Advanced Technology Development Center (ATDC), Indian Institute of Technology Kharagpur, established in July 1998, is an interdisciplinary research center carrying out investigations in emerging areas from multiple disciplines. These include the Advanced VLSI Design Laboratory, MEMS Design Laboratory, Micro-Electronics Laboratory, Kalpana Chawla Space Technology Cell, Centre for Theoretical Studies, Microfluidics Laboratory, P K Sinha Centre for Bio-Energy, Centre for Railway Research, etc. The major areas of faculty expertise of the department include Biomedical Signal Processing, Communication Systems, Computer Networks, Digital Signal Processing, Image Processing & Computer Vision, Instrumentation, Radar Signal Processing, Speech Signal Processing, VLSI Systems, VLSI CAD, MEMS and High Performance Computing, Embedded System Design, Embedded Control Systems, etc.

**Course Objective**

- Introduction to real time control and signal processing applications
- Use of state-of-the-art FPGA platforms

**Course Content**

**January 6, 2014**

**Morning Session:** Real time signal processing

**Afternoon Session:** Demonstration on Real-time Signal Processing, Speech Processing, Biomedical Signal Processing, Virtual labs experiments on embedded system

**January 7, 2014**

**Morning Session:** Embedded Control System design

**Afternoon Session:** Demonstration on Hardware-in-the-Loop simulation, Virtual labs experiments on Signals and Networks

**January 8, 2014**

**Morning Session:** Image Processing

**Afternoon Session:** Demonstration on Vision Experiments

**January 9-10, 2014:** Workshop by Xilinx
About CoreEL University Program:
The mission of the University Program from CoreEL is to provide Eco-System support to Indian Academia in Engineering Higher Education in the field of VLSI and Embedded Systems, thereby enabling the delivery of quality education. We achieve this by providing state of the art products from Xilinx, Mentor Graphics and Wind River to Universities, Multi-year application engineering support on these products, Faculty and Students Training providing Industry Specific inputs to update the curriculum, helping Universities set-up Centers of Excellence in the VLSI and Embedded Systems.

Target Participants:
Faculty members, Research Scholars from academic institutes and engineers from industry.

Registration Fee:
Industry participants: Rs. 10000/-
Academic/ Faculties: Rs. 3000/-
Research scholars: Rs. 2000/-
Registration fee includes registration kit, lunch, accommodation and refreshments.

Payment mode:
The Registration form in the prescribed format, along with non-refundable DD drawn in favor of "DEAN CEP, IIT KHARAGPUR", payable at KHARAGPUR, to be sent to the mentioned contact address provided below on or before Jan 1, 2014.

Aftednoon Session:
- Software Development and Debugging
Lab 5: Software Debugging Using SDK
- Use API to drive CPU’s timer. Perform software debugging using SDK.

Resource persons:
Dr. Parimal Patel, Xilinx University Program
Mrs. Sadiya Arsad, National Manager,
Mr. Samik Basu, Zonal Manager,
Mr. Mayur Deshmukh, Application Engineer,
CoreEL Technologies India Pvt. Ltd

Course Content

CoreEL Technologies:
CoreEL Technologies is a technology company with business spread across design services & product development, distribution and training. Head Quartered in Bangalore, India, CoreEL is a leading provider of VLSI & Embedded System design services and Intellectual Property.

Workshop on Xilinx Embedded Design flow using Zynq and Vivado Design suite
After the completion of this training program the participants will be able to:
- Rapidly architect an embedded system targeting the ARM processor of Zynq located on ZedBoard using Vivado and IP Integrator
- Extend the hardware system with Xilinx provided peripherals
- Create a custom peripheral and add it to the system
- Write a software application to access peripherals

Course Highlight:
The training program delivers the following key concepts to the participants:
- Introduction to Vivado Tool flow
- Concepts of Embedded Design using Xilinx FPGA’s
- Implementing SoC solutions using Soft and hard IP’s from Xilinx
- Designing SoC based applications using ARM Cortex-A9 core in Zynq FPGA
- Developing software applications for ARM Cortex-A9 process core target and testing using Software Development Kit (SDK)

Pre-requisites:
- Digital logic and FPGA design experience
- Basic experience with Xilinx Vivado design software suite
- Basic understanding of C programming
- Basic microprocessor experience

January 9, 2014
Morning Session:
- Introduction to Embedded System Design using Zynq
Lab 1: Simple Hardware Design
  • Create a Vivado project and use IP Integrator to develop a basic embedded system for a target board.
  • Zynq Architecture
  • Extending the Embedded System into Programmable Logic

Afternoon Session:
Lab 2: Adding Peripherals in Programmable Logic
  • Extend the hardware system by adding AXI peripherals from the IP catalog.
  • Adding Your Own IP Peripheral
Lab 3: Creating and Adding Your Own Custom IP
  • Use the Manage IP feature of Vivado to create a custom IP and extend the system with the custom peripheral.

January 10, 2014
Morning Session:
- Software Development Environment
Lab 4: Writing Basic Software Applications
  • Write a basic C application to access the peripherals.