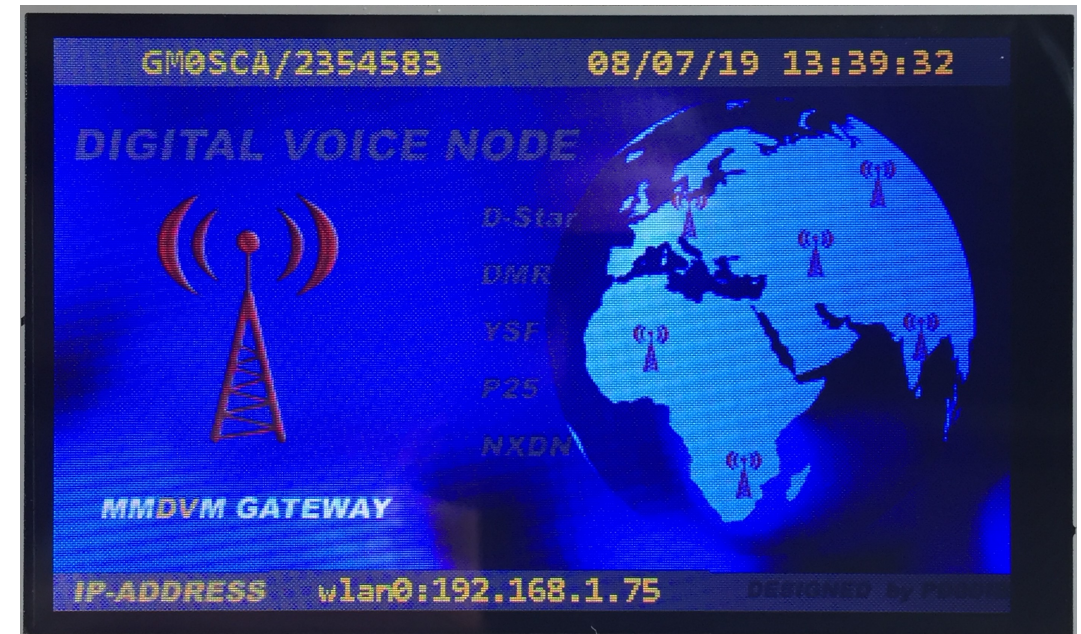
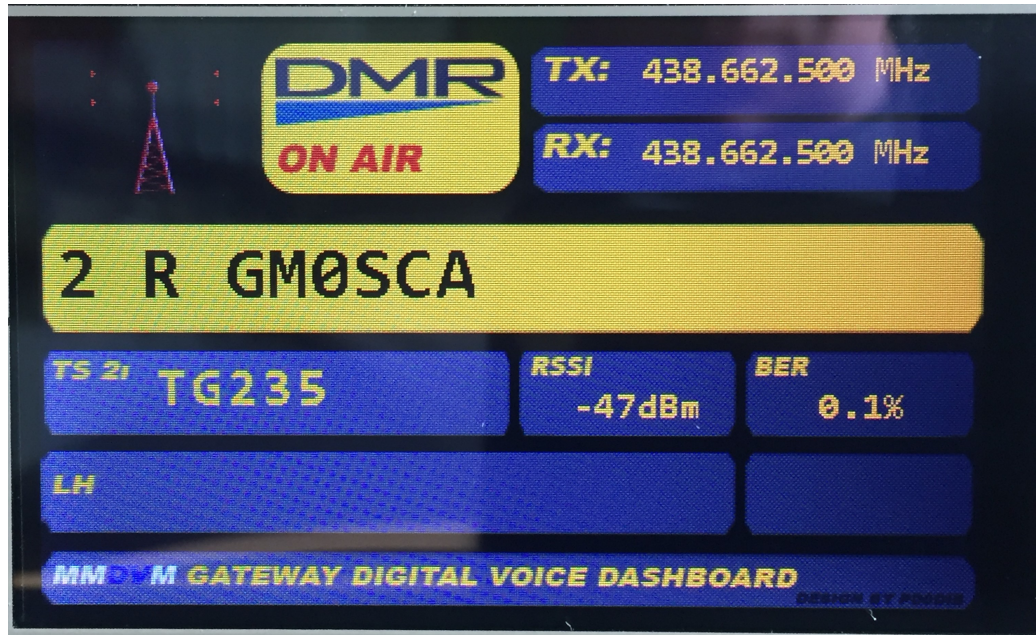


