Pedometer Demo for iCE40 Ultra™ Wearable Development Platform User Guide

UG102 Version 1.0, September 2015

Demo Setup

Hardware Requirements

- iCE40 Ultra™ Wearable Development Platform
- Android smart phone with Android 4.3 or 4.4
  Note: Current design may not function correctly on Android 5.0.
- Windows PC or Linux machine for downloading the bit stream
- USB cable for programming the device

Software Requirements

- Lattice Diamond® Programmer software 3.3 or higher
- Android apk file *PedometerDemo.apk*
- MachXO2™ device bitstream file *p2dsi.jed*
- iCE40 Ultra device bitstream file *pedo_top_wrapper_bitmap.bin*

Figure 1. Demo Setup

Smartphone with
Android 4.3 or higher

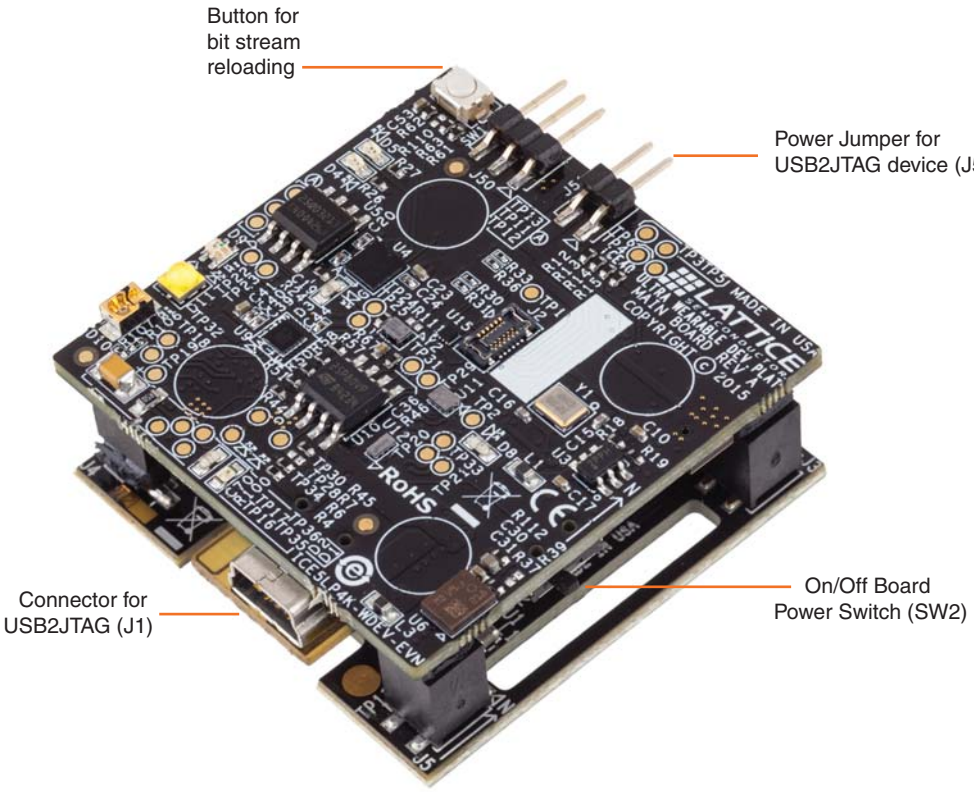
iCE40 Ultra Wearable
Development Platform

Jumper Settings for iCE40 Ultra Wearable Development Platform

Connect the USB2JTAG Power Jumper (J51) for FTDI device. For more information about the board, see EB100, iCE40 Ultra Wearable Development Platform User Guide.

