Synapse-Xbee Adapter Kit

Ever want to change the species of your RF modules? Upgrade your XBee-footprint devices to the more feature-rich Synapse series of 2.4GHz radios!

Synapse module not included

Build Time: 20mins
Skill Level: Beginner (2/5)

- Drop-in XBee replacement
- Secont UART access
- Tx/Rx/GPIO indicators
- Open Source Hardware

open source hardware

SOLARBOTICS ®
Ltd

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Introduction:
The XBee series of 2.4GHz modules are very cool, but the Synapse series trumps them with a second UART, I2C, extra I/O, and even PWM. And they use embedded Python! This adapter board lets a ***Synapse 802.15.4 RF Module*** act as a drop-in replacement for a 10-pin XBee module application. The pin mapping is designed for best device-to-device matching with the exception of power, UART, reset, and the reserved pins.

There are 2 breakout headers on this board:

The 3-pin header **P1** includes breakout pins XB TX & XB RX, which are for the main UART communication lines that are used by both the XBee and Synapse Modules. These pins are attached to the following:
- **XB TX** (Data Out): Xbee Pin 2 (DOUT) pins to
  Synapse Pin 10 (GPIO8_TX_UART1)
- **XB RX** (Data In): Xbee Pin 3 (DIN/!CONFIG) to
  Synapse Pin 9 (GPIO7_RX_UART1)
- **GND:** Connection to the negative reference of power

- The 3-pin header **P2** includes breakout pins TX0 & RX0, which are for the other UART port that the Synapse Module has (UART0). These pins are attached to the following:
  - **Tx0** (Data Out): Synapse Pin 6 (GPIO4_TX_UART0)
  - **Rx0** (Data In): Synapse Pin 5 (GPIO3_RX_UART0)
 - **GND**: Connection to the negative reference of power.

This design is release under the Open Source Hardware Definition v1.0

Disclaimer of Liability & other Legalese

Parts & Materials List
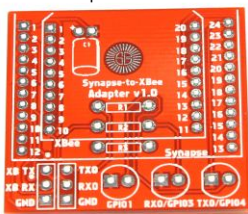
6.8µF Electrolytic capacitor
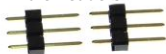
5mm Super bright LEDs
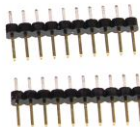
Adapter PCB

3-pin 0.1" Male headers
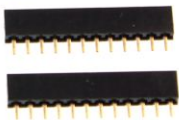
10-pin 2mm Male headers

220 ohm resistors

12-pin 2mm Female headers
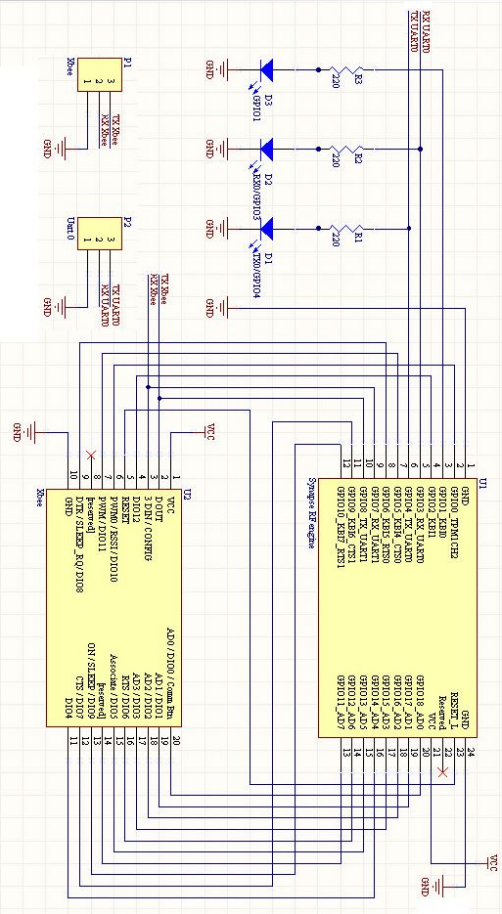
Tools & Materials Needed:

- Soldering supplies
- Side cutters

- Safety glasses
- Masking tape (optional)