Adding a Bluetooth™ display to your DMR Hotspot



Simon Edwards, GMØSCA, July 2019

Why would you want to...?

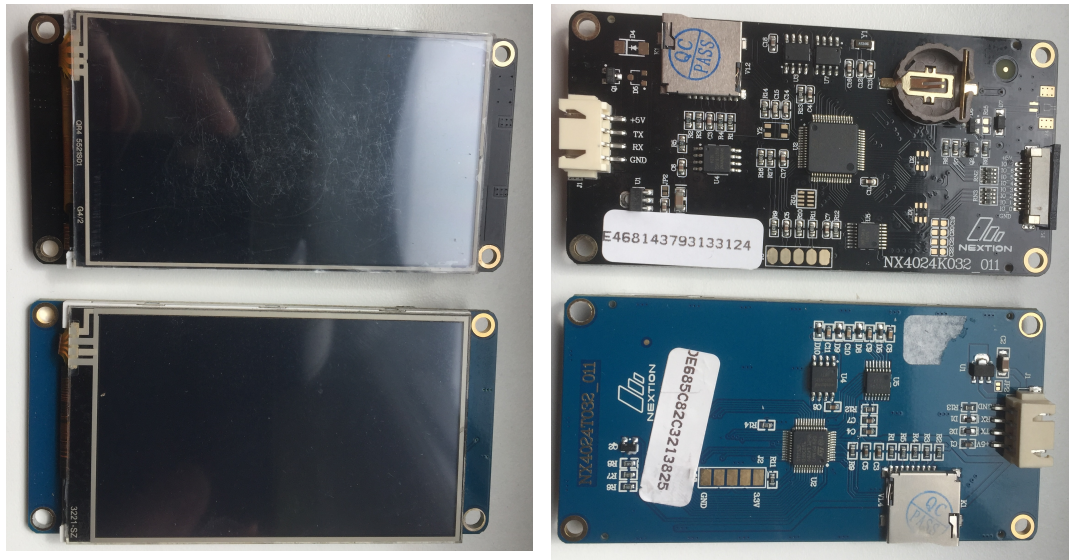
- Monitoring Pi-Star running a Hotspot shows the radio is talking to the Hotspot but it doesn't confirm the radio is talking to the outside world
- Configuring an external display to show the IP address confirms the Hotspot is connected via the Internet to the outside world
- Especially useful if you live in an area where there is no DMR coverage
- The display can be configured to show a number of options
- Easy to see and read when mounted on the dashboard when mobile and not in a repeater coverage area
- Ideal for use with Raspberry Pi Zero running DMR in a vehicle

Items needed include:

- Arduino
- Arduino Integrated Development Environment (IDE) software
- Nextion screen
- 2 x HC-05 Bluetooth™ modules
- Assorted Dupont cables
- Hotspot using MMDVM or USB/TTL as an output

