

Category 1: Nil
(Enclose Certificate that your institute is approved by TEQIP-II)

Category 2: ₹ 500

Category 3: ₹ 5000*

Payment should be made via demand draft drawn in favour of
“**CEP-STC, IIT Kharagpur**”, payable at Kharagpur

DEMAND DRAFT DETAILS

Amount ₹	
Bank Name	
Place	
Branch Code	
DD No. & Date	

Declaration

The information provided is true to the best of my knowledge. If selected, I agree to abide by the rules and regulations of the course and shall attend the course for the entire duration without any failure.

Place _____

Date _____

Signature of applicant _____

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

Prof. Santanu Chattopadhyay
Department of E&ECE
IIT Kharagpur - 721302
Email: santanu@ece.iitkgp.ernet.in

About IIT Kharagpur

History

First in the chain of IITs to be set up by the Government 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 585 faculty members in 19 Departments, 9 Centres, and 12 Schools offering 6 M.Sc. programmes, 5 Joint M.Sc. -Ph.D. programmes, 15 B.Tech (Hons.) programmes, 49 joint M.Tech. - Ph.D programmes, 2 M.Tech. programmes (in video-conferencing mode), 1 Master of City Planning programme, 1 Master of Medical Science and Technology programme, 1 LL.B. in Intellectual Property Rights programme, 34 Dual-Degree (both B.Tech and M.Tech) programmes, and 2 Management programmes. It also has MS, Ph.D, and D.Sc. programmes.

Location

Kharagpur is known world over for two landmarks. One, the longest railway platform, and the other, the Indian Institute of Technology, more commonly known as IIT. Situated about 120 km west of Kolkata, Kharagpur can be reached in about 2 hours by train from Howrah railway station of Kolkata or 3 hours by car from Kolkata Airport. Kharagpur is also connected by direct train services to most major cities of the country. The Institute is about 10 minutes drive (5 km) from the Kharagpur railway station. Private taxi, auto-rickshaw or cycle-rickshaw can be hired to reach the Institute.

Weather

Winter (October to February) is moderate and pleasant (10 to 25°C) in Kharagpur. Summer (March to June) is hot (25 to 40°C) and sometimes humid. Rains are normally confined to the months of June to September.

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, modeling 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

Date: May 25 - 29, 2015

Everyday 6pm - 8pm

Important Dates

Last date for receiving application: May 10, 2015

Last date for intimation to the applicants: May 15, 2015

Goals and Objectives

- To introduce embedded systems with their features
- Identifying various hardware platforms available for designing an embedded system
- Enumerating different interfacing techniques commonly used in embedded systems
- Exposing the participants to the issues in real-time system design and Real-Time Operating Systems (RTOS)
- Enumerating techniques for Hardware-Software Co-Design including Co-Simulation and Hardware-Software Partitioning

Venue

IIT Kharagpur and its extension centers at Bhubaneswar and Kolkata through online video lecture. All video-conferencing enabled classrooms at Kharagpur, Kolkata and Bhubaneswar are equipped with high definition video-conferencing system. Each of these acoustic treated air-conditioned video enabled classrooms with multiple HD cameras, document viewers and large display monitors permit teachers to conduct LIVE interactive sessions from Kharagpur with multiple remote classrooms at Kolkata and Bhubaneswar. 8 Mbps leased line connectivity of Kolkata and Bhubaneswar centers with Kharagpur ensure uninterrupted bi-directional lossless audio video transmission.

Eligibility

Category 1: Teachers/students of TEQIP sponsored colleges, universities, institutions.

Category 2: Students of IIT Kharagpur

Category 3: Others with BE/BTech or equivalent degree in Electronics/ Electrical/ Computer Science or related areas.



santanu@ece.iitkgp.ernet.in / indrajit@ece.iitkgp.ernet.in

Course Contents

- **Introduction to Embedded Systems:** Definition – Features of Embedded Systems – Design Metrics – Embedded System Design Flow – Example Embedded Systems
- **Embedded Processors:** ARM Microcontrollers – Digital Signal Processors – Field Programmable Gate Arrays – ASIC – Choice of Embedded Hardware Platform
- **Interfacing Standards:** Need for Special Interfaces – 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:** Types of Real-Time Tasks – Task Periodicity – Task Scheduling – Scheduling Algorithms RMS, EDF – Resource Sharing – Priority Inheritance Protocol – Example RTOS
- **Hardware-Software Co-design:** Co-Simulation Techniques – Partitioning Techniques: Integer Linear Programming, Kernighan-Lin Heuristic, Genetic Algorithms, Particle Swarm Optimization – Extended Partitioning – Power Aware Partitioning – Functional Partitioning and Optimization

The Faculty



Santanu Chattopadhyay received his PhD from Indian Institute of Technology (IIT) Kharagpur in 1996. He is currently a Professor in the Department of Electronics and Electrical Communication Engineering, 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 published more than 150 papers in reputed international journals and conferences. He has published several text and reference books in the related areas, including one on *Embedded System Design* (2nd Ed.) from PHI Learning, India. He is a senior member of IEEE.



Indrajit Chakrabarti received the PhD from Indian Institute of Technology (IIT) Kharagpur, India in 1997. He is currently a Professor in the Department of Electronics and Electrical Communication Engineering, 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 20 papers in international journals, and is a member of IEEE.

REGISTRATION FORM

KNOWLEDGE DISSEMINATION PROGRAMME

EMBEDDED SYSTEM DESIGN

May 25 - 29, 2015

Name

Date of Birth

Gender Male FemaleCategory Academic Student Professional
(Please enclose a bonafide certificate from your parent institution)

Organization

Address for Correspondence

Preferred location for attending

Phone

E-mail

Highest Academic Qualification

Experience (in years)

Accommodation Required (at IIT Kharagpur) Yes No

Registration Fees

Category 1: Nil**Category 2:** ₹ 500**Category 3:** ₹ 5000

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

Accommodation

Outstation participants may be provided accommodation at IIT Kharagpur on self-payment basis, subject to the availability.

Course Co-Ordinators

Prof. Santanu Chattopadhyay

Principal Coordinator

Dept. of Electronics and Electrical Communication Engineering

IIT Kharagpur, West Bengal – 721302

Phone: +91-3222-283564 (O), 09434042800 (M)

Email: santanu@ece.iitkgp.ernet.in
iitkgp.santanu@gmail.com**Prof. Indrajit Chakrabarti**

Coordinator

Dept. of Electronics and Electrical Communication Engineering

IIT Kharagpur, West Bengal – 721302

Phone: +91-3222-283566 (O), 09434047041 (M)

Email: indrajit@ece.iitkgp.ernet.in
indrajit.chakrabarti@gmail.com