Course content

This course introduces students to the fundamental principles of digital logic and system design, which are essential for understanding hardware development. Emphasis is placed on practical skills in digital circuit analysis, design, and system integration.

Key topics covered include:

1. Logic Algebra: Basic principles of Boolean algebra and its application in simplifying digital logic.
2. Combinational Logic Circuits: Design and analysis of basic combinational circuits (AND, OR, NOT, NAND, etc.) and their practical applications.
3. Sequential Circuits: Introduction to flip-flops, registers, and counters, including the design and behavior of sequential logic circuits.
4. Synchronous Sequential Circuits: Design and analysis of clocked sequential circuits, including timing diagrams and state diagrams.
5. Asynchronous Sequential Circuits: Concepts and design of circuits without clocks, including hazards and race conditions.
6. Hands-on Experiments: Implementation and testing of digital circuits using FPGA or 74 integrated circuit chips.

Course Objectives

Knowledge

1. Understand the fundamental concepts of digital logic and digital systems.
2. Gain proficiency in the basic analysis and design methods for combinational and sequential circuits.

Skills

1. Analyze and describe engineering problems using digital logic principles.
2. Design digital logic circuits to solve computer engineering problems.
3. Build experimental systems using FPGA or integrated circuit chips to validate digital circuit designs.

Competencies

1. Analyze experimental results, interpret findings, and draw effective conclusions.
2. Understand environmental factors, especially energy consumption, and design circuits with power efficiency in mind.
3. Apply simplification methods to reduce circuit complexity and optimize performance.