18-348 Spring 2013
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Group 3B

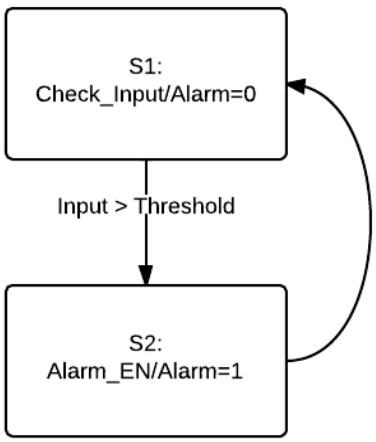
1.

Our project is a noise meter that will alert people when they are close to a predefined threshold limit. The threshold is user defined and passed through a potentiometer input. As nose gets closer to a predefined level then the display will become brighter and more LEDs will light up. If the level crosses the threshold then an alarm animation will be displayed to ensure users notice.

2.

- System Inputs
  - Power Switch – unit shall be on when this is powered on
  - Threshold pot – shall set the threshold limit
  - Microphone input – will take in the column of the outside world.
- System Output
  - LCD_Display should display the current threshold level and last sampled input
  - LED_Matrix shall display different animations and interact with sound
- Internal State Variables
  - System enabled – display is on or off
  - Threshold level – the current value of threshold in Db
  - LED rows out – LEDs matrix row that should be turned on
  - LED col out – LED matrix column that should be turned on
  - LED output – The LEDS to output – one led per bit
- Requirements
  1. LED matrix shall be sound sensitive
  2. The microphone shall be able to detect sound
  3. User shall be able to input a noise threshold through a potentiometer
  4. Threshold value should dictate what levels are displayed on the LCD
  5. A COP timer shall be user to ensure the system is operating properly
  6. LCD display should display the current threshold value and last sampled value
  7. If the input is beyond the threshold then an alarm shall sound
  8. After a predefined time the alarm shall be turned off.

State Chart Design



Part 4.

Requirement	S1	S2	T1	T2
R1	x			
R2	x			
R3	x			
R4	x			
R5	x			
R6	x			
R7		x	x	
R8	x			x

Part5

We will use a priority preemptive scheduler to ensure that our ISRs are run in the needed time. Below are listed in order of priority

T1 – Check_Noise – Shall check the input noise level – period 100ms
T2 – Calculate_Display – Shall determine which LEDS to turn on at which luminosity. P: 100ms
T3 – Alarm_Animation – Sets LEDS in an alarm animation sequence P: 50ms
T4 – Display_LEDS – Shall display the calculated LEDS using PWM P: 50ms
T5 – Display_LCD – Dispalys the current input level and threshold on screen P: 200 ms
T6 – Check_Threshold – See if the input has changed P: 500ms

Part 6.

As we have some long calculations, displays and animations we need a watchdog to make sure that everything is timed correctly and does not get out of place. The timeout period is around 1 second, as we need to make sure that the long alarm time does not interfere with input.

If the watchdog resets the device then we shall make sure that the values are reset and the alarm is off.

Part 7.1.

White box tests	Pass/Fail	Initial State	Input 1(State after input)	Input 2 (State after input)
Test 11.1		S1	Over threshold (S2)	

Test 11.2		S1	Over threshold (S2)	Below threshold (S1)

Traceability	T1	T2
Test 11.1	X	
Test 11.2	X	X

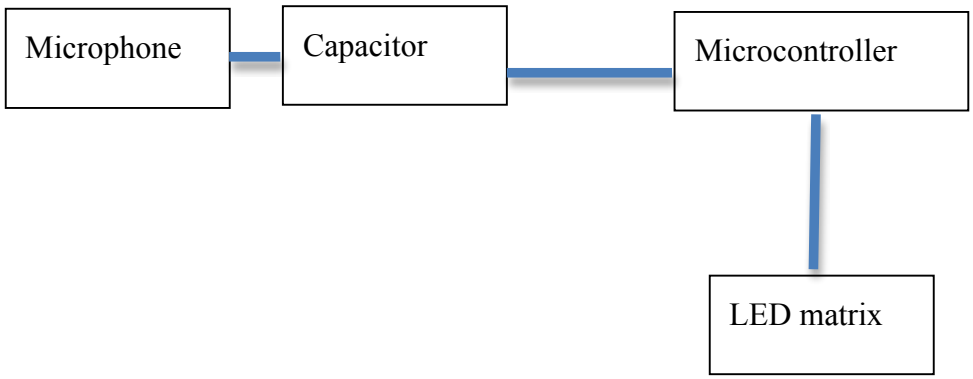
Part 7.2

Pass/Fail	Test Description	Result
Test 12.1	Input noise above threshold, until alarm turns on, then wait for it to turn off.	Alarm should turn on and turn off in time
Test 12.2	Time all tasks to see if they follow timing constraints	Times should work out
Test 12.3	Change potentiometer, and have same noise level.	LED values should change
Test 12.4	Change potentiometer and the number on the LCD screen	LCD threshold # should change
Test 12.5	LED matrix changes when sound changes	LEDs change

	R1	R2	R3	R4	R5	R6	R7
Test 12.1	X					X	X
Test 12.2					X		
Test 12.3	X		X	X			
Test 12.4			X				
Test 12.5	X	X					

Part 8.

Index	Quantity	Part Number	Description	Customer Reference	Available Quantity	Backorder Quantity	Unit Price	Extended Price
1	1	102-1720-ND	MIC COND ANALOG OMNI -42DB		1 Immediate	0	1.18000	$1.18
2	1	445-5303-ND	CAP CER 0.1UF 50V 10% RADIAL		1 Immediate	0	0.29000	$0.29
3	1	160-1555-5-ND	LED MATRIX 5X7 0.7" SUPER RED		1 Immediate	0	4.13000	$4.13
							Subtotal	**$5.60**



Part 9.

The TA can follow the test plan as above to determine if the project is following. However, the easiest way to test this would be as follows:

1. Test that sound input changes the LEDs
2. Test that the threshold can be changed
3. Test that the LCD displays the threshold
4. Test that the threshold can be met and that the alarm goes off
5. Test that the alarm turns off on its own after a period of time
6. All of these involve just making noise and turning a potentiometer.