OE1UPS	Peter	2321019	4191 OE 1 DMR-Wien	TS 2	OE1XQU	232102	5 m 20 s	Wien - Wien / Austria	
REF-LIST+	18		DO2BCB	Christian	2623680	262 - Germany DMR	TS 1	DB0GOE	262347	5 m 51 s	Hann.-Muenden - Lower Saxony / Germany	
	19		OE1JTB	OE1JTB	2321063	4191 OE 1 DMR-Wien	TS 2	DONGLE		6 m 9 s	Wien - Wien / Oesterreich/Austria	
MASTER	20		DL2RBB	Bernhard	2628245	4025 Bayern-Ost	TS 2	DM0FFL	262802	6 m 17 s	Landshut - Bayern / Germany	
	21		DM2MZ	Florian	2628291	4025 Bayern-Ost	TS 2	DB0RDH	262863	6 m 47 s	Aufhausen - Bayern / Germany	
SELECT	22		DJ9AK	Norbert	2626424	262 - Germany DMR	TS 1	DB0HTV	262691	6 m 57 s	Frankfurt - Hessen / Germany	
	23		DL1HDL	Detlef	2622061	4002 Hamburg	TS 2	DONGLE		8 m 15 s	Hamburg - Hamburg / Germany	
STATUS	24		DL1BH	Stefan	2623302	4002 Hamburg	TS 2	DONGLE		8 m 56 s	Bremerhaven - Bremen / Germany	
	25		DG2DAD	Walter	2624238	5057 - GPS -7	TS 2	DB0YS	262404	9 m 4 s	Olpe-Altenkleusheim - Nordrhein-Westfalen / Germany	
	26		DL9OBD	Thomas	2623113	5059 - GPS -9	TS 2	DB0TVH	262325	9 m 6 s	Neustadt - Niedersachsen / Germany	
	27		DG0CBP	Bjoern-Iwo	2620059	Talk to DL9OBD(2623113)	TS 2	DB0TVH	262325	9 m 7 s	Abbenrode / Nordharz - Saxony-Anhalt / Germany	
	28		HG7ZSO	Zsoldi	2167020	4770 Hungary	TS 2	HG2RUE	216101	9 m 8 s	Peteri - Pest County / Hungary	
	29		HA7PTY	Istvan	2167005	5059 - GPS -9	TS 2	HG5RUC	216502	9 m 12 s	Szazhalombatta - Pest County / Hungary	
	30		HA7EO	Marton	2167006	4770 Hungary	TS 2	HG5RUC	216502	9 m 32 s	Szazhalombatta - Pest County / Hungary	

SOME HAM RADIO APPLICATIONS

- Radio programming: Chirp
- Logging: CQRLOG, Klog, xlog
- CW Trainers
- Exam study tools
- Rig control
- Digital modes: fldigi, wsjt
- APRS
- Sign/upload your Logbook of The World (ARRL)
- HSMM
- PISSTV – Pi slow scan TV
- IRLP node
- Allstar node