Wearable Board Details

Figure 2. Wearable Board Details

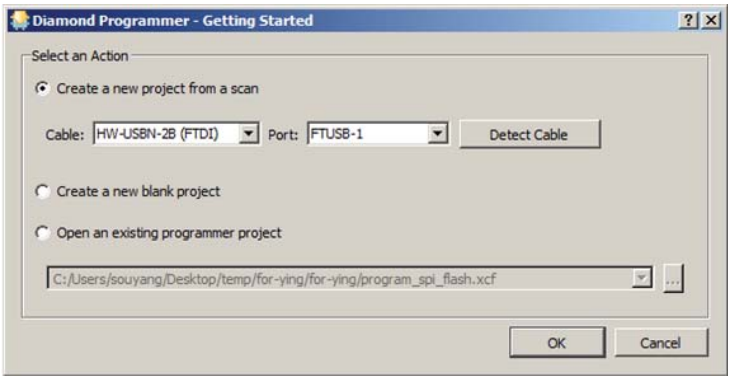


Flashing Bitmaps to Wearable Board

To flash bitmaps to wearable board:

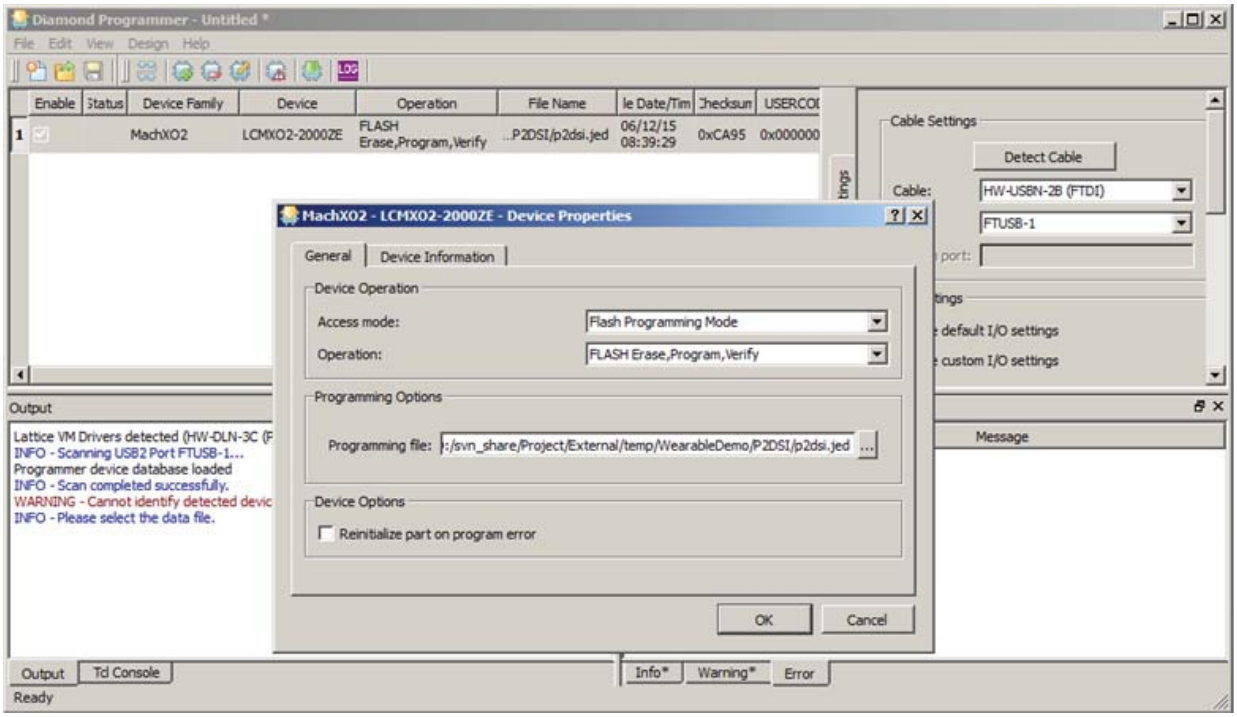
1. Connect jumper J51 to power on USB2JTAG device.
2. Connect the wearable board to the PC through the USB mini socket (see EB100, iCE40 Ultra Wearable Development Platform User Guide).
3. Power on the board using the Power Switch (see EB100, iCE40 Ultra Wearable Development Platform User Guide).
4. Start Diamond Programmer.
5. In the Getting Started dialog box, select **Create a new blank project** and click **OK**. This opens the main interface of Diamond Programmer.

