BIOS C6SDK 2.0 Getting Started Guide

Introduction

The BIOS C6 Software Development Kit (BIOS C6SDK) provides the core foundational building blocks that facilitate application software development on TI's single core DSPs. The foundational components include:

- SYS/BIOS which is a light-weight real-time embedded operating system for TI devices
- Drivers
- Basic networking stack and protocols
- Optimized application-specific and application non-specific algorithm libraries
- Flash and boot utilities
- Demonstrations

The purpose of this User's Guide is to provide more detailed information regarding the software elements and infrastructure provided with BIOS C6SDK. BIOS C6SDK pulls together all the elements into demonstrable DSP applications and examples for supported EVMs. The objective being to demonstrate device, platform, and software capabilities and functionality as well as provide the user with instructive examples. The software provided is intended to be used as a reference when starting their development.

Note: It is expected the user has gone through the EVM Quick Start Guide provided with their EVM and have booted the out-of-box demonstration application flashed on the device.

Specifically, this *Getting Started Guide* provides information on installing the BIOS C6 Software Development Kit, loading the EVM out-of-box demonstration application via JTAG, and running the out-of-box demonstration application. It is expected the user has gone through the EVM *Quick Start Guide* provided with their EVM.

By the end of this *Getting Started Guide* the user should have :

- Installed CCS
- Installed the BIOS-C6SDK Software
- Connected to the EVM via CCS/JTAG

After completing the material in this *Getting Started Guide*, it is recommended the user continue on to the BIOS C6SDK User's Guide for additional information on the C6SDK software elements and to get started with development on the TI DSP using the BIOS-C6SDK.

Supported Devices/Platforms

The latest BIOS C6SDK Release supports the following Texas Instrument devices/platforms:

Platform Development Kit	Supported Devices	Supported EVMs
C6748	C6748, OMAPL138	TMS320C6748/OMAP-L138/LCDK (C6000™ L13x/C674x Development Kit)

Getting Started

This section will walk you through installing and using the BIOS Single core C6 Software Development Kit. It is expected that you have gone through the EVM *Quick Start Guide* for your EVM.

The overall steps are:

1. Make sure your EVM hardware is set up
2. Install Code Composer Studio 5.1.0.09000

3. Install the BIOS-C6SDK 2.0
4. Use JTAG to load the application
5. Run the application

Hardware Setup

Follow instructions in one of the links below that correspond to the EVM that you are using

- OMAPL138/TMS320C6748 EVM Hardware Setup [1]

Installing Code Composer Studio

The BIOS-C6SDK 2.0 uses CCS 5.1.0.09000. To install CCS please refer to the instructions provided in the CCSv5 Getting Started Guide [2].

💡 **Note:** When installing Code Composer Studio you can choose to control what is installed. For example, you may not want support for particular devices and ISA's. If you choose to do a custom installation, the following components <u>must be </u>installed to support the C6SDK:
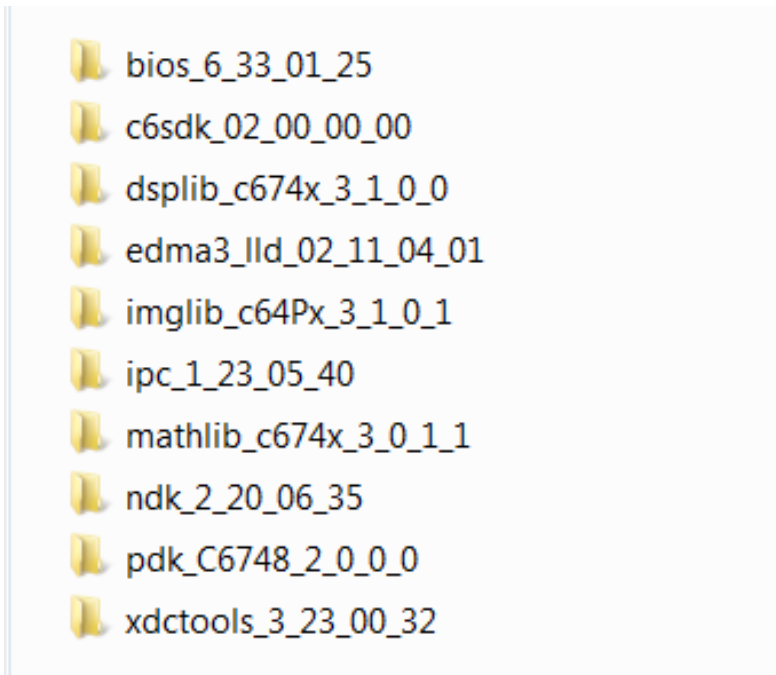- SYS/BIOS 6
- XDC
- CG Tools