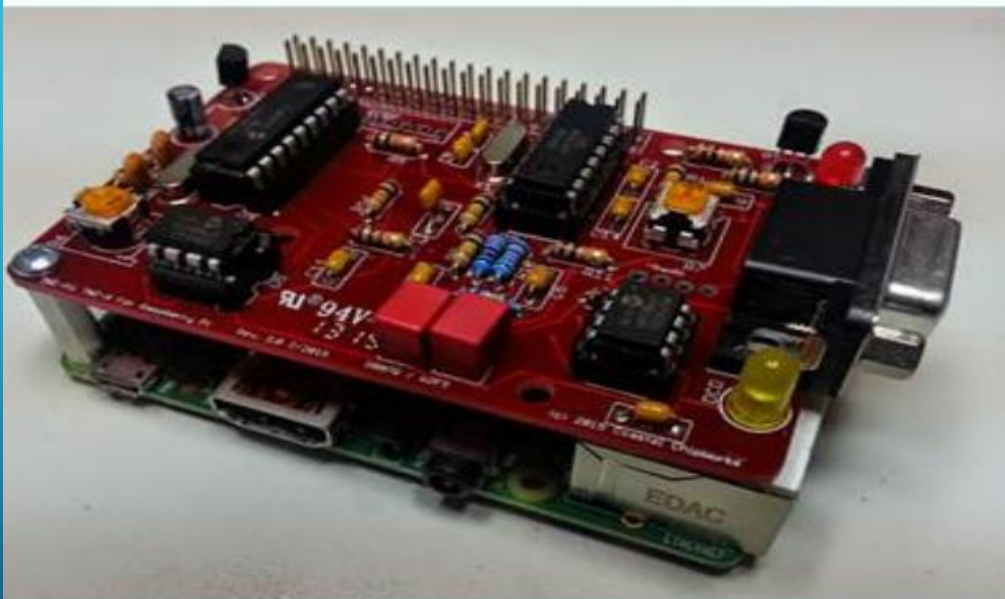
FM Transmitter



Source: <http://cdn.makezine.com/uploads/2014/01/pifmbattery.jpg>

APRS Applications

+TNC-Pi, TFT Display



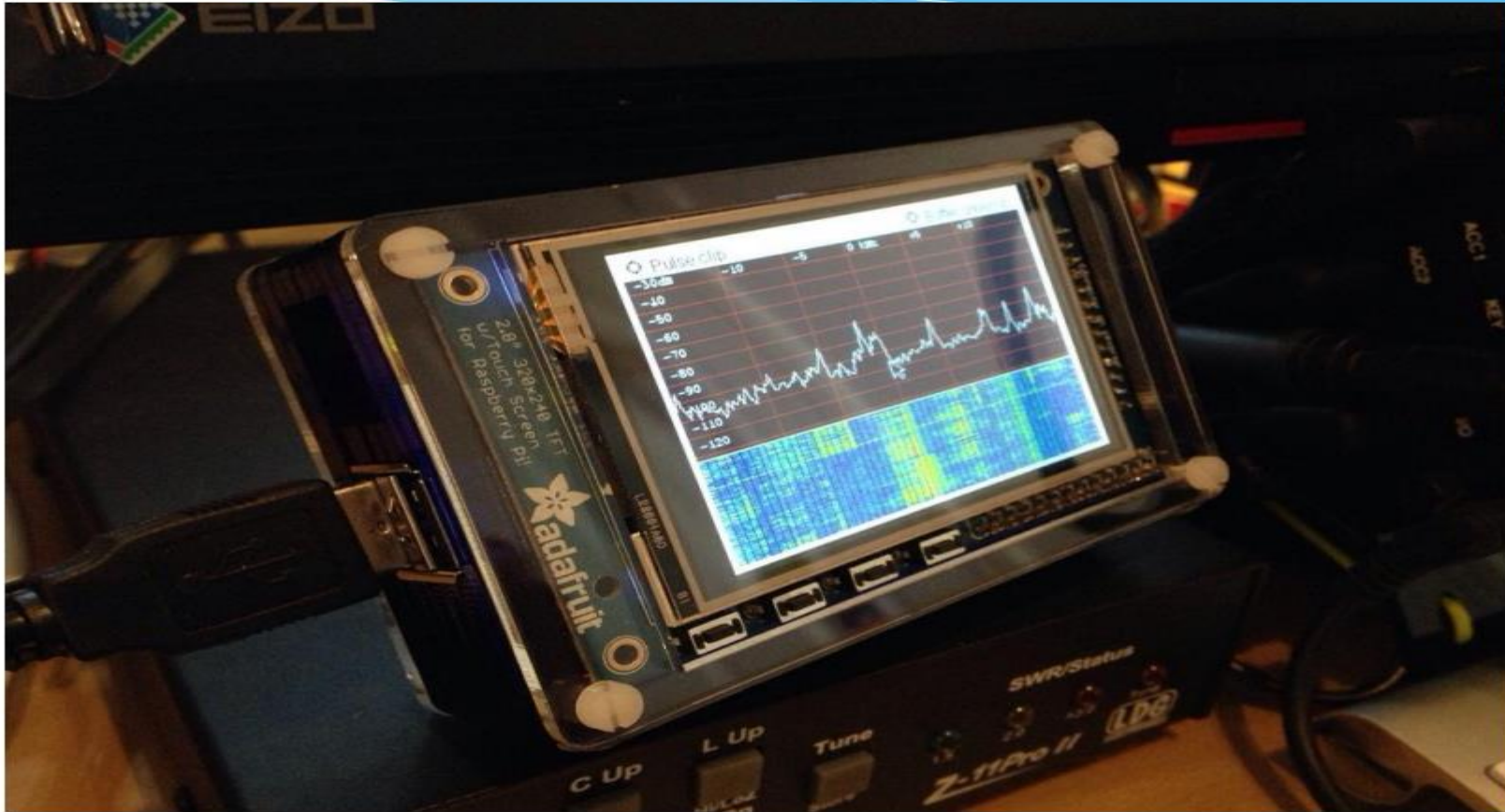
Source: <http://tnc-x.com/TNCPI.htm>

DV Access Point (DVAP) Dongle



Source: <http://ab4bj.com/wordpress/2013/02/setting-up-a-raspberry-pi-to-work-with-a-dv-access-point-dongle-dvap/>

