Stellaris® LM3S9B90 Evaluation Kit

The Stellaris LM3S9B90 Evaluation Kit for Ethernet and USB OTG provides a low-cost way to start designing Ethernet and USB OTG applications with Stellaris microcontrollers. The LM3S9B90 Evaluation Board (EVB) functions as a complete evaluation target that also includes a debugger interface (BD-ICDI) that can be used to program and debug the evaluation board as well as any other external Stellaris device. The included USB cable is all that is needed to provide power and communication to the host PC.

LM3S9B90 Evaluation Board

Requirements

- You have a PC, with a USB interface, running Microsoft® Windows 2000, XP, or Vista.
- You have the Stellaris LM3S9B90 Evaluation Kit Documentation and Software CD

Board Set-Up

The LM3S9B90 Evaluation Board is configured for immediate use. First, connect the LM3S9B90 Evaluation Board to the ICDI board using the 8-pin and 10-pin ribbon cables included in the kit. The 8-pin cable inserts into the header labeled PWR/UART on each board. The 10-pin cable inserts into the header labeled JTAG/SWD on each board. To power the EVB, use the USB-miniB to USB-A cable supplied in the kit. Connect the miniB (smaller) end of the USB cable to the connector labeled "USB J4" on the ICDI board. Connect the other end (Type A) to a free USB port on your host PC. The USB is capable of sourcing up to 500 mA for each attached device, which is sufficient for the evaluation board. If connecting the board through a USB hub, it must be a powered hub.

Important Note: The next step explains how to install the FTDI drivers for the board. Some customers with previous installations of the FTDI drivers may experience trouble when installing newer (2.02.04 and later) versions of the driver. The problem only seems to affect users of Windows XP, and not Windows Vista. If you have any problems with the driver installation, go to www.ti.com/lm_ftdi_driver for information.

When you plug in the EVB for the first time, Windows starts the Found New Hardware Wizard and asks if Windows can connect to Windows Update to search for software. Select "No, not this time" and then click Next.

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Next, the Found New Hardware Wizard asks from where to install the software. Select "Install from a list or specific location (Advanced)" and click Next.
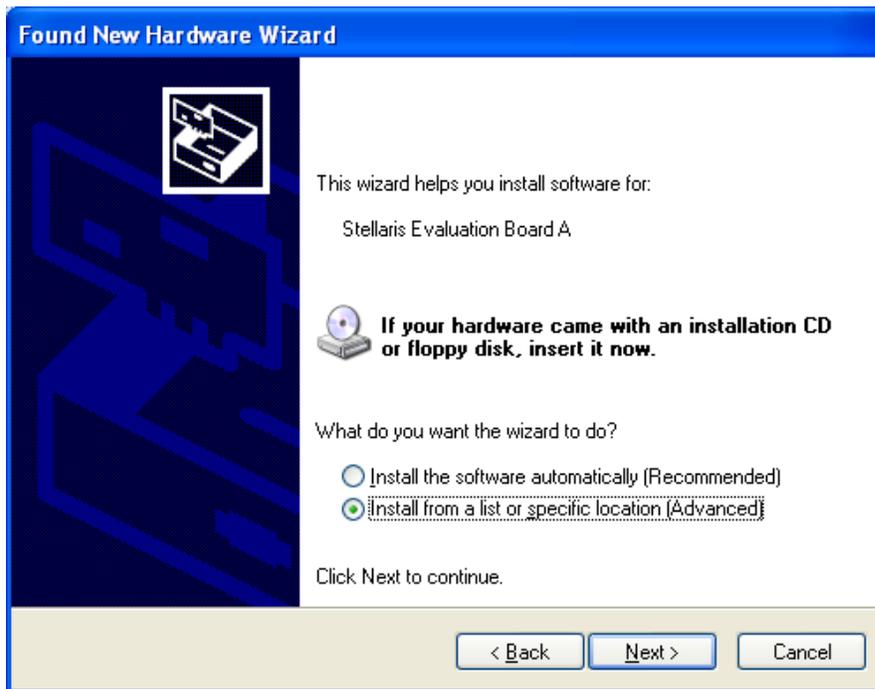
Make sure the "Documentation and Software" CD that came with the evaluation kit is in your CD-ROM drive. Select "Search for the best driver in these locations," and