Figure 3. Getting Started Dialog Box



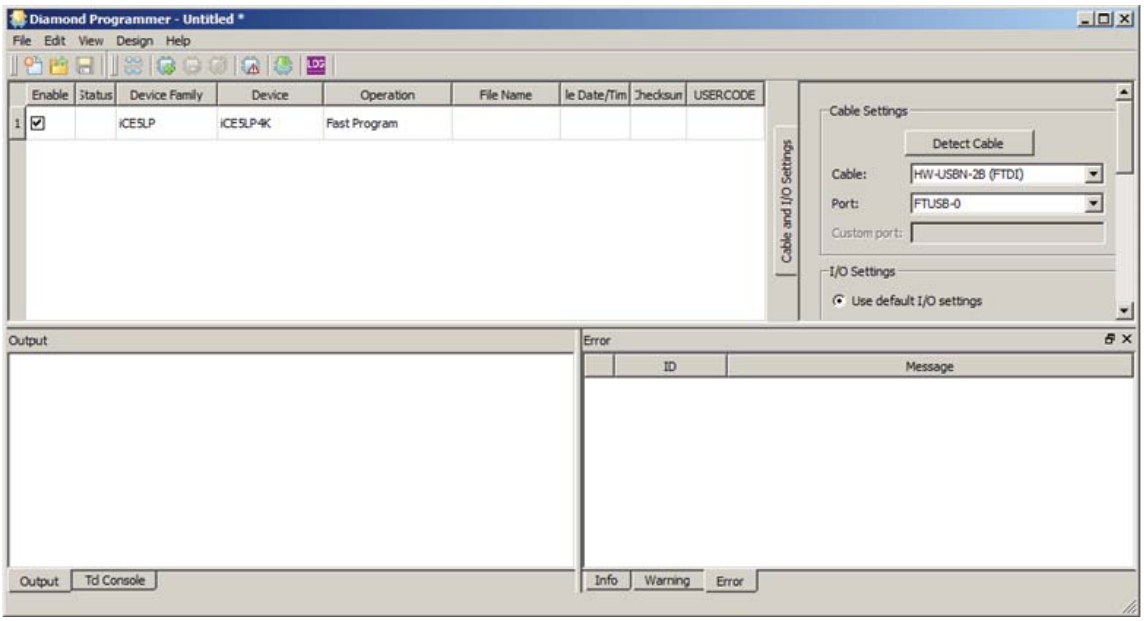
6. Click **Detect Cable** and Select FTUSB-1 and click **OK** to open the main window of Diamond Programmer.
7. Double-click Operation type and fill out the three items in the form as shown in Figure 4.