In Windows 7, install and run CCS/BIOS C6SDK in administrator mode, this will rule out issues with CCS start-up and RTSC component recognition.

Installing the C6 Single core Software Development Kit

To install C6SDK on your PC run the C6SDK installer (bios_c6sdk_<version>_setupwin32.exe). The C6SDK install includes several sub-components, all of which will be installed in the same location. This location can be choosen using "Destination Folder". It is recommended that you keep the default installation paths for BIOS C6SDK components in "C:\Program Files\Texas Instruments". For Windows 7 users this path will be "C:\Program Files (x86)\Texas Instruments". Refer FAQ section in BIOS C6SDK 2.0 User Guide for auto discovery of components of BIOS C6SDK through CCSv5.

Once the installation is complete all the C6SDK components will be installed in the specified installation directory (e.g., C:\Program Files\Texas Instruments\). Each of the directories will be of following format <component_name>_<component version>. Please refer to individual components release notes for detailed information on the components or package.

With a typical default install you should see directories similar to the ones below:

bios_6_33_01_25
c6sdk_02_00_00_00
dsplib_c674x_3_1_0_0
edma3_lld_02_11_04_01
imglib_c64Px_3_1_0_1
ipc_1_23_05_40
mathlib_c674x_3_0_1_1
ndk_2_20_06_35
pdk_C6748_2_0_0_0
xdctools_3_23_00_32

Steps to create a CCS Configuration File

1. First time CCSv5 users needs to follow the steps described in CCSv5_Running_for_the_first_time [3] page.

2. The above procedure will open up the CCSv5 GUI.

3. Create a New Target Configuration, by selecting the tab *File -> New -> Target Configuration File*.

4. Enter a configuration file name (say "evmomapl138_xds510.ccxml") in the file name field, check the Use shared location box and hit finish button (the procedure assumes you are using Spectrum digital XDS510 USB emulation).

5. Select the connection type as "Spectrum Digital XDS510 USB emulator" in the drop down list and enter OMAPL138 in the *Device* search field. Select OMAPL138 and save the file by clicking *Save* button."

6. Click View->Target configurations to list the available target configurations. The configuration file (evmomapl138_xds510.ccxml) created above will be under "User Defined" section

7. Right click on the configuration file and select *Launch Selected Configuration*. This will launch the configuration and open the debug view.

8. Most of the development and debugging will require CCSv5. For more information on CCSv5 see the CCSv5 Getting Started Guide [2] page.

