# **Connection of Atom Board with I/O Explorer Board**

Gerard Spivey, Ravi Jaglal, and D. Charles Kim , Electrical and Computer Engineering, Howard University, Washington, DC 20059

**Objective-** To expose students to the IOEXPLORER board, then show them how to connect it with the Inforce ATOM (TunnelCreeck E6XX) Board, and run the sample code that it comes with.

### **Motivating Concepts-**

- The Inforce board has limited hardware connectivity
  - Only has "small" amount of DC General Purpose Input Output (GPIO) pins.
- The IOEXPLORER has lots of flexibility for hardware user input, and diverse output control
  - o 5 x 12-pin Pmod<sup>™</sup> headers
    - 1 x 6-pin Pmod™ header
    - 8 x R/C servo connectors
    - SPI master port
    - UART interface port
- ATOM board has high compute capabilities compared to typical embedded microprocessors and microcontrollers
- Smaller embedded processor evaluation kits tend to have a large amount of I/O capabilities but lack sheer compute capabilities
- This lab takes advantage of both strengths by using the compute power of the Intel ATOM processor but using the IO diversity of the IOEXPLORER board.

## Hardware-

# Inforce ATOM Board



SATA Connector

IOEXPLORER Board



#### Procedure-

1. Download the Digilent Adept suite from Digilent's website <u>http://www.digilentinc.com/Products/Detail.cfm?NavPath=2,66,828&Prod=ADEPT2</u>

### ADEPT for Linux

Adept 2 for Linux provides the core runtime necessary to communicate with Digilent system boards and a wide assortment of logic devices. This functionality is accessed using the configuration tools in Adept Utilities.

Adept 2 for Linux:	
32-bit:	
Adept 2.9.5 Runtime, X86 Linux	Download!
Adept 2.1.1 Utilities, X86 Linux	Download!
64-bit:	
Adept 2.9.5 Runtime, X64 Linux	Download!
Adept 2.1.1 Utilities, X64 Linux	Download!
SDK:	
Adept 2.0.1 SDK, X86 & X64 Linux	Download!

- 2. Download the 32-bit Runtime, Utilities, and SDK
- 3. Uncompress each tar file
- 4. Enter each uncompressed tar file and run each install file
  - a. To run the make file you must use terminal
  - b. Traverse into each uncompressed tar file
  - c. Type the command: ./install
    - i. During each install press enter after any suggested paths
- 5. Run the DGIO sample code
  - a. Enter the uncompressed Digilent SDK folder
  - b. Enter the Samples folder
  - c. Enter the dgio folder
  - d. Enter the DgioDemo folder
  - e. Run the make file
    - i. Traverse to this location via terminal
    - ii. Type: make
      - 1. The make file is set up to compile the c program in this folder

- 2. NOTE: If you entered any different paths during the install process you will need to modify the makefile to match those new paths.
- f. Run the compiled program
  - i. Type: ./DgioDemo
- 6. The sample program will run
  - a. Read the Digilent Documentation to answer questions on the API and the sample program
  - b. NOTE: You must plug in the IOEXPLORER via the USB cable in order for the program to run completely

# Conclusion-

This lab exposes students to the IOEXPLORER board as a potential partner board that could be used with any projects that require any complex or diverse I/O handling that the Inforce Board is incapable of dealing with.

NOTE: This lab was designed as a quick start lab in order to quickly help students see how the IOEXPLORER interfaces with Inforce ATOM board. Each team project may require a separate function from the IOEXPLORER board. It is expected that students will explore the IOEXPLORER board and its capabilities to develop custom applications for their needs.