

Bluetooth I2C

ADDING BLUETOOTH TO THE I2C2PC ADAPTOR

Summary

It is very easy to add a Bluetooth module to the I2C2PC adaptor to make a wireless I2C adaptor that can datalog and control up to 100m from a PC.

You can order a pre-assembled Bluetooth adaptor from us, or with the parts and tools to hand it is a 15min job.

To software the interface remains the same as RS232 and USB: It is still a comport interface.

We used the BlueSMiRF Extended module from www.sparkfun.com. This is a simple module based on the Blueradios bluetooth module. It is a Class 1 (100m range) module, but to get this range you will need a Class 1 adaptor at the computer end.

As it has a 6 pin header and regulator built in it is very easy to use. This module has a built-in antenna.



Figure 1.:

1 Pre-Assembled Adaptors

If you have purchased a preassembled adaptor then:

- The adaptor is set for Bluetooth. To use RS232 or USB, you will need to remove the jumpers inside the case
- The baud rate of the BT adaptor has already been set, and the unit tested.
- To use the BT from your computer you must first “*Pair*” with the adaptor, then “*Connect*” to it. If you are asked for a password, it is “default”
- The bluetooth adaptor has a red LED for connected, and it may be useful to open the case so you can see the lights, if you are having difficulty connecting.
- When closing the case, do not over tighten the screws as the bluetooth module is a tight fit.

2 You will need:

- BlueSMiRF Extended module from www.sparkfun.com
- 2pin and 3 pin 0.1” headers and 3 shunts.
- Micromatch 6 female, same as used for I2C.
- 6 way ribbon cable and micromatch 6 way male.
- A Bluetooth capable PC or USB bluetooth stick.

3 How

- Add micromatch CN9 to the I2C2PC adaptor.
- Add pin headers J1 and J2 to the I2C2PC, and jumper as shown.

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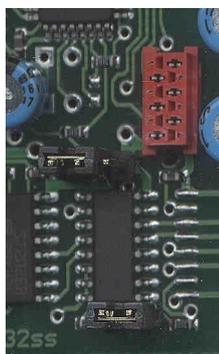


Figure 3.2.:



Figure 3.1.:

- Make up a cable with micromatch male one end and 0.1” socket for the BlueSMiRF the other end. If you use two 3 way housing it will be easy to separate the power from the RX/TX to do a loopback test with a jumper later.

#	<i>I2C2PC CN9</i>	#	<i>Sparkfun Blue SmiRF Extended</i>
1	VCC (+5)	2	PWR
2	CTS (out)	1	CTS-I
3	RXD (out)	5	RX-I
4	TXD (in)	4	TX-O
5	RTS (in)	6	RTS-O
6	GND	3	GND



Figure 3.3.:

- Before powering up the adaptor, using a continuity meter to check that the +5 and GND pins go to the correct positions on the BlueSMiRF
- Power up the I2C2PC adaptor with the Bluetooth module plugged in. The green status led on the Bluesmifrf should flash at 1Hz.
- Now you should be able to detect it and connect to it from your PC. (If you are asked for it, **the default password is “default”**). In Blue Soleil, looking at the *Status* of a connected device will tell you what comport it is using.

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- Realterm should be able to open the comport. It will be on a high comport eg Com6. If the connection is good the red LED on the Bluesmirf should come on when you open the comport. The CTS and DSR indicators in Realterm should be lit. If just the TX indicator is lit continuously, then the connection is not OK. The bluetooth software at the PC end can be fussy to connect, and sometimes remove and reconnecting or unpairing gets it going.
- You need to change the Bluetooth modules baud rate to 57600. Realterm has controls for this on the “misc” tab. Press the buttons to “Enter AT Mode”, “Set Baud Rate”, “Exit AT Mode”. Alternatively you can use the Blueradios config utility, or by using the AT command set from Realterm or any other terminal.
- Now it should be working! Type “?” and the adaptor should reply eg with “18”
- If it not talking to the I2C2PC adaptor: First make sure the jumpers J1, J2 on the I2C2PC are correct.
- If that fails, fit a shunt as shown below so you can do a loopback test. (J1 links RTS&CTS)



Figure 3.4.:

- Stick the module inside the lid of I2C2PC case with double sided foam tape, or 3M Dual Lock velcro tape, and reassemble once it is all working.
- When closing the case, do not over tighten the screws as the bluetooth module is a tight fit.

