

Introduction:

This report is about making an elevator controller for a three-story building. The controller works using a Moore finite state machine. We used Verilog to design it and ran tests to make sure it works. The elevator follows specific rules; it handles requests, moves in the right direction, and opens and closes its doors when needed. Our job was to draw out the design, write the code, and test it to see if it does everything correctly.

Current State	Condition	Next State	Current State	Condition	Next State
I0	no requests	I0	MU	after move up from I0	I1
I0	R(0)	OD0	MU	after move up from I1	I2
I0	dir=up & up_req	MU	MU	after move up from I2	I3
I0	dir=down & down_req	MD	MD	after move down from I2	
I0	dir=up & !up_req & MD down_req		I3		
I0	dir=down & !down_req MU & up_req		MD	after move down from I1	
I1	no requests	I1	I2		
I1	R(1)	OD1	MD	after move down from I0	
I1	dir=up & up_req	MU	OD0	after 1 cycle	I0
I1	dir=down & down_req	MD	OD1	after 1 cycle	I1
I1	dir=up & !up_req & MD down_req		OD2	after 1 cycle	I2
I1	dir=down & !down_req MU & up_req		OD3	after 1 cycle	I3
I2	no requests	I2			
I2	R(2)	OD2			
I2	dir=up & up_req	MU			
I2	dir=down & down_req	MD			
I2	dir=up & !up_req & MD down_req				
I2	dir=down & !down_req MU & up_req				
I3	no requests	I3			
I3	R(3)	OD3			
I3	dir=up & up_req	MU			
I3	dir=down & down_req	MD			
I3	dir=up & !up_req & MD down_req				
I3	dir=down & !down_req MU & up_req				

Legend:

I0, I1, I2, I3 = Idle states at floors 0,1,2,3 (doors closed)
 MU = Move Up (one floor up)
 MD = Move Down (one floor down)
 OD0, OD1, OD2, OD3 = Open Door states at floors 0,1,2,3
 R(x) = Request at floor x
 dir=up/dir=down = Current direction
 up_req = Requests above current floor
 down_req = Requests below current floor
 no requests = No pending requests

Elevator Controller Design:

This design controls an elevator of a three-story house using Moore FSM. It does the basic actions which include moving the elevator, determining its direction, and performing door operations. Requests from the floors and the cabin are encoded using a 4-bit system ensuring reasonable prioritization according to the direction (up or down) the elevator is moving to. Then, once this request has been satisfied, the system automatically resets it. Between any two floors, the elevator takes one clock cycle and pauses briefly and opens its doors at the end position. Because it has well-defined states and transitions, the FSM ensures that the operation runs smoothly, and it performs well under many conditions.