Nextion screens

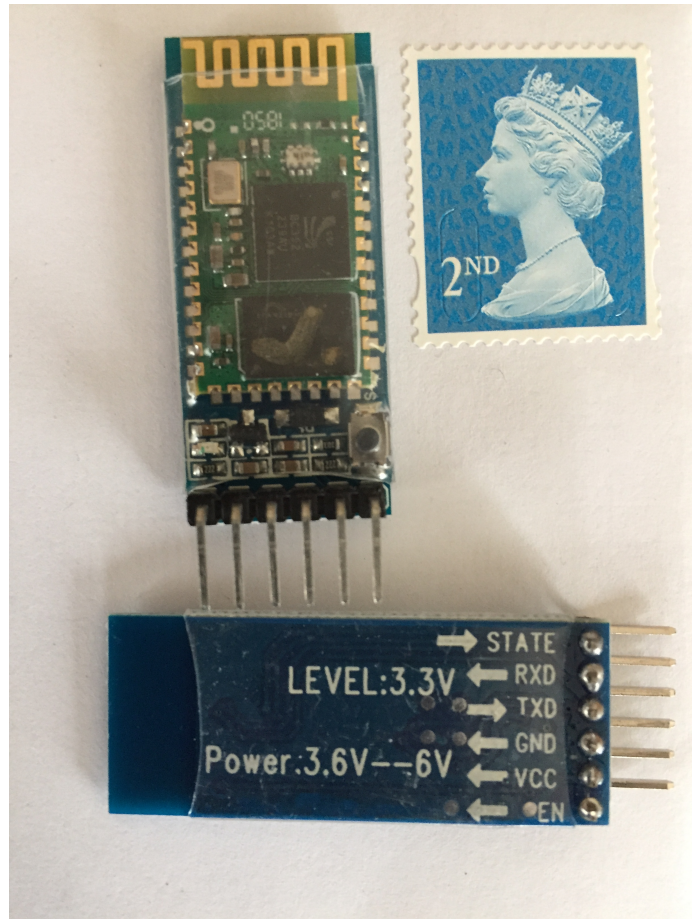
- Many sizes available – 2.4” up to 7” display
- Two versions – ‘T’ and ‘K’
- Little difference in cost between the two
- Plenty of help and screen images available on the Nextion Facebook



