Organized by
Electronics & ICT Academy

MNIT Jaipur
http://www.mnit.ac.in/eict

VLSI/Embedded Systems & IoT: Smart Systems Design

26th June – 31st July 2020
http://academymnit.wordpress.com

Online Summer Training Programme
EICT Academy funded by
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meity.gov.in/content/schemes-projects

Detailed Module Contents

Module 1: Digital System Design using Verilog hands on

Day 1 (2 hours)	Importance of Digital design in today's perspective ; Basics of Digital electronics; combinational circuits ; Basics of Verilog & its features, Modelling style of verilog
Day 2 (2 hours)	Verolog design for combinational circuits along with hands on learning – like Basic gates, Half adder, full adder, multiplexer and Testbench design using Verilog; 4 bit full adder
Day 3 (2 hours))	Verilog design for combinational circuits like Encoders, decoders, functional implementation
Day 4 (2 hours)	Basics of sequential circuits; Verilog coding for sequential circuits, like- flip flop, registers, counters etc
Day 5 (2 hours)	Verilog project, 4 bit serial full adder

Module 2: Mixed Signal IC Design using hands on learning

Day 1 (2 hours)	Importance of Mixed signal design in today's perspective; Basics of Sample and Hold circuits; types of sample and hold circuits
Day 2 (2 hours)	Digital to analog (D/A) converters; Types of D/A- Current-steering DAC – Binary weighted DAC, Thermometer DAC
Day 3 (2 hours))	Implementation (using available software) of D/A converters
Day 4 (2 hours)	Analog to Digital converters (A/D) ; Types of D/A- Flash ADC –Interpolative and Folding architectures. Successive Approximation ADC; Pipeline ADC. Over sampling ADC – Noise shaping, Sigma-Delta modulator.
Day 5 (2 hours)	Implementation (using available software) of A/D converters

Module 3: System Verilog for Verification

Day 1 (2 hours)	Basic Concept of Verification, Test Bench Design, System Verilog Introduction, Basic Features of System Verilog
Day 2 (2 hours)	System Verilog Data Types, Array concepts of System Verilog, Types of Array in System Verilog, Advance Faetures of Verification in System Verilog
Day 3 (2 hours))	Inter Process Communication, Methods of Interposes Communication, Randomization, Basic Of Verification Environment
Day 4 (2 hours)	Assertion of System Verilog, Coverage Basics
Day 5 (2 hours)	Coverage , Bins , Types of coverage, Cross Coverage, Examples

Module 4: FPGA and Synthesis Algorithms

Day 1 (2 hours)	PLD concepts, FPGA basic components, 7 series architecture, Synthesis & simulation, Implementation
Day 2 (2 hours)	Synthesis algorithms, High Level Synthesis, Architectural Synthesis, Scheduling and binding Concepts
Day 3 (2 hours))	Scheduling Algorithms, Constrain optimization, Resource Sharing and Binding
Day 4 (2 hours)	Logic Level Synthesis, Two-Level and Multi level Combinational Logic Optimization, Sequential Optimization
Day 5 (2 hours)	Data Path and Control path Design with Examples, Optimisation techniques

Module 5: Embedded systems & IoT

Day 1 (2 hours)	Embedded System basics, Embedded system architectures: state of the art and practice
Day 2 (2 hours)	AI for Embedded System, Intelligent Embedded Systems and application
Day 3 (2 hours))	Basics of IoT, IoT Communication Protocol, Hardware and Software, Networking with IoT Interoperability in IoT, Introduction to Arduino Programming:
Day 4 (2 hours)	Machine Learning Models: Classification and regression, Programming with Python
Day 5 (2 hours)	understanding and Implementation: Embedded System Hardware Emulation on Pc using Qemu , Raspberry Pi, ARM cortex ,esp32 Emulation On Windows or Linux System (with limited Functions) Implementation of Mqtt Client and broker server in virtual environment for IOT application

Module 5: Smart Electronics System Design

Day 1 (2 hours)	Case Study 1: Smart healthcare System , Internet of medical things, Connected Health
Day 2 (2 hours)	Case Study 2: Assistive Living, Intelligent Prosthetic Control System
Day 3 (2 hours))	Case Study 3: security and Privacy issues for smart system
Day 4 (2 hours)	Case Study 4: Smart City applications
Day 5 (2 hours)	Future Direction of IoT