Embedded System Design

Overview:

Information processing has become the heart of any modern electrical/electronic equipment. While in eighties and early nineties, the task of information processing used to be accomplished via large mainframe, mini, and personal computers, the trend has changed since significantly transferring the computation inside the new electronic gadgets being introduced in every front of life – consumer electronics, automobiles, home appliances, office automation etc. The continual effort to embed computational elements into larger application systems has given rise to the embedded systems. The design goals of these systems vary significantly from the general computational systems in the sense that they often have a set of very strict performance requirements, while at the same time, they have to meet many other design constraints. Future electronic engineers need to be equipped with the design methodology of such systems. Expertise in just one or few domains, such as, hardware, software, networking etc. may not be sufficient to enable the designer to take wise decisions regarding the implementation platforms and design techniques to be utilized for the cost-effective solutions to the design problems. An overall knowledge of all the fields with pros and cons of design alternatives is essential for designing such systems. As a subject, embedded system is an amalgamation of different fields such as computer architecture, operating systems, modelling real-world environment, interfacing standards, networking, algorithms, and so on. The purpose of this course is to encompass the essential principles of all these fields in the context of designing real-time embedded systems.

Course Schedule: June 20-24, 2016

Important Dates:

Last date for receiving applications: May 20, 2016
Last date for intimation to applicants: June 10, 2016

Goals and Objectives:

- Embedded Systems and their features
- Identifying various hardware platforms
- Enumerating different interfacing techniques
- Issues in real-time system design
- Hardware-Software Co-Design including Co-Simulation
- Hands-on with ARM microcontrollers

Venue:

Dept. of Electronics and Electrical Communication Engineering, Indian Institute of Technology Kharagpur

Course Content:

- **Introduction to Embedded Systems:** Definition – Features– Design Metrics – Design Flow – Example Embedded Systems
- **Embedded Processors:** ARM Microcontrollers – Digital Signal Processors – Field Programmable Gate Arrays – ASIC – Choice of Embedded Hardware Platform
- **Interfacing Standards:** Serial Peripheral Interface – Inter Integrated Circuits – RS-232C Series – Universal Serial Bus (USB) – Infrared Communication (IrDA) – Controller Area Network (CAN) – Bluetooth
- **Real-Time System Design:** Real-Time Tasks –Periodicity – Scheduling – Scheduling Algorithms RMS, EDF – Resource Sharing – Priority Inheritance Protocol – Example RTOS
- **Hardware-Software Co-design:** Co-Simulation– Partitioning Techniques: Integer Linear Programming, Kernighan-Lin Heuristic, Genetic Algorithms, Particle Swarm Optimization – Extended Partitioning – Power Aware Partitioning – Functional Partitioning and Optimization
- **Hands-on Training with ARM processor**

Eligibility:

- **Category I:** Teachers/students of TEQIP sponsored colleges, universities, institutions
- C**ategory II:** Students of IIT Kharagpur
- **Category III:** Others with BE/BTech or equivalent degree in Electronics/ Electrical/ Computer Science or related areas

The Faculty:

Santanu Chattopadhyay is currently a Professor in the Dept. of Electronics and Elec. Comm. Engg., IIT Kharagpur. His research interests include Embedded Systems, System-on-Chip (SoC) and Network-on-Chip (NoC) Design and Test, Power- and Thermal-aware Testing of VLSI Circuits and Systems. He has authored a textbook on*Embedded System Design* (2nd Ed.) from PHI Learning, India. He has published more than 50 papers in international journals.

Indrajit Chakrabarti is currently a Professor in the Dept. of Electronics and Elect.Comm. Engg, IIT Kharagpur. His research interests include VLSI architectures for image and video processing, digital signal processing, error control coding and wireless communication. He has published more than 25 papers in international journals.

Registration Fees:

Category I: Nil. Boarding, lodging and local hospitality will be provided by IIT Kharagpur.
Category II: Rs. 500.
Category III: Rs. 5000/-. Accommodation may be arranged at IIT Kharagpur on self-payment basis, subject to availability.

Payment should be made via demand draft drawn in favor of "CEP-STC, IIT Kharagpur", payable at Kharagpur.

Course Coordinators:

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About IIT Kharagpur

First in the chain of IITs to be set up by the Govt. of India, Indian Institute of Technology, Kharagpur started in 1951 in the erstwhile Hijli Detention Camp..It has now blossomed into one of the finest technical institutions in the world, with nearly six hundred faculty members. At present, the IIT has 19 Departments, 9 Centres and 12 Schools, offering a number of B.Tech. (Hons.), M.Tech., M.S., Ph.D. and D.Sc. programmes.

Situated about 120 Km west of Kolkata, Kharagpur can be reached in about two hours by train from Howrah railway station in Kolkata or three hours by car from Kolkata Airport. Kharagpur is also connected by direct train services to most of the major cities in the country. The Institute is about ten minutes drive (about five Km) from the Kharagpur railway station. Private taxi, auto-rickshaw or cycle-rickshaw can be hired to reach the Institute from the railway station.

Weather

Summer (March to June) is hot (25°C to 40°C) and sometimes humid. Rains are normally confined to the months of June to September. Winter (October to February) is moderate and pleasant (19°C to 25°C) in Kharagpur.

REGISTRATION FORM

QIP Short Course on

EMBEDDED SYSTEM DESIGN

June 20-24, 2016

Name:

Gender: ☐ Male ☐ Female

Category: ☐ **I** ☐ **II** ☐ **III**
(Please include a *bonafide* certificate from your institution for Categories I and II)

Organization:

Address for Correspondence .....

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Phone:

Email:

Highest Academic Qualification:

Experience (in years):

Accommodation required: ☐ **Yes** ☐ **No**

Demand Draft Details (for Category II and III):

Amount (Rs.)	
Bank Name	
Place	
Branch Code	
DD No. & Date	

Place:

Date:

Signature of applicant:

Please complete the details given above and mail alongwith registration fee to:

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