check the "Search removable media (floppy, CD-ROM…)" option. Click Next.
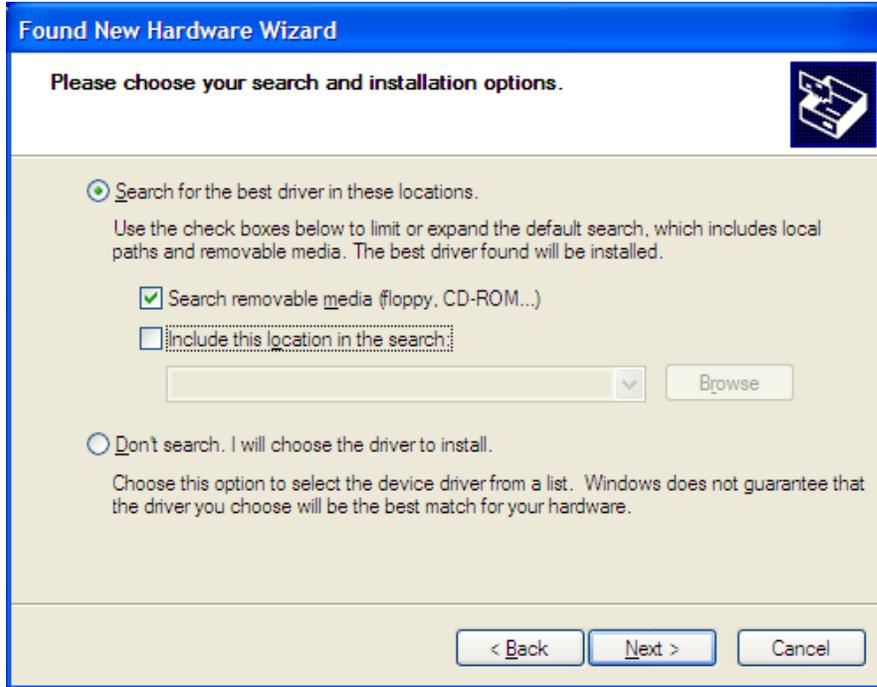
Windows finishes installing the drivers for "Stellaris Evaluation Board A." When the driver install is finished, the Found New Hardware Wizard window appears like the one below. Click Finish to close the dialog box.

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You have just installed the drivers for "Stellaris Evaluation Board A." The USB device built into the EVB is a composite USB device. After you click Finish, Windows automatically installs a driver for the "Stellaris Evaluation Board B" part of the composite USB device. Follow the same instructions as above to install the drivers for this device.

The Found New Hardware Wizard appears one last time. This is to install the drivers for the "Stellaris Virtual COM Port." Again, follow the same instructions to install the drivers for this device.

Now all of the FTDI drivers for the LM3S9B90 Evaluation Board have been installed. These drivers give the debugger access to the JTAG/SWD interface and the host PC access to the Virtual COM Port.

With the drivers installed, Windows will automatically detect any new Stellaris boards that you attach, and install the drivers for you.

Quickstart Application

The LM3S9B90 Evaluation Board comes preprogrammed with a quickstart application. Once you have powered the board, this application runs automatically. The quickstart application is a game that consists of a Z-machine interpreter running a Z-code version of the classic Colossal Cave Adventure game originally created by William Crowther. The Ethernet interface provides a telnet server and the USB interface provides a CDC serial port. Either interface can be used to play the game, though not at the same time.

The LED on the evaluation board will be turned on when the game is being played; further connections will be refused since only one instance of the game can be played at a time. The push button on the evaluation board will restart the game from the beginning; this is equivalent to typing ``restart'' followed by ``yes'' in the game itself.

The virtual COM port provided by the ICDI board (which is connected to UART0 on the evaluation board) provides a simple status display. The most important piece of information provided is the IP address of the Ethernet interface.

The game is played by typing simple English sentences in order to direct the actions of the protagonist, with abbreviations being allowed. For example, ``go west'', ``west'', and ``w'' all perform the same action.

Three display modes are available; ``verbose'' (which displays the full description every time a location is visited), ``brief'' (which displays the full description the first time a location is visited and only the name every other time), and ``superbrief'' (which only displays the name). The default display mode is ``brief'', and ``look'' can be used to get the full description at any time (regardless of the display mode).

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Playing the Game via Ethernet

The LM3S9B90 microcontroller contains an integrated Ethernet controller, which can be used by the game. Attach the board to a LAN or directly to your PC. If there is a DHCP server present on the LAN, the board attempts to obtain an IP address from the DHCP server. If an IP address cannot be obtained from a DHCP server, the board acquires a link local IP address using the AutoIP protocol. If connecting to a LAN, your PC's configuration should match the board's, except for the IP address. In most cases, if you connect the board directly to your PC, your machine automatically detects the correct IP address and subnet settings after several seconds.

