EMBEDDED SYSTEMS DESIGN

PROF. ANUPAM BASU
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IIT Kharagpur

TYPE OF COURSE: Rerun | Core | UG
COURSE DURATION: 12 weeks (18 Jan’ 21 - 09 Apr’ 21)
EXAM DATE: 25 Apr 2021

PRE-REQUISITES: Computer Organization, Basic of Microprocessors
INTENDED AUDIENCE: Environmental engineering professionals and students pursuing a degree with emphasis in Environmental engineering.
INDUSTRIES APPLICABLE TO: Any industry working in the area of Embedded Systems

COURSE OUTLINE:
This course on Embedded systems will first the students to the fundamental requirements of embedded systems and the interaction between hardware and software in such systems. Next the course will discuss some basic steps of hardware design, introduce the students to ASIPs, ASICs and FPGAs. Next, the students will be exposed to the very important issue of designing for less power consumption and introduce them to the techniques that are adopted to this end. Since many of the embedded systems will have real time constraints, basic issues of real time operating systems will be discussed. This will be followed by formal specification models and languages, mapping the specification to hardware and software components along with decisions on design tradeoffs and hardware software partitioning. Next, synthesis if hardware and software along with a few of the optimization techniques will be presented. The course will end with a brief overview of design verification methods that are adopted for embedded system design.

ABOUT INSTRUCTOR:
Prof. Anupam Basu is Professor in the Dept. of Computer Science Engineering, IIT Kharagpur, and has been an active researcher in the areas of Cognitive and Intelligent Systems, Embedded Systems and Language Processing. Presently he is acting as the Chairman and Head of the Center for Educational Technology, IIT Kharagpur. He has developed several embedded system based tools empowering the physically challenged and has led several national projects in the area.

COURSE PLAN:

Week 1: Introduction to Embedded System, ASICs and ASIPs
Week 2: Designing Single Purpose Processors and Optimization
Week 3: Introduction to FPGAs and Synthesis
Week 4: Verilog Hardware Description Language (Verilog HDL)
Week 5: Microcontrollers and Power Aware Embedded System Design
Week 6: Real Time Operating System
Week 7: Real Time Scheduling Algorithms
Week 8: Modelling and Specification
Week 9: Design Synthesis
Week 10: Digital Camera Design and Hardware Software Partitioning
Week 11: Design Optimization
Week 12: Simulation and Verification