‘K’ is touch screen version and has
16MB Flash RAM

‘T’ is basic version and has
4MB Flash RAM

HC-05 Bluetooth™ Modules

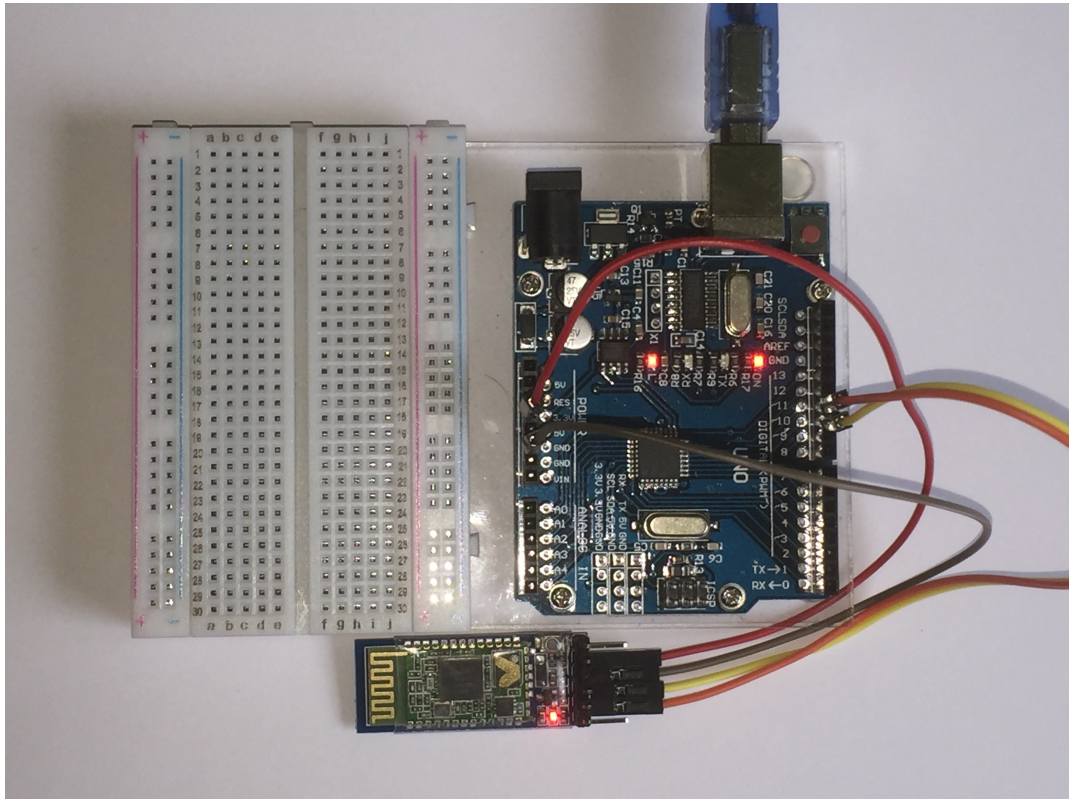


- Arrive configured as Slave
- Need to configure one as Master
- Can be configured with an Arduino and using the Arduino IDE software

Arduino Integrated Development Environment (IDE) Software

- Can be used on various platforms: Windows, Mac or Linux
- Used to create config files called a 'sketch'
- Has a Terminal mode included which is used to configure the HC-05
- Hundreds of other uses for Arduino (similar to Raspberry Pi)

Connecting the HC-05 to an Arduino



Arduino GND to HC-05 GND
Arduino Pin 10 to HC-05 TXD
Arduino Pin 11 to HC-05 RXD

Apply USB power to Arduino
Press & hold button on HC-05

Arduino 3.3V to HC-05 VCC

LED on HC-05 will flash on / off on a
2 second cycle

Configuring the HC-05

HC-05_Setup | Arduino 1.8.9 (Windows Store 1.8.21.0)

File Edit Sketch Tools Help



HC-05_Setup HC_05

```
#include <NeoSWSerial.h>

NeoSWSerial BTSerial(10, 11); // RX | TX

void setup()
{
  pinMode(9, OUTPUT); // this pin will pull the HC-05 pin 34 (key pin) HIGH to switch module to AT mode
  digitalWrite(9, HIGH);
  Serial.begin(9600);
  Serial.println("Enter AT commands:");
  BTSerial.begin(38400); // HC-05 default speed in AT command mode
}

void loop()
{
  // Keep reading from HC-05 and send to Arduino Serial Monitor
  if (BTSerial.available())
    Serial.write(BTSerial.read());

  // Keep reading from Arduino Serial Monitor and send to HC-05
  if (Serial.available())
    BTSerial.write(Serial.read());
}
```

COM7

```
10:13:27.645 -> OK
10:13:34.744 -> +ROLE:1
10:13:34.744 -> OK
10:13:41.461 -> +BIND:98D3:31:F94EDA
10:13:41.461 -> OK
```

