Digital Circuits and Systems - Video course

COURSE OUTLINE

Digital circuits are the basic blocks of modern electronic devices like mobile phones, digital cameras, microprocessors and several other devices. In this course, we will learn the fundamentals of digital circuits and how to engineer the building blocks that go into digital subsystems.

We will learn the basics of combinational as well as sequential logic. We will also have a thorough treatment of sequential circuits and state machines. We will also learn how to analyze the performance of digital circuits.

The course will emphasize on the design philosophy as well as good design practices used. Students will also get an exposure to Verilog, a popular hardware modeling language.

COURSE DETAIL

Module No.	Topics
1	• Introduction to Digital Circuits • Digital Hardware • Design Process • Boolean Logic • Truth Tables • Logic Gates • SoP and PoS form • Basic Verilog
2	• K-Map • Minimization of SoPs • Incompletely Specified Functions • Number Representation • Unsigned Numbers • Addition and Subtraction
3	• Multiplexers • Decoders • Encoders • Sequential Design Elements • SR Latch, D Latch, D Flip Flop • Registers
4	• Counters, Shift Registers • Design Examples • Synchronous Sequential Circuits • Canonical Model of a State Machine • Types of State Machines • State Diagram, State Table, State Assignment • Moore and Mealy Model
5	• State Minimization

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Electronics & Communication Engineering

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	• State Machine Examples • Design Principles • Timing a digital circuit • Fundamentals of timing analysis • Setup and Hold time
6	• Detailed Design Example • Detailed Timing Analysis • Optimization for Timing
7	• Area vs Delay tradeoff • Pipelining • Parallelism • Pipelining vs Parallellism • Multiplication • Floating Point Representation
8	• Memory • Digital System Examples • Review