ELE3510 Lab 5: FSM

1 dedicated lab period, 1 lab period to complete

Objectives

- Review FSM concepts
- Utilize the switches and seven segment displays

Prelab

- Review the SSEG display info from CE1911   ☐
- Review the FSM class notes   ☐

Assignment

Part 1: Create a controller for a simple Elevator

Specifications:

1) The number of floors is specified via a generic: NUM_FLOORS (must work for ANY positive value)
2) If a "desired_floor" value above the maximum is input – the elevator should go to the top floor
3) No negative floor numbers (starts at 1)
4) If the wait time on a floor exceeds the DELAY_CNT(generic) clks, automatically return to floor 1
5) If the "desired_floor" input changes while in transit, the new "desired floor" value will take effect immediately
6) If the "desired_floor" input changes while returning to floor 1 automatically, the new "desired_floor" input will be ignored until floor 1 is reached
7) Generics:
   a. NUM_FLOORS
   b. DELAY_CNT
8) Input signals:
   a. rstb
   b. clk
   c. desired_floor (? bits)
9) Output signals:
   a. Desired floor displayed on SSEGs in hex (assume no more than 255 floors for this part only)
   b. Current floor displayed on SSEGs in hex (assume no more than 255 floors for this part only)
   c. LED indicating desired floor has been reached

Additional Requirements:

1) Implementation must be via an FSM
2) A separate binary_to_sseg_hex block must be implemented and instantiated in the DE10 implementation
3) Run simulation(s) to verify operation (see following for the required sequence)
4) Create a DE10 implementation of your design
   a) Provide support for 60 floors (NUM_FLOORS)
   b) Set the DELAY_CNT generic to 10
   c) SW0 resets to floor 1
   d) SW1 – SW6 indicate the desired floor in binary
   e) LED0 indicates desired floor reached

f) Desired floor displayed on SSEGs 5/4 in hex
g) Current floor displayed on SSEGs 1/0 in hex

Check Off

You must demonstrate your working design(s) prior to the beginning of the next lab period

- Demo the Elevator FSM (Simulation, DE10)   80%

Lab Report (informal)

- Due at 4:00 pm, the day of the next lab period – in the box
- Include a properly documented informal lab report.   20%

Elevator Simulation

NUM_FLOORS = 60, DELAY_CNT = 10

Up to 18

Change to 12 part way (should change)

Down to 6

Wait long enough for an automatic return

Attempt to change during return (should not change)

Attempt to go to 63 (should stop at 60)