Autoscroll Show timestamp Both NL & CR 9600 baud Clear output

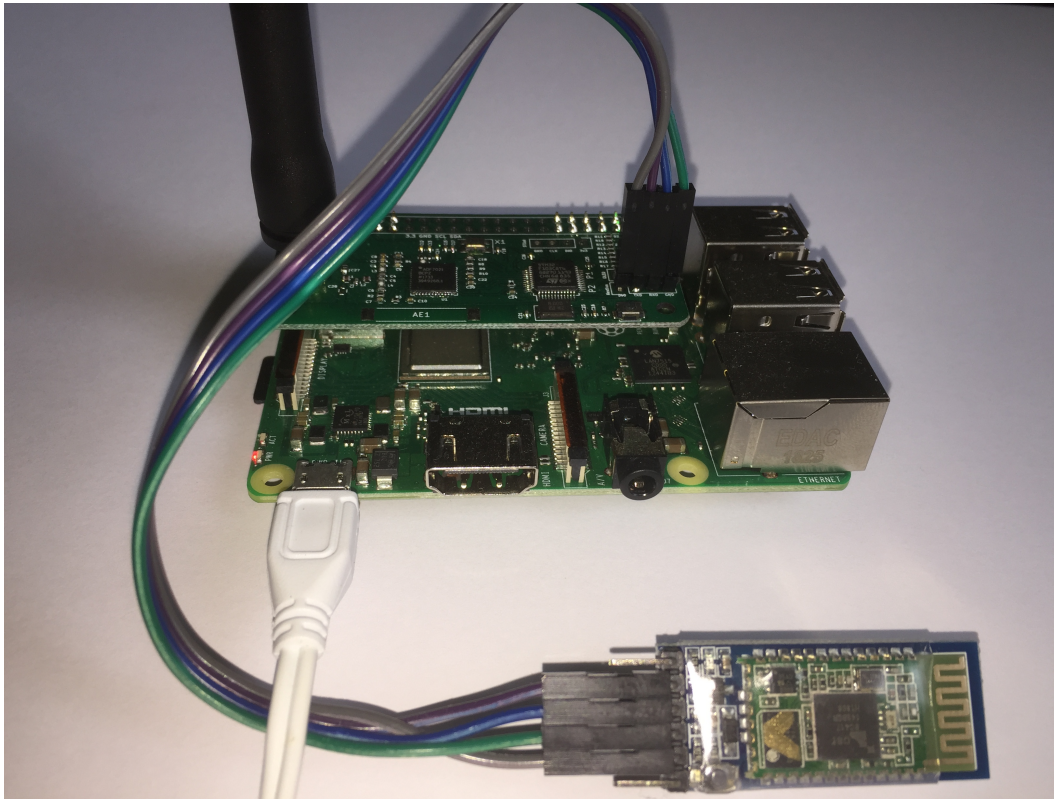
AT Commands – Slave Module

- Ensure your CAPS LOCK is ON!
- Select the Serial Monitor (top right of screen)
- Check / change the bottom entries to show:
 - Both NL & CR and 9600 baud
- Type AT [ENTER] – response should be OK, confirms you are talking
- Type AT+ROLE? [ENTER] – response should be 0 which is Slave
- Type AT+ADDR? [ENTER] – write down the reply e.g.
98D3:31:F94EDA
- Mark the module so you know it is the slave.

AT Commands – Master Module

- Disconnect the Slave Module and connect the Master following the same connection process
- Type AT [ENTER] - response should be OK
- Type AT+ROLE=1 – response should be OK
- Type AT+BIND=9803,31,F94EDA (this is the address of the Slave but note the use of commas, not colons)
- To check type AT+BIND? Make sure the response shows the same digits as the Slave