Warning: Do not accidentally plug the module into an I2C port. The AUX interface CN9 has totally different pinout. If someone else might do this unintentionally, glue the connector down or attach a note in the unit.

4 Software

No software changes are needed as the Bluetooth is still another comport as far as software is concerned. Just be aware of the potential for an RF connection to vanish.

4.1 Latency:

One drawback of the Bluetooth is increased latency. So it is important to write your code so that this is not going to be an issue.

Latency is only a problem if you write blocking code that requires a return value before it will issue the next command. If your code sends a series of commands, and processes the results as they return, there will be no problem.

For example a data logging program can simply issue a command to read data every second, and capture all returning data to a file. This arrangement works regardless of the latency.

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To test the latency, you can turn on Log files from Realterms capture tab. The log file (realterm.log) has timing information in it.

5 Selecting Interfaces

Make sure the jumper by the DB9 is not fitted

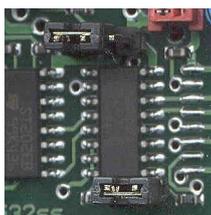


Figure 5.1.:

With the jumper fitted as shown in the picture the AUX bluetooth interface is selected.

The jumper only selects the source of signals *from* the PC. Data returning *from* the adaptor always comes out all three ports (RS232,USB,Bluetooth). This is useful for debugging.

<i>J1</i>	<i>J2,J3</i>	<i>Mode</i>
none	none	Autoselect USB/RS232 Selects USB when it is enumerated
none	USB (left)	USB only
none	RS232 (right)	RS232 only
fitted	none	invalid
fitted	USB (left)	AUX (Bluetooth) Only
fitted	RS232	invalid

6 Baud Rate

At the PC end the baud rate setting does not matter as it is going to a virtual comport anyway.

The Baud rate at the Bluetooth module can be set by using the Blueradios utility, or sending the AT commands from a terminal.

Realterm has support for this on the “MISC” tab, in the BlueSmirf box.

7 PC Bluetooth Stack

Some of the standard adaptors in pc's and laptops have a poor bluetooth software stack, and the Windows default stack has a poor reputation.(doesn't connect smoothly,

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disconnects, or has other annoying software behaviour (like “blue screen of death”). You should try to make sure you have up to date drivers for your bluetooth adaptor.

You may be better to give up on the internal adaptor and get an external class 1 USB adaptor that is has working software, and is more powerful anyway. Look for an adaptor other people recommend.

We have used adaptors with the BlueSoleil software for the PC, and it works well.

8 Range

This is a Class 1 (100m range) module, but to get this range you will need a Class 1 adaptor at the computer end. If you are buying an adaptor, make sure to get a Class 1 type.

Laptops will usually have a Class II adaptor (20m range), and it will be further limited by the compromised antenna in the laptop case.

In this case an external Class 1 USB adaptor will be more powerful, and can be mounted in a clear position at the end of the USB cable. With all radio systems, antenna position is paramount. Having the antenna clear of walls, people, wires and metal will all help, and outdoors, mounting it high, ie not on the grounds helps.

For more range, a directional antenna can be used, or some form of external antenna. An alternative Bluesmirf module is available with an SMA connector for using an external antenna.

You will find many articles on the web about using WiFi USB adaptors with “Cantennas” and other tricks.

One last alternative for even greater range are special high sensitivity Bluetooth modules from Lesswire.Com. These claim to give 3x the range of Class 1 adaptors.