

Course Name: Computer Architecture & Organization

Course Code: CSSE4205

SEMESTER 2-AY24-25

Assessment Type: Assignment

Allotted Mark: 5 Marks

# Enhancing Existing Logic Circuit Solutions for Real-World Problems

## Overview

This assignment provides students with a practical opportunity to apply their knowledge of logic circuit design and optimization techniques to real-world problems. By enhancing an existing logic circuit solution, students will develop valuable skills in problem-solving, critical thinking, and engineering design, preparing them for future challenges in the field of electronics and embedded systems.

## Objectives

The objective of this assignment is to analyze and enhance an existing logic circuit solution to better address real-world problems. By optimizing various aspects such as speed, power consumption, size, and reliability, students will gain hands-on experience in improving the performance and efficiency of logic circuits in practical applications.

## Assignment Deliverables

### 1. Project Report: Your report should include the following sections:

1. **Title:** Provide the specific real-world problem where solution is enhanced.
2. **Introduction:** Describe the chosen problem and its significance in a real-world context.
3. **Existing Logic Circuit Solution:** Students will choose an existing logic circuit solution that is used in a real-world application. This could be a circuit from consumer electronics, industrial automation, communication systems, or any other relevant field.
4. **Analysis of Current Solution:** Perform a comprehensive analysis of the selected logic circuit solution, including its design, functionality, performance metrics, and limitations. Identify areas where improvements can be made to better address real-world challenges.
5. **Identify Enhancement Goals:** Based on the analysis, define specific enhancement goals for the logic circuit solution. These goals may include improving speed, reducing power consumption, enhancing reliability, optimizing for a specific application requirement, adding more functionality or component, and others.
6. **Implementation of Enhancements:** Apply the proposed strategies to enhance the existing logic circuit solution. This could involve redesigning certain components, modifying the circuit layout, or introducing new techniques to improve performance and efficiency.

7. **Simulation:** Use Logisim's simulation features to test and validate the behavior of the logic circuit solution under different conditions. This allows you to verify that the circuit functions correctly and reliably before implementing it in the physical world.
8. **Conclusions:** Provide a brief wrap-up of the assignment, reinforcing the significance of the work undertaken and its implications for future work in logic circuit design and optimization.

**2. Logic Circuit Solution (Logisim File):** The complete logic circuit design to solve the chosen real-world problem with enhancement. The design must be done using the Logisim tool.

## Evaluation Criteria

Your submission will be evaluated based on the following criteria:

- a) Effectiveness of Enhancements (2 marks)
- b) Innovation and Creativity (1 mark)
- c) Documentation/Report (2 Marks)

## Important Dates

- ✓ The assignment is due on: **(Week 14)**.
- ✓ **UPLOAD** the two files (**DO NOT COMPRESS**):
  1. The report and
  2. The enhanced Logisim file
- ✓ Note: *Late submissions will incur 0.5-mark deduction per day, including weekends.*

## List of Problems

Students can choose from the following identified problems or suggest another problem, where logic circuit design is applicable.

S.No.	Problem Topic
1	Traffic Light Control System
2	Alarm System
3	Digital Clock
4	Calculator
5	Game Logic
6	Data Transmission
7	Traffic Light Pedestrian Crossing
8	Digital Combination Lock
9	Vending Machine
10	Robotics Control
11	Home Automation
12	Traffic Congestion Detection
13	Security Access Control
14	Audio Processing
15	Robot Arm Control
16	Digital Piano
17	Temperature Control System
18	Remote Control System