Connect the Master to your MMDVM

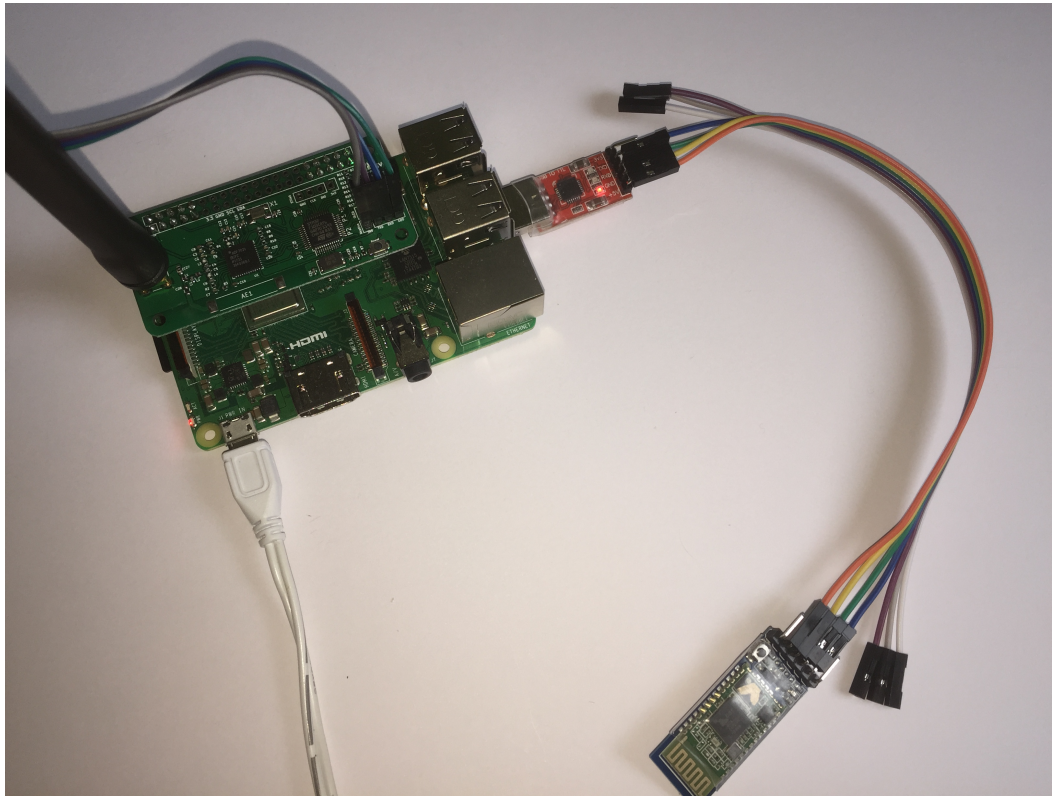


MMDVM GND	to HC-05 GND
MMDVM TXD	to HC-05 RXD
MMDVM RXD	to HC-05 TXD
MMDVM 5V	to HC-05 VCC

Note the cross over of RXD / TXD.

Pi-Star MMDVMHost Configuration
Display Type needs to be set to
Nextion / Modem / G4KLX