QTY	Part	Designators
3	5mm LED (1 each of red, green, orange)	GPIO1, GPIO3, GPIO4
3	220 Ohm resistor (red red brown)	R1, R2, R3
2	12-pin 2.0mm Spacing female header	
2	10-pin 2.0mm Spacing male header	
2	Synapse-Xbee Adapter PCB	
1	6.8uF 35V Electrolytic cap	C1
1	3-pin 0.1" Spacing male header	
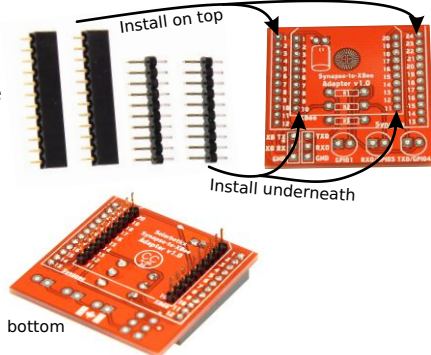
Circuit Diagram

Construction
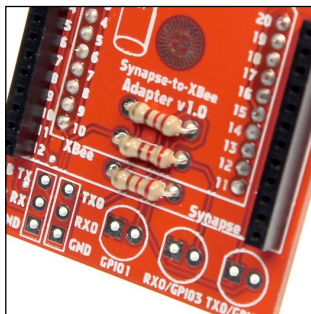
1. Pins / Headers: Take your Synapse-Xbee Adapter PCB and solder on the 10-pin male header pins on the side with the Solarbotics Logo.

If necessary, use some tape to hold the pins in place while you solder.

Install on top

Install underneath

top

bottom

2. Resistors: Bend the 220 ohm resistor leads tight against the resistor body and install in the R1, R2, & R3 positions. Solder and trim!
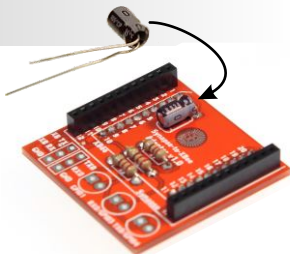
Bend the resistor leads 90˚ to the body of the resistor. Try to keep them tight against the body.

Installed and soldered!

Construction

3. Capacitor: Bend the leads on the 6.8μF electrolytic capacitor to the *left* of the negative symbol on the cap. Install it <u>flat</u>, at 'C1', matching the orientation pictured on the board markings (also observing polarity) and solder it in place. It must lay flat to avoid the Synapse module to be installed above it.

4. LEDs: Time for Rx / Tx / GPIO LED indicators. We prefer to use Green for TX0, Red for RX0, and Orange for GPIO1. If your LEDs are clear, color-test them with a coincell battery, or take your chances! Just remember to match the shape, or put the shorter lead through the *square* pad. Install, solder and clip!

5. Communication Header: We broke out both the UART1 (XBee UART) and UART0 (Synapse Spare) to this pair of headers for easy comms hacking. Install the two 3-pin headers here, then solder, and trim! You're done!

Applications

If you already have Xbee hardware, like the Xbee Shield by Arduino, you can use your Arduino board to program the synapse module through the Xbee Shield (remove the Arduino IC, and set jumpers to USB).
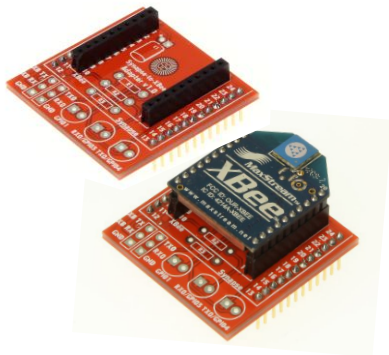
You can use a Synapse module with the Lilypad as a <u>longer range</u> drop-in replacement for an Xbee. Use this application for e-textile projects where wireless controls/readings are needed, or you can use the Synapse module to control and communicate with other modules sewn onto other costumes and/or garments.

<u>Here's a nifty trick:</u>
You can always go the other way if you'd like to adapt an Xbee module to a board designed for Synapse modules. Just add a set of 12 male headers and 10-pin female headers (both 2mm spacing) to an unpopulated Synapse-Xbee Adapter PCB, and you can then use Xbee modules on Synapse boards.

Technical Support

Technical support is available if you are having problems - please contact us and provide as much detailed information as possible.

E-mail: support@solarbotics.com

Related Items

Solarbotics Synapse-to-FTDI Adapter SKU# 39250

Synapse Max Range Mesh with RP-SMA Connector
SKU# 51750

Synapse Max Range Mesh with RP-SMA Connector
SKU# 51762

Synapse Max Range Mesh with Integrated Antenna
SKU# 51752

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