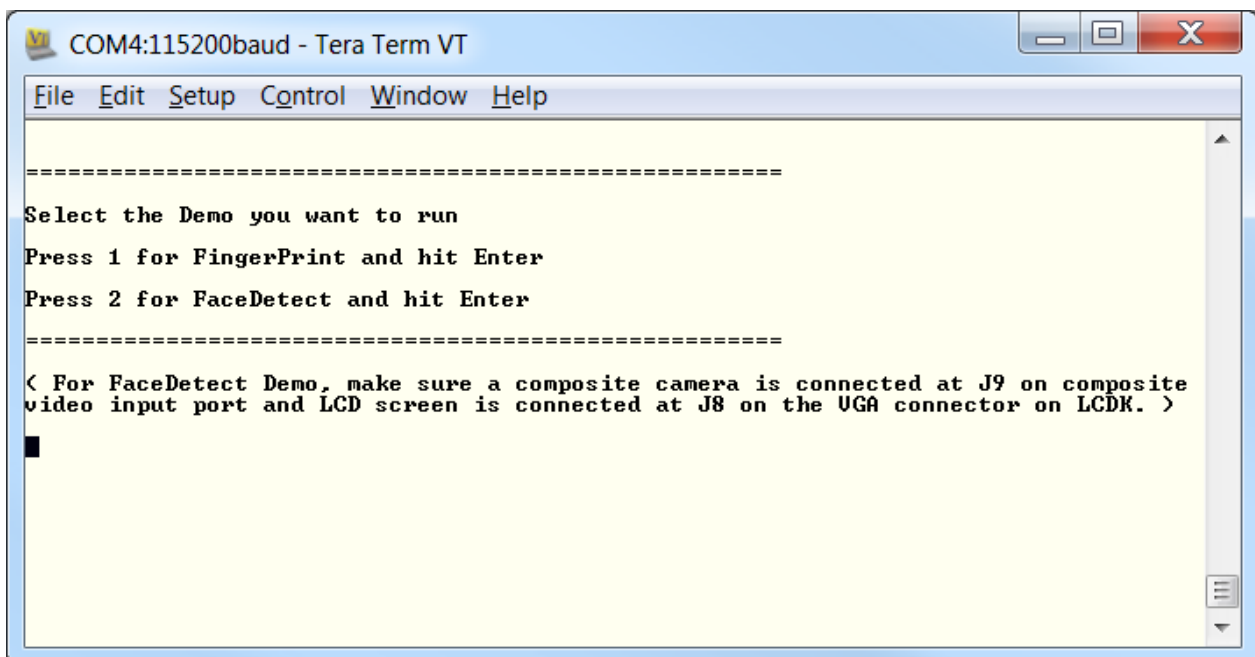## Running the Demonstration Application

Running Facedetect Demo on EVMC6748

- Ensure that the Hardware is setup as explained in Hardware Setup for Demos in User Guide.
- Open CCSv5.1 and launch the target configuration file for TMS320C6748 or OMAPL138
- Go to Tools -> GEL Files
- Right click inside the GEL Files window and select Load GEL.
- Browse to the pdk_C6748 folder -> gel and select C6748.gel
- The loaded gel file will be in GEL Files window.
- In the Debug window, Right click on "Spectrum Digital XDS510USB Emulator_0/C674X_0 [Non-Project Debug Session]" -> Connect Target (Make sure the EVMC6748/LCDK is ON before saying Connect Target)
- Make sure DIP switches 5 and 8 of S7 are ON to boot in the emulation mode.
- In the console window, you will find the PLL and DDR frequencies getting set by the GEL file.

- It is a good practice to reset the CPU by going to Run -> Reset -> CPU Reset
- Now go to Run -> Load -> Load Program
- Browse to c6sdk_02_00_00_00\demos\facedetect\bin\{COMPILATION_METHOD}\evmC6748\Release amd open facedetect_evmC6748.out
- Wait until the program is loaded.
- Now run the program by going to Run -> Resume. If your hardware is set up correctly, you should be able to see a box around faces captured by the camera. For best results, stand a few feet away from the camera and make sure the camera is placed in such a way that your face and the camera are exactly at the same level. This is needed as it is a frontal face detection demo. Also, for the same reason, make sure your head is not tilted with respect to the camera.