Or you can use a USB/TTL Converter

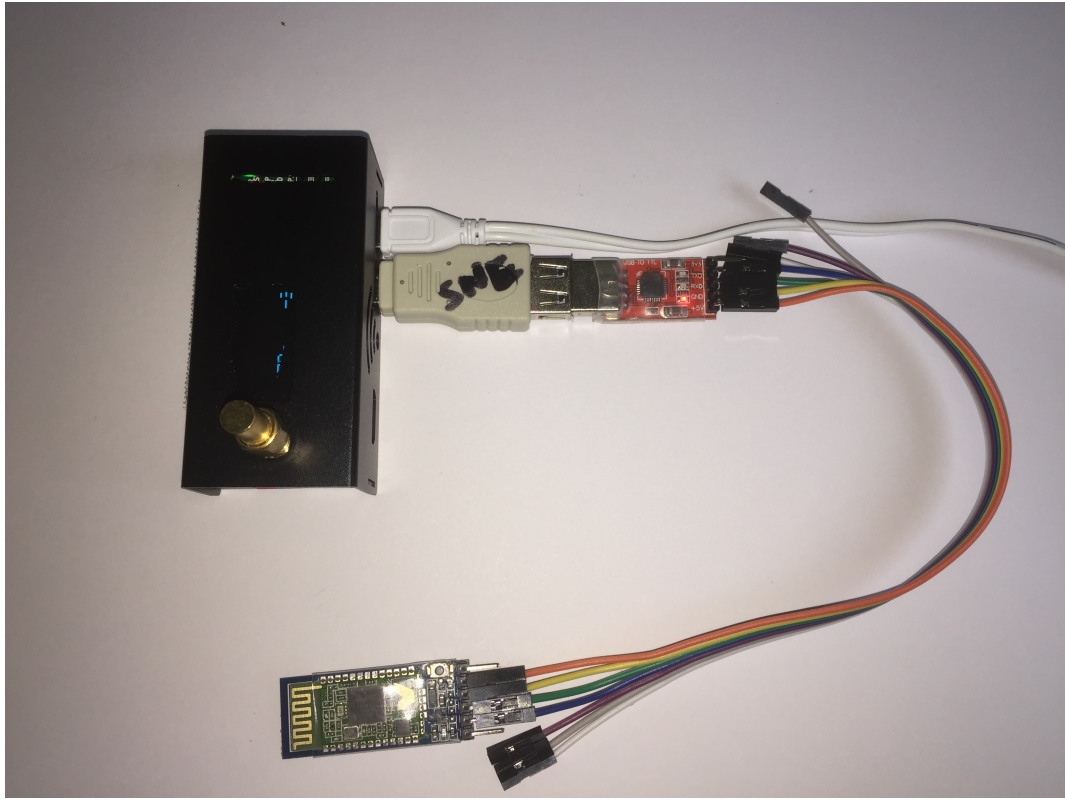


USB/TTL GND	to HC-05 GND
USB/TTL TXD	to HC-05 RXD
USB/TTL RXD	to HC-05 TXD
USB/TTL 5V	to HC-05 VCC

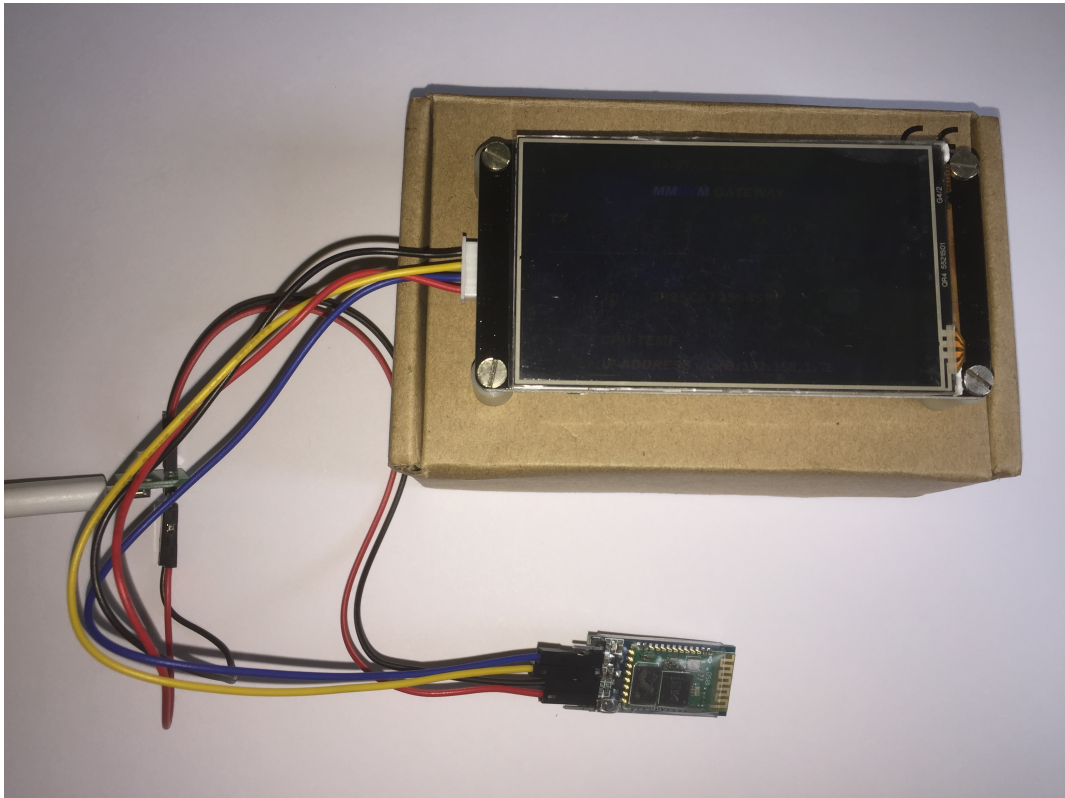
Note the cross over of RXD / TXD.