Figure 4. Changing Programming Mode



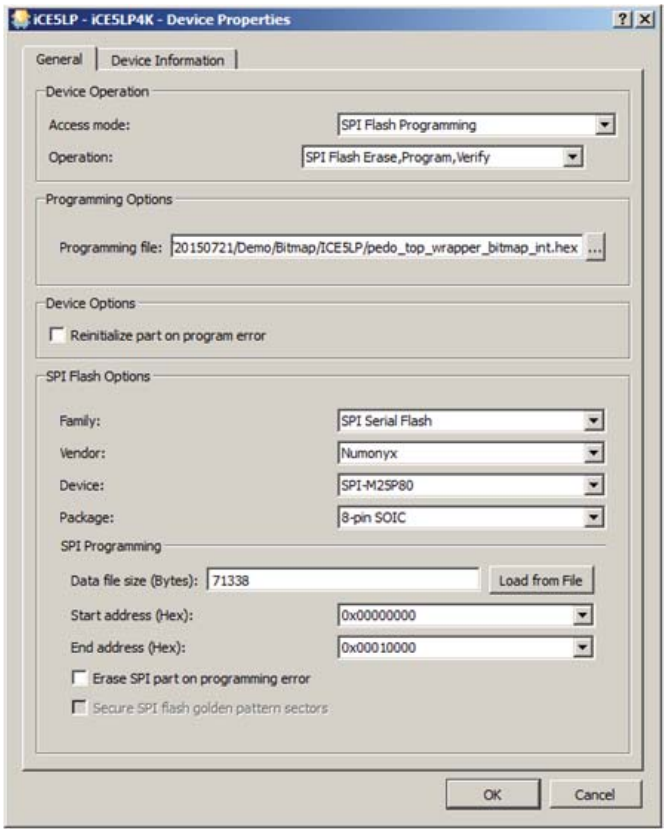
8. Select **Flash Programming Mode** in Access mode.
9. Select **FLASH Erase, Program, Verify** in Operation.
10. Select **bitmap/p2dsi.jed** under Programming file.
11. Click *OK* to close the dialog box.
12. Click the **Program** button to flash MachXO2 and check Status.
13. After programing MachXO2, select **iCE5LP** under Device Family.
14. Select **iCE5LP4K** under Device.
15. Set Cable to **HW-USBN-2B (FTDI)**.
16. Set Port to **FTUSB-0**.

Figure 5. Programming the Device



17. Double-click on a blank area in Operation to open the Device Properties dialog box.

Figure 6. Device Properties



18. Configure the settings as shown in Figure 6.
19. Select the program file **/Pedometer/bitmap/pedo_top_wrapper_bitmap.bin**. Then click **OK**.
20. Click the **Program** button to flash the iCE40 device and check Status.

Installing PedometerDemo.apk to Android Phone

To install PedometerDemo.apk to Android:

1. In the Android phone, go to **Settings > Security > Unknown sources** to allow the installation of the APK directly to the Android phone.
2. Connect the Android phone with the PC and make sure the driver is ok.
3. There are two methods to install the application.
   — Open a Windows command line tool and change the directory to Pedometer\Demo_Quickstart\Android_Application. Install the application by using the command below.

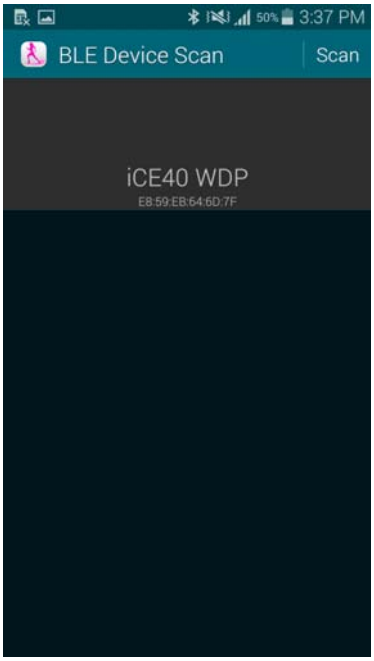
     ```
     adb install PedometerDemo.apk
     ```

   — Go to the Pedometer\Demo_Quickstart\Android_Application directory. Copy the PedometerDemo.apk into the phone, and then install it on the phone.
4. Deselect the **Unknown sources** option.

Connecting the iCE40 Ultra Wearable Board to the Android Phone

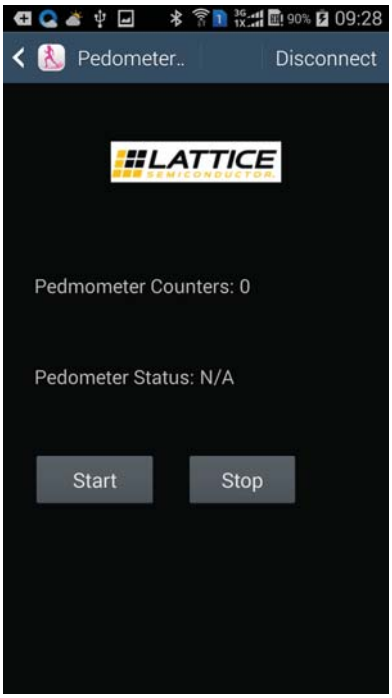
1. Power on the board using the Power Switch (see EB100, iCE40 Ultra Wearable Development Platform User Guide).
2. Enable Bluetooth on the Android phone.
3. Go to the Apps menu and click the **Pedometer Demo** icon to open the installed application.
4. Click the **Scan** button on the top right of the screen. An iCE40 Ultra BLE device is detected.