Running Demos on C6748 LCDK

- Connect a mini USB cable at J3 on the UART port on LCDK with the other end going to the host computer at one of its USB ports.
- If you do not have the driver installed on your PC, you can find it here [4]
- Now open a serial port terminal like Tera Term [5] on the host computer and connect to the appropriate Serial port.
- Set the baud rate to 115200. (To do this in Tera Term, go to Setup -> Serial port and set the Baud rate as 115200 from the drop down menu)
- The C6748 LCDKs have IT_IS_ALL_ABOUT_YOU demo flashed on them by default. So just power on the board and you should be able to see a screen like below in about 10 seconds on the serial terminal -
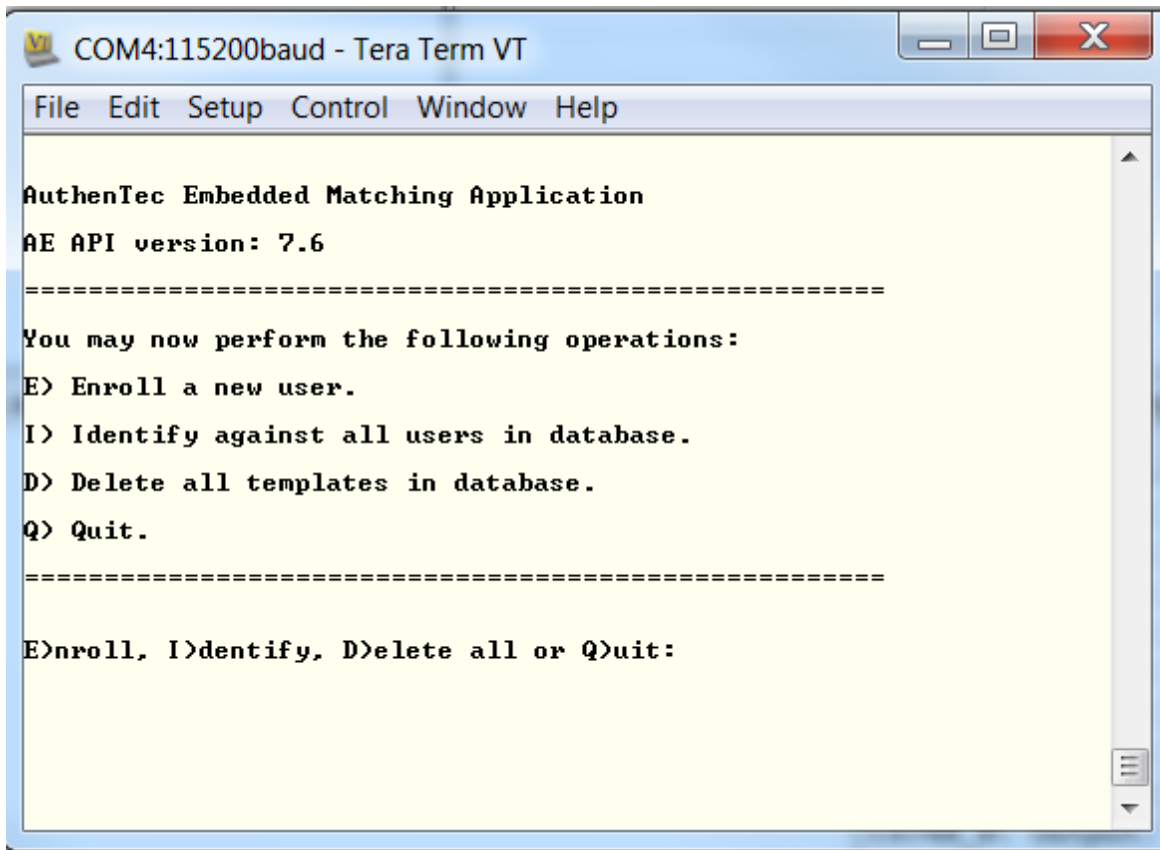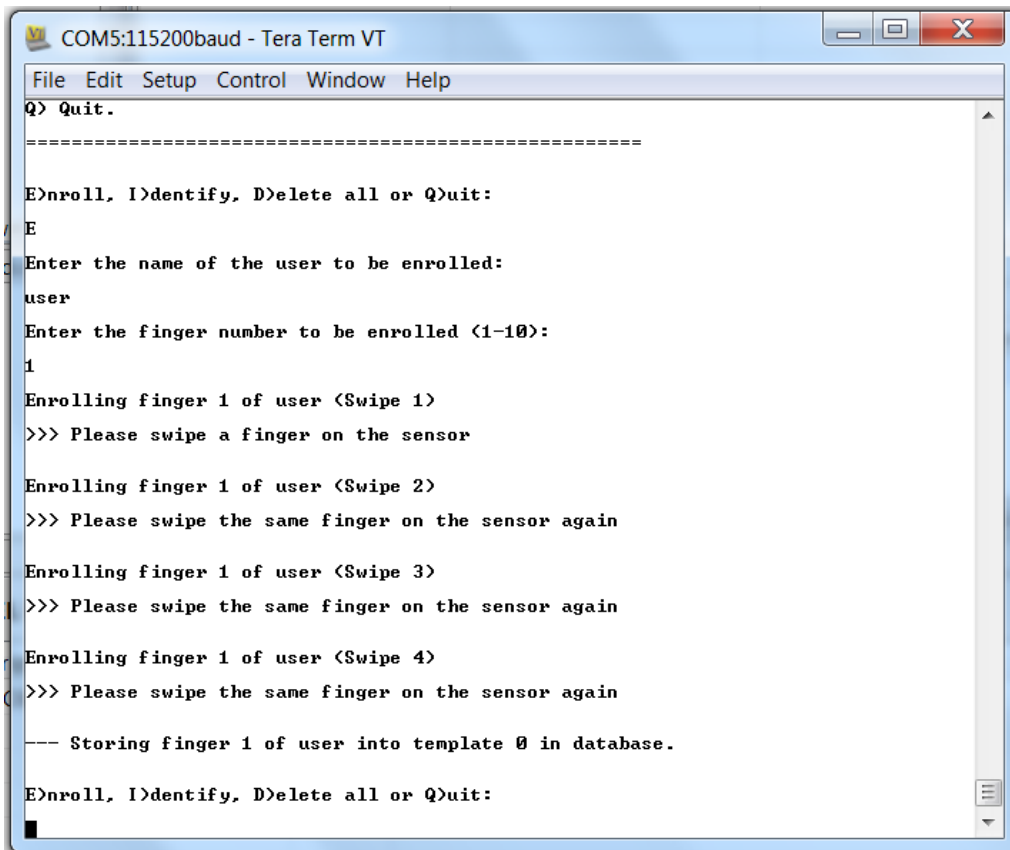