In some cases, you need to manually configure your IP address and subnet mask when connecting the evaluation board directly to your PC. To do this, disable the machine's wireless network connection and any other internet connections that could interfere with the network being created. Select the Internet Protocol (TCP/IP) connection within the Local Area Connection Properties and click on Properties. Next, manually configure your IP address as 169.254.19.60 and your subnet mask to 255.255.0.0, as shown below. The application running on the LM3S9B90 evaluation board has a software Auto-MDX feature which allows you to use a straight-though or cross-over Ethernet cable.

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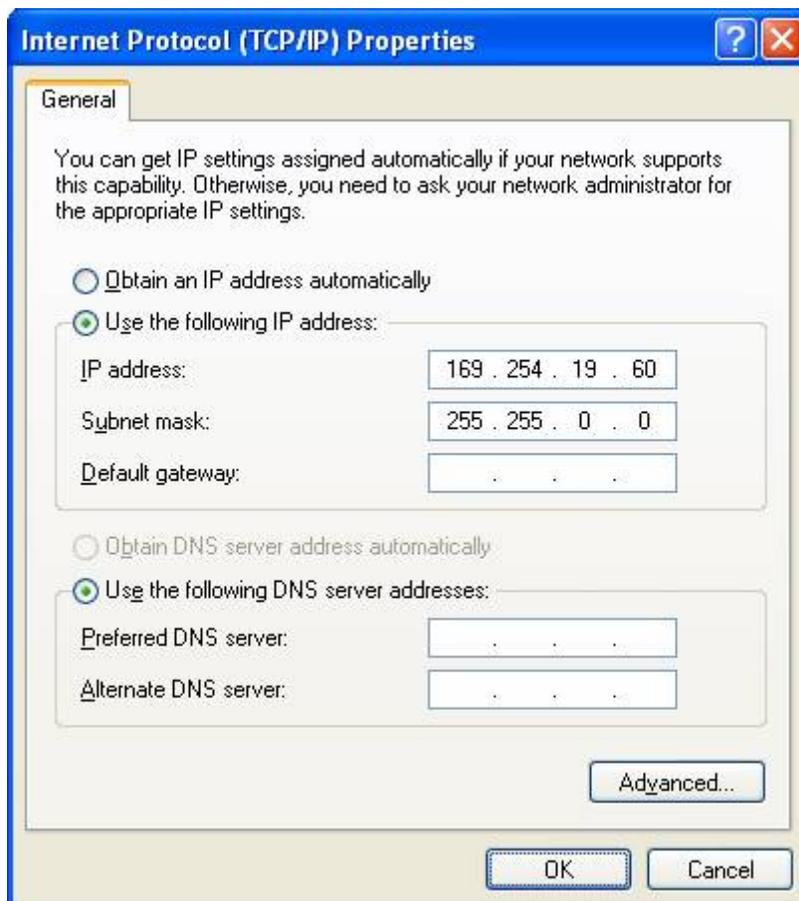
LM3S9B90 EVALUATION KIT README FIRST

Determining the IP Address

The IP address of the LM3S9B90 evaluation board can be obtained in two ways:

- Using the Finder utility

- Using the Virtual COM port

Using the Finder Utility

1. Insert the Documentation and Software CD into the CD-ROM drive of your computer. If Autoplay is enabled on your PC, the index.htm file automatically opens in your default web browser. If not, use Windows Explorer or other browser to open the index.htm file manually.

2. From the CD menu, select the Tools button. Click the 'Download' link for the Finder utility.

3. Save the Finder utility to your preferred location.

4. Browse to the location where you saved the Finder utility and double click the icon to run the utility.

5. The Finder utility will start up and you should see the S2E module in the list of available Stellaris boards similar to the screen shot below. The IP address listed will be used in the next step.

Note: You can alternatively run the Finder application directly from the CD. The Finder utility is located in the /Tools/Finder directory on the CD.