Figure 7. BLE Device Scan



5. Click **iCE40 WDP** to connect the iCE40 Ultra Wearable Development Platform and open the demo interface.

Figure 8. Pedometer Device Connected



6. In Figure 8, if the top right text box displays Connect, it means that the device has been disconnected. Click **Connect** or click the **Back arrow** on the top left corner to reconnect the device.

Demo Procedure

Follow all the steps mentioned above so that the wearable board and the phone are ready with necessary bitmap and application respectively. The demo application also should be connected to the board via BLE.

Strap the wearable board on the wrist.

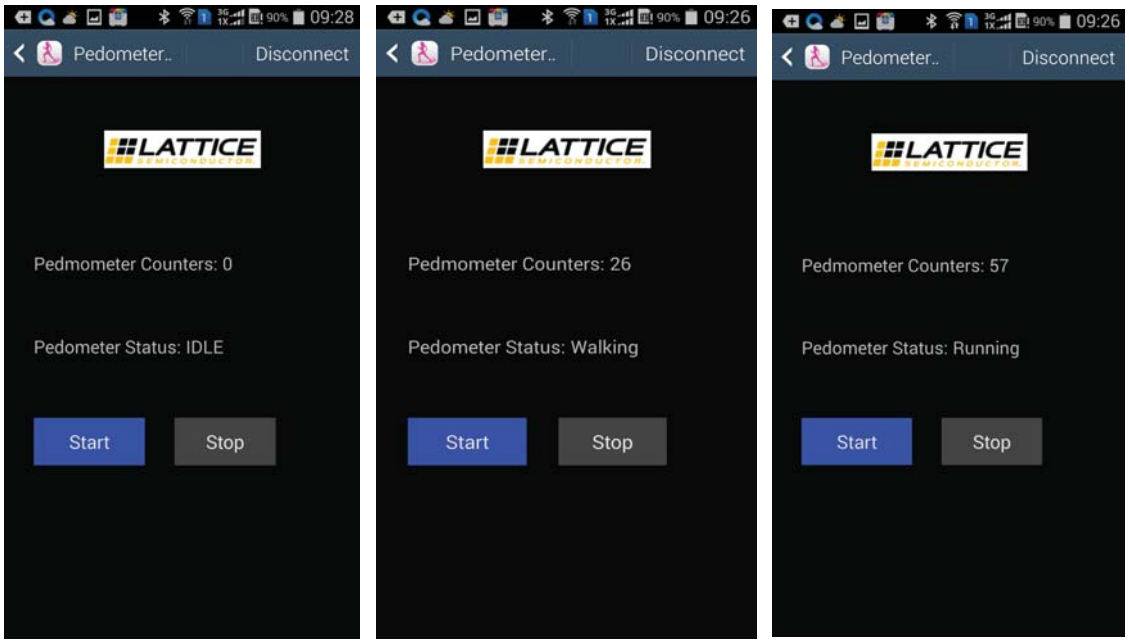
To run the demo:

1. Click on the **Start** button at the bottom left of the interface. The button turns to blue indicating to indicate that the application is active. The first status is Idle which means that the connection is set up but no walking nor running activity is detected.

Figure 9. Starting the Application

2. Walk, run or stay motionless at times to test the monitors. The step count corresponding to the action is detected and shown in the Pedometer Counters and Pedometer Status box as shown in Figure 10.

Figure 10. Pedometer Readings



Technical Support Assistance

Submit a technical support case through www.latticesemi.com/techsupport.

Revision History

Date	Version	Change Summary
September 2015	1.0	Initial release.