- Select 1 for FingerPrint or 2 for FaceDetect. Once any demo is selected, the board needs to be rebooted to run another demo.
- Before selecting facedetect, make sure the hardware is setup correctly.
- If your hardware is set up correctly, you should be able to see a box around faces captured by the camera. For best results, stand a few feet away from the camera and make sure the camera is placed in such a way that your face and the camera are exactly at the same level. This is needed as it is a frontal face detection demo. Also, for the same reason, make sure your head is not tilted with respect to the camera.
- If you select Finger print demo, you should see a screen like below

```
COM4:115200baud - Tera Term VT                                          _  □  ✕

File  Edit  Setup  Control  Window  Help

AuthenTec Embedded Matching Application
AE API version: 7.6

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You may now perform the following operations:

E> Enroll a new user.
I> Identify against all users in database.
D> Delete all templates in database.
Q> Quit.

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E>nroll, I>dentify, D>elete all or Q>uit:
```

- Type E to enroll a user and press enter.
- Enter the name of the user to be enrolled.
- Enter the finger number to be enrolled. Multiple fingers of the same user can be enrolled as different templates in the database.
- Now swipe the desired finger on the sensor. A video of the swipe sensor usage is available in the c6sdk_02_00_00_00\docs folder. Remember to swipe the finger in the direction going from the power cord to away from the board or the other way but NOT in the direction going from or to the USB/UART port. You will have to swipe the finger 3-4 times to get a good image of the finger.
- Once the application finds a good image, it will store the finger image as a template in the database.
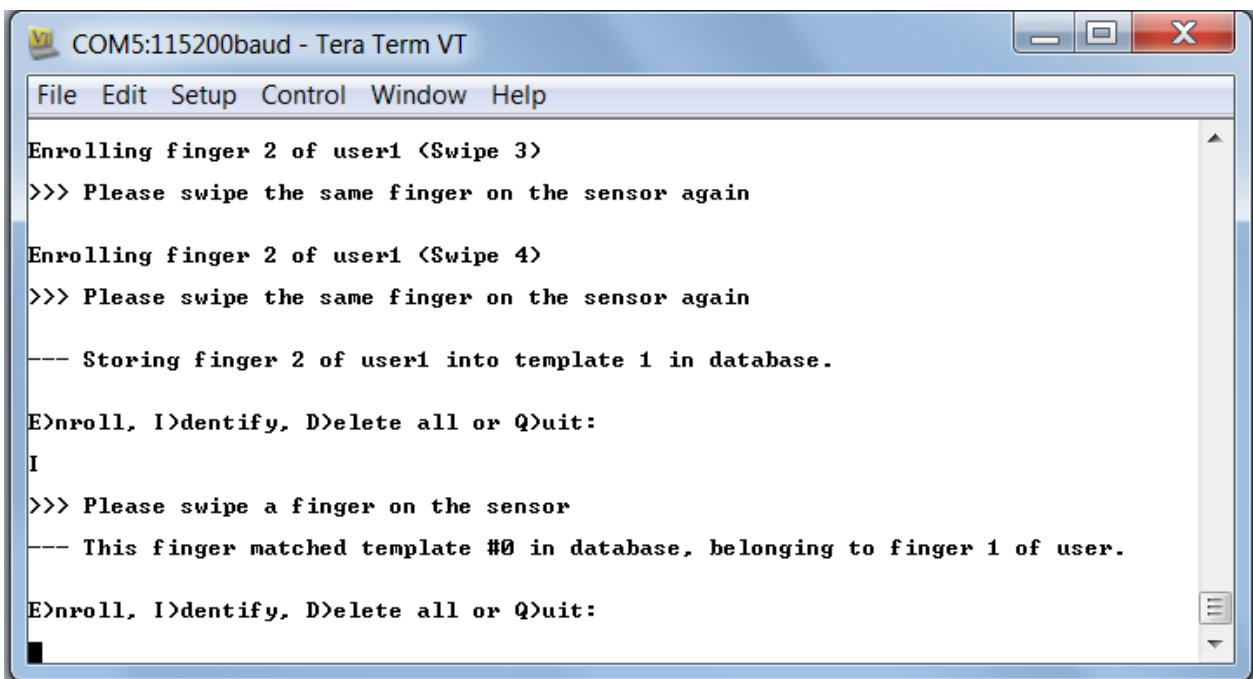- The console should look like below

- You can enroll upto 10 users using the procedure above.
- To identify a fingerprint, type I in the console and hit enter.
- Swipe the finger to be identified.
- If the fingerprint exists in the database, the application will print the name and finger number of the identified user on the console; otherwise it will say finger did not match.

- You can delete all templates in the database by typing D on the console. It will ask for confirmation in case you select D mistakenly.
- You can stop the demo by selecting Q and can select facedetect demo by resetting the board again.

Technical Support and Product Updates

Technical Support and Forums

For technical discussions and issues, please visit

- **C6000 Single Core DSP forum**: http://e2e.ti.com/support/dsp/ tms320c6000_high_performance_dsps/default.aspx [6]

  ***BIOS Embedded Software forum**: http://e2e.ti.com/support/embedded/f/355.aspx

  ***Embedded Processors wiki**: http://processors.wiki.ti.com

Note: When asking for help in the forum you should tag your posts in the Subject with "BIOS C6SDK", the part number (e.g. "OMAPL138/EVMC6748") and additionally the component (e.g. "NDK").

References

[1] http://support.logicpd.com/downloads/1230/

[2] http://processors.wiki.ti.com/index.php/CCSv5_Getting_Started_Guide

[3] http://processors.wiki.ti.com/index.php/GSG:CCSv5_Running_for_the_first_time

[4] http://www.ftdichip.com/Products/ICs/FT232R.htm

[5] http://logmett.com/index.php?/download/tera-term-473-freeware.html

[6] http://e2e.ti.com/support/dsp/tms320c6000_high_performance_dsps/default.aspx

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