Introduction to the Gumstix Platform

November 6, 2013

1   Lab Hardware

1.1   Hardware Kit Contents

Each lab group has been provided with a hardware kit with the following components:

- Gumstix verdex-pro 400xm-bt motherboard

- Gumstix robostix expansion board

- Gumstix 5.0 volt power adapter

- Acroname USB serial interface connector

- Serial extension cable

- USB A–B cable

The heart of the 18–342 hardware kit consists of the verdex-pro motherboard and the robostix expansion board. Figure 1 shows the connected hardware for a Basix board – the setup for a verdex-pro board is similar except for the fact that you won't be using a PXA-AVR jumper and there will be an empty microSD slot instead of a MMC slot. The verdex-pro motherboard is the smaller of the two boards and contains an Intel PXA27x processor (now owned by Marvel), 16 MB of onboard flash memory (StrataFlash), a microSD slot, and a Bluetooth module. The robostix board is the larger of the two and contains an Atmel ATmega128 microcontroller with headers for nearly every I/O pin, as well as additional headers for some of the gumstix (PXA) I/O pins.

The two boards may be connected by the white, 60-pin hirose connector. When connected, the verdex motherboard sits in the center of channel of the robostix between the upper three rows of I/O headers and the power jack. Since the basix/verdex motherboard itself lacks a power connector, it must always be used in conjunction with the robostix board to receive power.

The third PCB is the USB serial interface connector. It may connect to any of the gumstix (PXA) or robostix (AVR) UARTS, but is most often used to connect the Linux console on the gumstix to a host PC.

1.2   Hardware Setup

To setup the 18–342 hardware:

1. Gently snap the basix/verdex motherboard into the robostix so that the motherboard lies entirely on top of the robostix (as opposed to hanging off the other side).

2. Connect the male side of the four wire (black/green/red/yellow) extension cable to the "Brainstem" port of the serial converter. The black wire should connect on the left side when the converter is oriented such that the word "Brainstem" reads properly (i.e., Brainstem port on top, USB port on bottom).
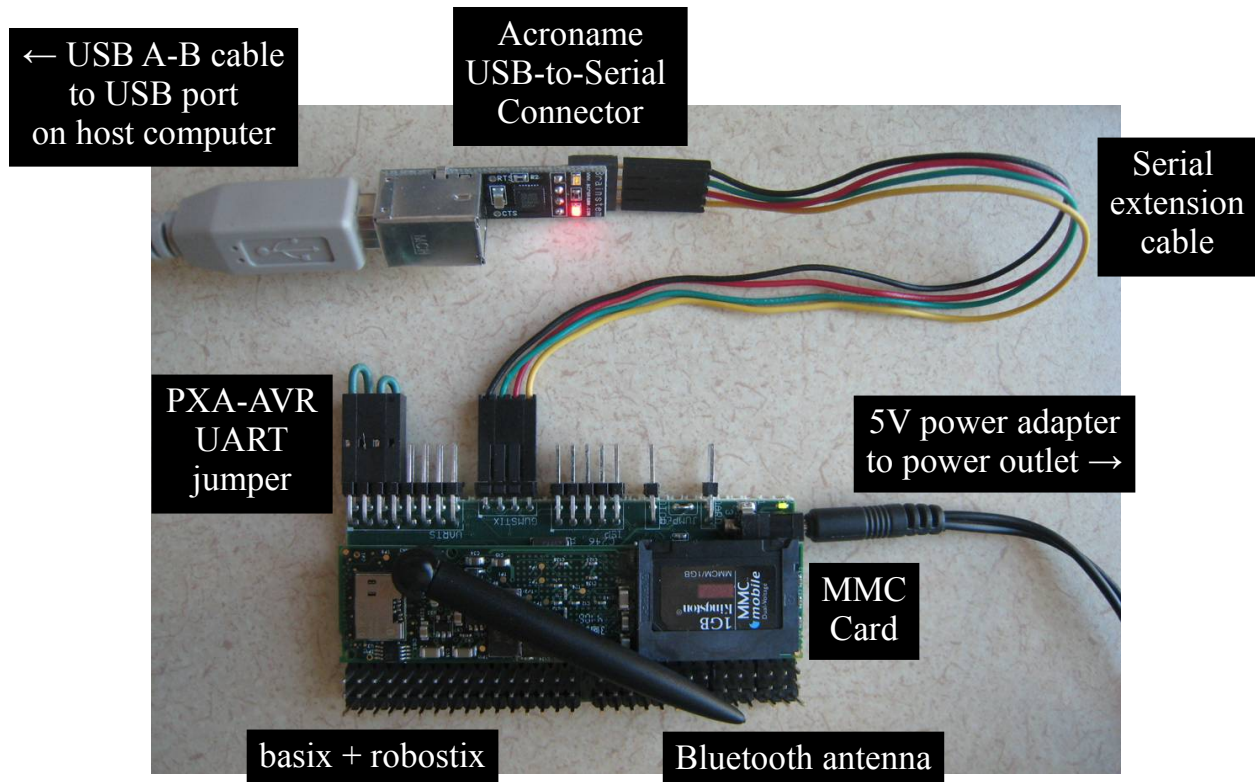
Figure 1: Hardware kit components connected together for a Basix board.