Pan Adapter for Electcraft KX3



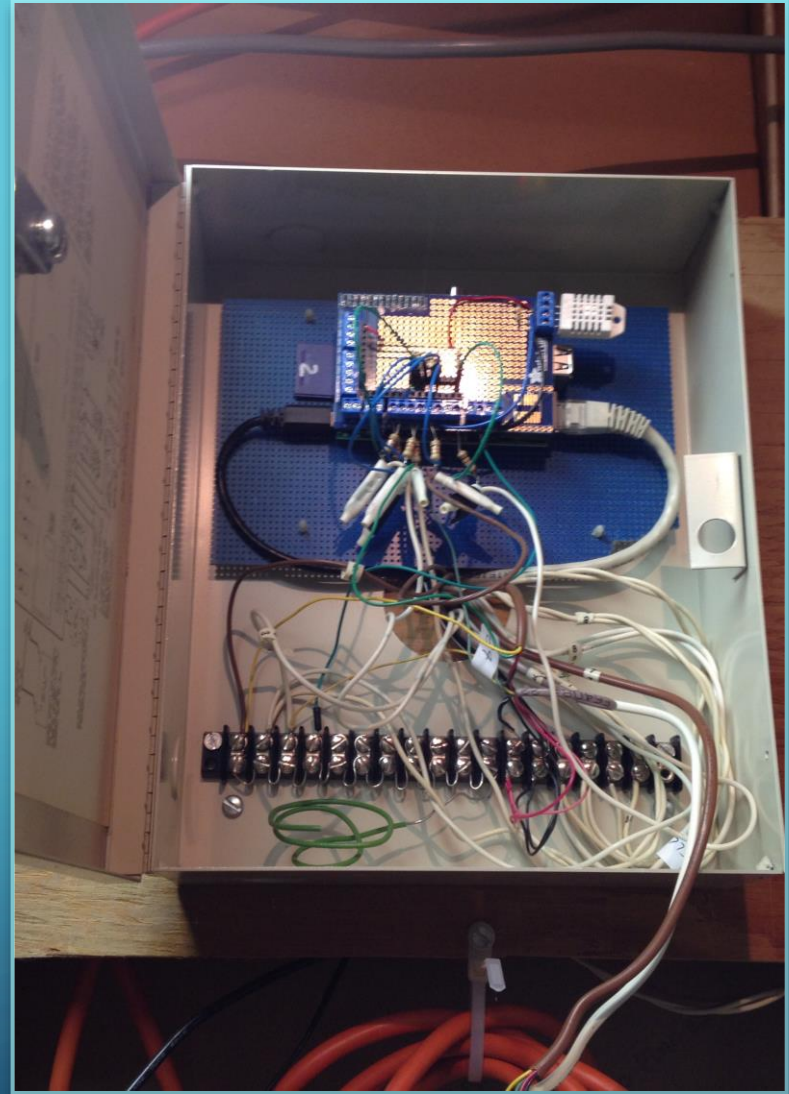
Source: <https://tigerstyleheavyindustries.wordpress.com/2014/04/20/aa6es-tiny-python-panadapter-on-a-raspberry-pi/>

OTHER NON-HAM USES FOR PI

- Weather station
- Airplane Tracker
- Home sensor monitoring and control
- Home security system
- Security cameras
- IoT's
- Solar station data gathering
- Cloud storage – Pi Drive
- Web page server
- OSMC for movies and TV –hopefully to someday replace cable
- High Altitude Balloon – data collection and pictures

PI REPLACED DSC SECURITY SYSTEM

- Control via web interface
- Sends text messages based on alert settings
- Interface with Pi proto shield board on top of Pi
- In operation 3 years



DUMP1090 (ADS-B RECEIVER) PI + SDR-DONGLE

5/11/2016
DUMP1090

Local Time

[Reset Map]

UTC Time

[Settings]

DUMP1090

Altitude: n/a Squawk: n/a

Speed: n/a ICAO (hex): n/a

Track: n/a

Lat/Long: n/a

ICAO	Flight	Squawk	Altitude	Speed	Track	Msgs	Seen
c0225b	N	5420	10700	186	104	275	2
c0635f	????????	6333	25000	0		1669	0
c060b3	????????	6323	25000	0		1869	0
c0224c		2371	26000	0		26	44
0c6034	BWA603	5415	30500	492	112	948	0
a76f68	????????	3561	32000	0		457	1
c07465	ACA868	0572	33000	488	98	1725	16
a03374		3431	36000	0		469	0
a1bf3a			38000	0		65	0

WEB LINKS FOR MORE INFORMATION

- http://elinux.org/RPi_Hub
- <http://Raspberrypi.org>
- <http://www.va2pv.com/dv4mini> - just about everything you need here plus a forum on DV4mini
- <http://wirelesshold.com/> Purchase the DV4mini here and also links to manual and software
- <http://wirelesshold.com/dv4home-2.aspx>
- <https://www.youtube.com/watch?v=4oYpyrjcXBc> – several youtube videos on dv4min from Laboenligne.ca
- <http://www.g0hwc.com/dv4mini.html>
- <http://dv4m.ham-dmr.ch/> One source for the DV4mini software
- <https://sites.google.com/site/g7eob1/radio/dv4-mini> - tips and links to software
- <http://va2pv.com/DV4miniCompactIMAGEinstructions.pdf> - pi image of DL5KV software
- <http://adafruit.com> –purchase pi's and accessories
- <http://www.mcmelectronics.com> – purchase pi's and accessories

AUDIO AND VIDEO RECORDINGS OF DV4MINI

- Couple minutes of DMR, Fusion and P25