Experiment 4: Bluetooth Interface

Objectives

The purpose of this experiment is to familiarize the students with the Bluetooth interface (PmodBT2) and how to communicate it with the microcontroller.

Equipment List

- ChipKIT$^{\text{TM}}$ Pro MX7 processor board with USB cable

- PmodBT2 - Bluetooth Interface

- Microchip MPLAB ® X IDE

- MPLAB ® XC32++ Compiler

- PC-based terminal emulations (HyperTerminal®)

Overview

The PmodBT2 is a powerful peripheral module employing the Roving Networks® RN-42 to create a fully integrated Bluetooth interface [4]. The PmodBT2 uses a standard 12-pin connection and communicates via UART (See Figure 13). There is a secondary SPI header on the board for updating the RN-42 firmware if needed.

By default, the UART interface uses a baud rate of 115.2 kbps, 8 data bits, no parity, and a single stop bit. The startup baud rate may be customized to predefined rates or set to a specific user customized baud rate. Predefined baud rates range from 1200 to 921k.

The Bluetooth module operates in two modes [4]: data mode (default) and command mode. While in data mode, the module operates as a data pipe. When the module receives data, it strips the Bluetooth headers and trailers and passes the user data to the UART port. When data is written to the UART port, the module constructs the Bluetooth packet and sends it out over the Bluetooth wireless connection. Thus, the entire process of sending/receiving data to the host is transparent to the end microprocessor. See Figure 14.

In order to enter the command mode, the PmodBT2 must receive "$$$" to which it will respond "CMD". When in command mode, the module will respond to a large number of commands allowing the user to customizing the module for specific applications. In order to exit command mode, send "—<cr>" (three minus signs in a row and where <cr>stands for the carriage return character) to which the device will respond "END".
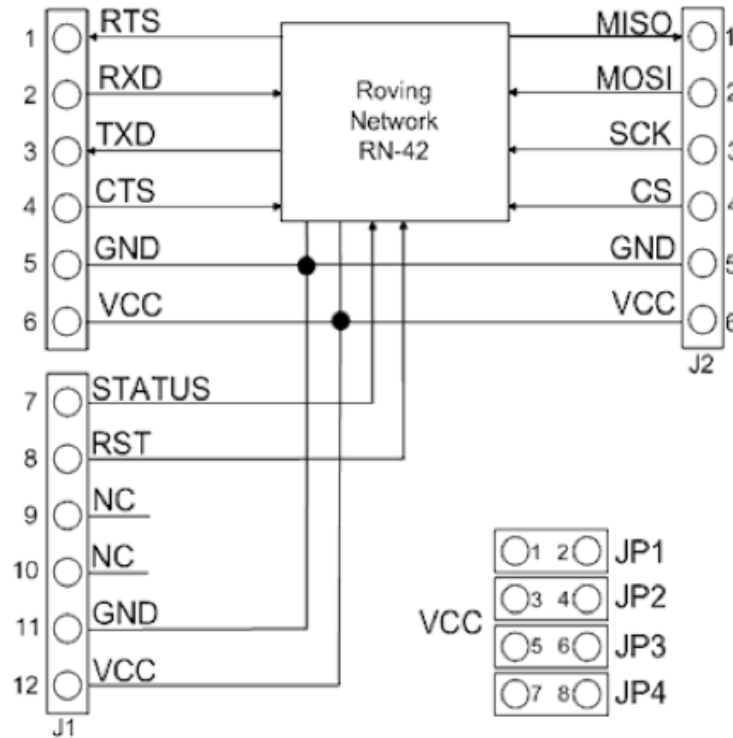
Figure 13: PmodBT2 block diagram.

Demo:

1. Connect Pmod BT2 via UART2 (JF).

2. Connect the chipKITTM Pro MX7 processor to the PC via the USB cable.

3. Install on your mobile BlueTerm app.

4. From BlueTerm app click on connect device and then select RNBT - 61E5.
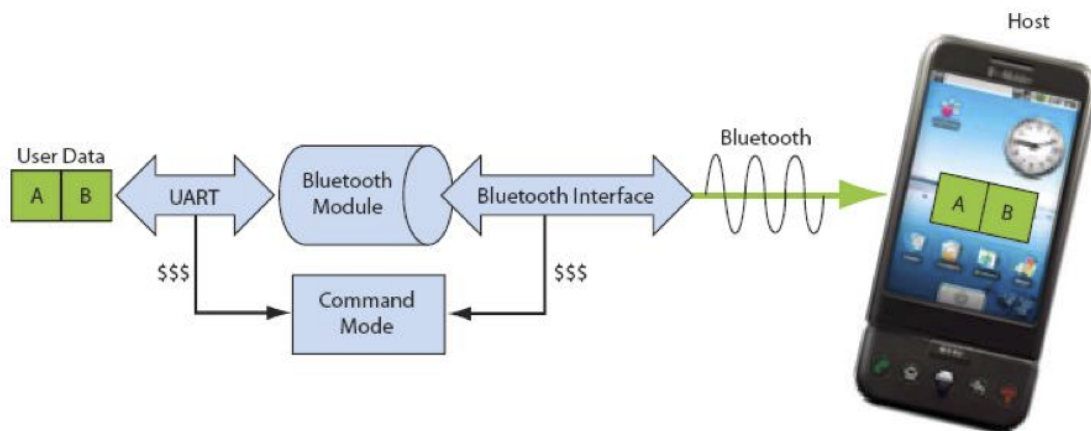
5. Send "$$$" via the mobile

Figure 14: DATA & COMMAND MODES.

6. Try some command such as D, GB, GR (refer to the Bluetooth Data Module Command Reference and Advanced Information User's Guide for more information).

Experiment

This experiment will require you to implement a chat system between the mobile and the HyperTerminal.

1. Initially, generate a new project.

2. Write a simple code to send your full name via the Bluetooth interface

   (a) Connect the Pmod BT2 to UART2

   (b) Configures the UART module at a 115.2 k data rate with 8 bits of data, no parity, and one stop bit.

3. Modify your code to implement a chat system between the mobile and the HyperTerminal.

   (a) For mobile configures the UART module at a 115.2 k data rate with 8 bits of data, no parity, and one stop bit.

   (b) For HyperTerminal configures the UART module at a 57.6 k data rate with 8 bits of data, no parity, and one stop bit.

Hint

You need to create two instances of UART in your Harmony project. The first connection is between the PC & MCU and the second one is between the Bluetooth module and the MCU. For more details on how to deal with USART by using Harmony framwework, refer to Experiment 3.