![TEXAS INSTRUMENTS]
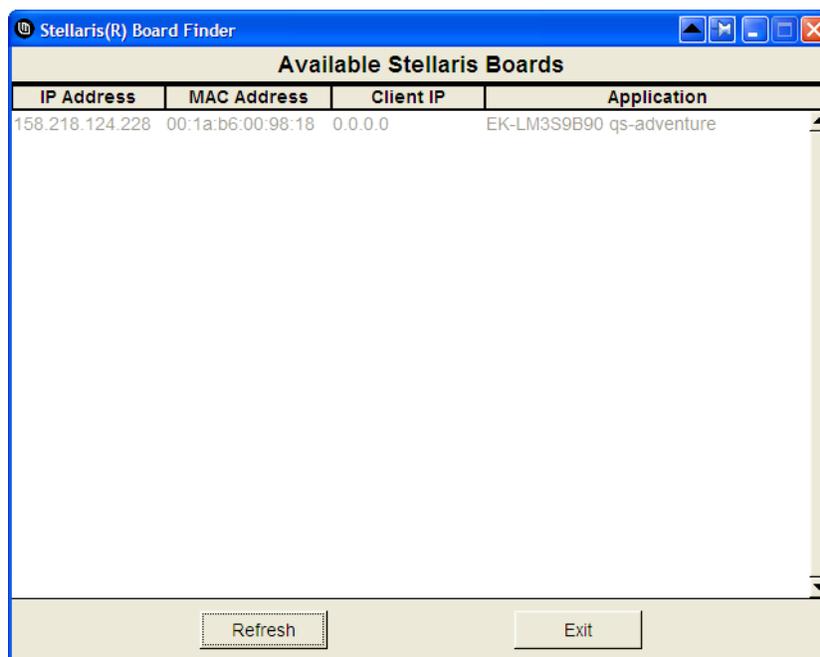
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Using the Virtual COM Port

1. Open a HyperTerminal window. On Windows XP, HyperTerminal can be found by clicking Start, Programs, Accessories, and then Communications.

2. Enter a name for the terminal window and click OK.

3. In the Connect Using pull-down menu, select the COM port associated with the "Stellaris Virtual COM Port" and click OK. Use Device Manager to determine the correct COM port if necessary.

4. Select 115200 bits per second, 8 data bits, no parity, 1 stop bit, and no flow control. Click OK.

5. Press the reset switch on the board. The text in the HyperTerminal will indicate that the IP address is being acquired. Wait for the IP address to be acquired.

Open a Telnet Connection and Play the Game

1. Open a HyperTerminal window.

2. Enter a name for the terminal window and click OK.

3. In the Connect Using pull-down menu, select TCP/IP (Winsock). Set the Port number to 23 and set the Host address to the IP address of the board found in the previous step. Then click OK.

4. You should see the introduction text of the game. The game is now ready to be played. See the Game Hints section below for hints.

Playing the Game via USB

The LM3S9B90 microcontroller contains an integrated OTG USB controller, which can be used by the game. Using the USB-OTG to USB-A cable, connect the OTG end to the board and the Type A end to your PC. Windows starts the Found New Hardware Wizard and asks if Windows can connect to Windows Update to search for software. Select "No, not this time" and then click Next.

TEXAS INSTRUMENTS

Next, the Found New Hardware Wizard asks from where to install the software. Select "Install from a list or specific location (Advanced)" and click Next.

Make sure the "Documentation and Software" CD that came with the evaluation kit is in your CD-ROM drive. Select "Search for the best driver in these locations," and