Pi-Star MMDVMHost Configuration
Display Type needs to be set to
Nextion / dev/ttyUSB0 / G4KLX

You can even use it on a Pi-Zero hotspot!



Connect the Slave to your Nextion

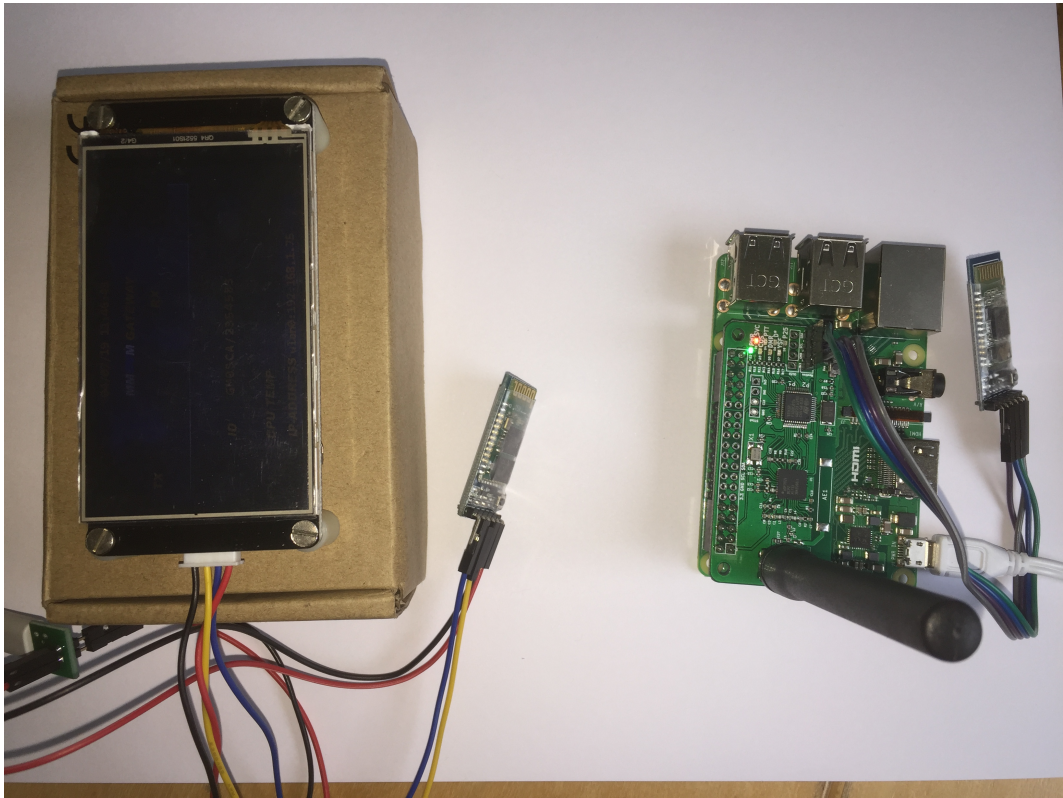


Use Nextion Power connector to power both screen and HC-05

Nextion GND	to HC-05 GND
Nextion TXD	to HC-05 RXD
Nextion RXD	to HC-05 TXD
Nextion 5V	to HC-05 VCC

Note the cross over of RXD / TXD

Once it's all connected...



The HC-05 modules will flash twice quickly every four seconds

Ta-dah! Success!

And the cost? (not including the hotspot):

Arduino Uno £9

Assorted Dupont cables £4

Nextion 3.2" 'K' screen £23

2 x HC-05 Modules £6

USB/TTL Converter £3

Any Questions?

Simon Edwards, GMØSCA

Email: gm0sca@btinternet.com