ENCS 338: Microprocessor-Based Systems

Project

First Semester 2019/2020

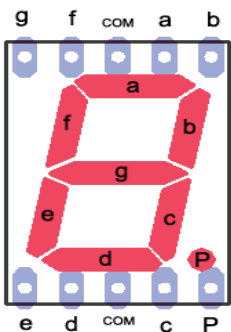## Dr. Abdel Salam Sayyad

Assigned: Thursday 24/10/2019

Due date: Saturday 7/12/2019

Instructions:

1- This project is individual work.
2- You have to either deliver the hardware part OR the software part. NOT both.
3- The project is worth 15% of the total mark.

Requirements:

Design an elevator control system based on the 8086 microprocessor, with the following features:

	Call Elevator	Specify Desired Floor	Elevator called?	Elevator at this floor?	
3rd Floor	Push Button (KEY5) (Going Down)		Red LED (LEDR3)	Green LED (LEDG3)	Display current floor
2nd Floor	Push Button (KEY4) (Going Up) Push Button (KEY3) (Going Down)	Push Buttons (KEY6-KEY9) KEY6= Ground Floor	Red LED (LEDR2)	Green LED (LEDG2)	
1st Floor	Push Button (KEY2) (Going Up) Push Button (KEY1) (Going Down)	KEY7 = 1st Floor KEY8= 2nd Floor KEY9= 3rd Floor	Red LED (LEDR1)	Green LED (LEDG1)	
Ground Floor	Push Button (KEY0) (Going Up)		Red LED (LEDR0)	Green LED (LEDG0)	

Components:

1- The 8086 microprocessor and all its supporting chips (clock generator 8284, data transceivers 74LS245, address latch 74LS373).
2- Memory chips: for EPROM, use two 2716 chips. For SRAM, use two TMS4016 chips. The pinouts for both chips are found in the attachment.
3- To interface with the push buttons, the LEDs, and the 7-segment display, you may use simple buffers (74LS244) and latches (74LS373). Alternatively, you may use the 8255 PPI.
4- PTI timer chip to organize the polling of the buttons every 200ms, and to simulate the elevator movement between floors (2 seconds).
5- EPM3032 Programmable logic device (PLD) from the Altera MAX3000 family to provide the address decoding and wait-state insertion. You may find the pinouts of this device on page 42 of the attached MAX3000 datasheet.

What to deliver:

If you choose the hardware part, you have to deliver:

1- Schematic design with the full connections of all the components.
2- Verilog (or VHDL) code for address decoding and wait-state insertion, PLUS meaningful simulations for both.

If you choose the software part, you have to deliver assembly code that achieves the following:

1) The elevator will initially be at the ground floor.
2) The users first call the elevator by pushing a push-button (KEY0-KEY5).
3) The elevator will only move when there are pending calls, otherwise it will remain at the last floor that it reached.
4) The "Elevator called?" red indicators will remain lit until the elevator stops at that floor.
5) Once the elevator stops to pick up a user, the user chooses which floor to go to (KEY6-KEY9).
6) The elevator will take 2 seconds to move from floor to floor, turning on the green light at each floor that it passes by, or stops at.