TEXAS INSTRUMENTS
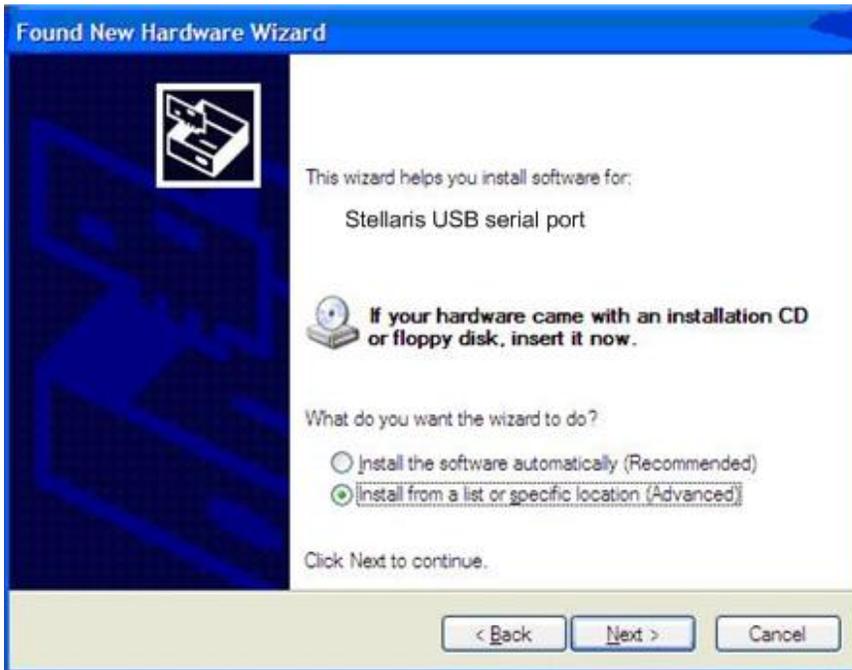
check the "Search removable media (floppy, CD-ROM…)" option. Click Next.
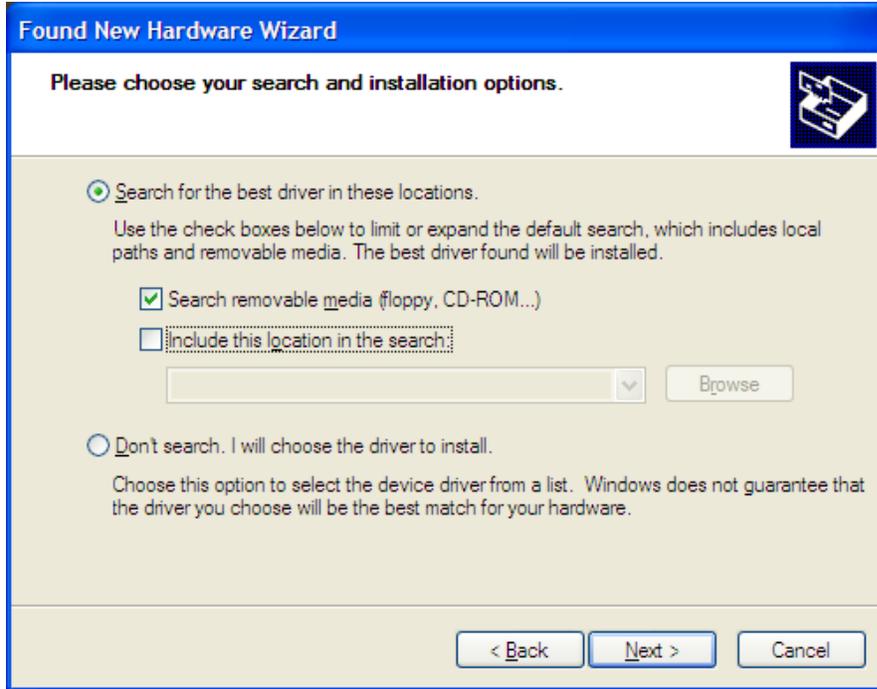
A warning pops up during the Hardware Installation like the one below; click Continue Anyway.

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Windows finishes installing the drivers for "Stellaris USB serial port." When the driver install is finished, the Found New Hardware Wizard window appears like the one below. Click Finish to close the dialog box.

You have just installed the drivers for "Stellaris USB serial port."

1. Open a HyperTerminal window. On Windows XP, HyperTerminal can be found by clicking Start, Programs, Accessories, and then Communications.
2. Enter a name for the terminal window and click OK.
3. In the Connect Using pull-down menu, select the COM port associated with the "Stellaris USB serial port" and click OK. Use Device Manager to determine the correct COM port if necessary.
4. Select 115200 bits per second, 8 data bits, no parity, 1 stop bit, and no flow control. Click OK.
5. Type any character. You should see the introduction text of the game. The game is now ready to be played. See the Game Hints section below for hints.

Game Hints

Important Note: This section contains hints that reveal solutions to a couple of the early puzzles in the game. Skip this section to avoid spoiling the full fun and experience of the game.

The following is a sequence of commands that will move the protagonist from the start of the game into the cave. In doing so, this solves the first two puzzles of the game while leaving the bulk of the puzzles still to be solved. The commands are:

```
east
get all
west
south
south
south
unlock grate with key
down
west
west
turn on lamp
```

Software Development Tools

The next step is to install and run the software development tools included in the development kit. For more information, see the quickstart guides included on the Stellaris LM3S9B90 Development Kit CD. Additional tools may be available through the www.ti.com/stellaris web site.

References

The following references are included on the Stellaris LM3S9B90 Evaluation Kit Documentation and Software CD and are also available for download at www.ti.com/stellaris:

- *Stellaris LM3S9B90 Evaluation Kit User's Manual*

- *StellarisWare® Driver Library User's Manual*

- *Stellaris LM3S9B90 Microcontroller Data Sheet*

IMPORTANT NOTICE