3. Connect the female side of the four wire extension cable to the "GUMSTIX" pins on the robostix board. The black wire should connect on the right side when the robostix board is oriented such that the word "GUMSTIX" reads properly (the pins are on the bottom).

4. Connect the USB A-B cable first to the serial converter, then to a USB port on the host computer. If the host computer is running Windows XP, Windows Vista or Mac OS, you may need to install the latest FTDI Virtual COM Port Driver before or while completing this step. The FTDI driver should already be available on most Linux machines.

Note: Do *not* connect the gumstix power adapter until after setting up serial communications on the host machine as described in the next section.

2 Local Setup

You now need to setup your local machine so as to be able to download the binaries that you generate on your/andrew machine to the gumstix. You will be using U-boot to download the binaries for you. U-boot requires files to be send over using the kermit protocol. Here is how you would transfer files:

 On Unix-like Machines:

1. if you are using unix.andrew.cmu.edu then scp or rsync your binaries or use an AFS mount to transfer the bin files to your machine otherwise the binaries should already be on your machine.

2. If you don't already have it, install the ckermit package on your system using your favorite package manager.

3. You may be able to use minicom and integrate ckermit with minicom — we have not tried this out. Instead, in this section, we shall use kermit to connect to your gumstix.

4. Download the provided `kermrc` from Blackboard/Resources. Place it in your home directory as `/.kermrc`. Now invoke `kermit`.

5. Power up the gumstix and interrupt the boot process. You will now be presented a `GUM>` prompt.

6. At the prompt, enter:

   ```
   loadb a3000000
   ```

   The gumstix should now print a message informing you that it is waiting for a file to be transfered.

7. Use Ctrl-backslash C to escape from the gumstix to the local machine. Use `cd` to navigate to the directory with the required bin file. Once you have found the file:

   ```
   send file_name.bin
   c
   ```

   The last c was to tell kermit to "continue" listening to the gumstix.

8. You should be back to the `GUM>` prompt. To load one of your application programs, enter:

   ```
   loadb a0000000
   ```

   The gumstix should again print a message informing you that it is waiting for a file to be transfered.

9. Use Ctrl-backslash C to escape from the gumstix to the local machine. Again `cd` to the directory that contains the program and:

   ```
   send app.bin
   c
   ```

   This will load the program `app.bin` at address `0xa0000000`.

10. Type `go a3000000` on `GUM>` prompt to start your kernel (which, if written appropriately, should execute the app).

On Windows Machines: Configuring HyperTerminal on Windows XP To configure HyperTerminal for connecting to the gumstix console on Windows XP:

1. Execute HyperTerminal from the Start menu (located in Accessories, Communications).

2. Cancel the "Location Information" dialog every time it appears.

3. Enter "gumstix" for the connection name, click OK.

4. Select the highest COM port under "Connect using",[1] click OK.

5. Select these settings on the "COM Properties" dialog:

Bits per second:	115200
Data bits:	8
Parity:	None
Stop bits:	1
Flow control:	None

6. Exit HyperTerminal, save the connection settings.

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[1]Or the appropriate device if not the highest COM port.

To invoke HyperTerminal for normal operation, execute HyperTerminal via `gumstix.ht` from the Start menu (located in Accessories, Communications, HyperTerminal).

1. Use an scp program or an AFS mount to transfer the required bin files to your machine.

2. Power up the gumstix and interrupt the boot process. You will now be presented a `GUM>` prompt.

3. At the prompt, enter:

   ```
   loadb a3000000
   ```

   The gumstix should now print a message informing you that it is waiting for a file to be transfered.

4. Using Hyperterm's Send File feature, send over the required bin file, after selecting the kermit protocol in the drop box.

5. Repeat as necessary.

6. Type `go a3000000` to start your kernel.