

Course Name: Computer Architecture	Course Code: CMPE-421L
Assignment Type: Complex Engineering Problem	Dated: 23 rd September 2024
Semester: 7th	Session: 2021
Lab/Project/Assignment #: 1	CLOs to be covered: CLO 1
Lab Title: Elevator Control System	Teacher Name: Engr. Afeef Obaid

Complex Engineering Problem (CEP):

No.	Attribute	Details	PLOs Covered
WP1	Depth of Knowledge required	This problem requires deep knowledge of system Verilog and Finite State Machines (FSMs)	1
WP2	Range of conflicting requirements	This problem involves wide range requirements including floor selection, priority handling, emergency stop and limit sensor. Additionally, the design must be efficient to minimize the processing time and operational cost.	3
WP7	Interdependence	This problem has interdependence as test bench and design depends upon the State Transition Graph (STG).	4

CEP Description:

Design a System Verilog FSM for an elevator control system. The system should control the movement of an elevator in a multi-story building. The following requirements should be met:

- 1. Floor Selection:** The elevator should be able to stop on multiple floors. Users can select the desired floor from inside the elevator.
- 2. Priority Handling:** The elevator should prioritize serving passengers based on the order in which they press the buttons. For example, if a user inside the elevator selects floor 5, and another user on floor 3 presses the button to go to floor 4, the elevator should first go to floor 3 to pick up the new passenger before proceeding to floor 5.
- 3. Emergency Stop:** Include an emergency stop button inside the elevator. When pressed, the elevator should stop at the next available floor and remain there until the emergency stop button is reset.
- 4. Limit Sensors:** Implement sensors to detect the elevator's position and ensure it does not exceed the top or bottom floors.
- 5. State Transitions:** Design a finite state machine to manage the elevator's states, such as moving up, moving down, idle, and emergency stop.
- 6. User Interface:** Create a simple user interface or testbench to simulate user input and elevator operation, including floor selections and emergency stop requests.
- 7. Testing and Simulation:** Develop a test bench to verify the correctness of your FSM design. Simulate various scenarios to ensure the elevator operates as expected.
- 8. Documentation:** Provide documentation that includes state diagrams, state transition tables, and explanations of the FSM's operation.