



DIGITAL LOGIC DESIGN (DLD)

(3+1 Credit Hours)

DEPARTMENT OF COMPUTER SCIENCE

FAST-NUCES UNIVERSITY, KARACHI, PAKISTAN

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Class & Section: BS(CS) 2B

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PROJECT TITLE:

“4-Way Traffic Control System with Pedestrian Walkthrough and Configurable Timers”

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1. Introduction

Efficient traffic management is essential for reducing congestion, minimizing accidents, and ensuring pedestrian safety. This project aims to develop a software-based 4-way traffic control system that optimises traffic flow while allowing pedestrian movement through designated crosswalks. The system will feature configurable timers to accommodate varying traffic conditions.

2. Objectives

- Design a digital traffic control system for a 4-way intersection.
- Implement pedestrian crosswalks with dedicated signalling.
- Allow configurable timer settings for adaptive traffic management.
- Develop an interactive software simulation to visualize traffic flow.

3. Key Features

- **Traffic Light Control:** Each road will have red, yellow, and green signals to regulate vehicle movement.
- **Pedestrian Walkthrough:** A pedestrian crossing signal will indicate when it is safe to walk.
- **Configurable Timers:** The system will allow users to set different time durations for each signal phase based on traffic density.
- **Emergency Mode:** A manual override for emergency vehicles or high-priority traffic flow.
- **Simulation Interface:** A software-based simulation to demonstrate real-time traffic control.
- **User-Friendly Interface:** A simple interface for users to configure and visualize the system.

4. Technical Details

- **Software Development:** The project will be implemented using LogicWorks, a digital logic simulation tool.
- **State Machine Design:** The traffic lights and pedestrian signals will be managed using a state machine to ensure smooth transitions.
- **User Interface:** A simple GUI will be developed to allow users to configure timers and visualize traffic flow.

5. Tools and Components

Logic Gates: AND, OR, NOT, NAND, NOR gates for signal processing.

Sequential Circuits: Flip-flops (D, JK, or T) to maintain traffic light states.

Counters: Binary or decade counters to manage timed transitions.

Multiplexers & Decoders: To control and select signal outputs.

Clock & Timing Circuits: 555 Timer or clock pulse generator for timing signals.

Input/Output Components: Switches for pedestrian inputs and LED indicators for traffic light representation.

Software Simulation: Implemented in LogicWorks for digital logic simulation

6. Process Flow

1. **System Initialization:** The system starts by setting default timer configurations.
2. **Signal Transitioning:** Traffic lights and pedestrian signals operate based on a state machine.
3. **Timer Adjustment:** Users can modify signal durations based on traffic needs.
4. **Emergency Handling:** Manual override mode allows priority access when needed.
5. **Real-Time Simulation:** The GUI displays an interactive model of traffic movement.

7. Expected Outcomes

- A functional digital logic-based traffic control system.
- Improved traffic flow efficiency and pedestrian safety.
- A configurable software model that can be extended for real-world applications.

8. Conclusion

This project provides a practical approach to traffic management by integrating digital logic principles into a software-based simulation. The system can adapt to different traffic scenarios by allowing timer customisation and pedestrian signalling, making it a valuable tool for urban planning and traffic regulation.