UNIVERSIDAD DE MONTERREY

SUBJECT: **Embedded Systems Laboratory**	SEMESTER: OT24
ASSIGMENT: **Activity 2.4 ISR-Library**	
WORK FORMAT: **TeamWork**	
DOCUMENT FORMAT: **Digital - Blackboard**	
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Instructions I. Meet the requirements of the embedded system thoroughly. Make a short presentation with: Cover, Introduction, Development, Conclusions, Code. Use images of your work.

Hardware Requirements.

- The system now controls 2 wheels
  - Both wheels must be external-ISR-monitored
  - External ISRs should not be activate all the time.
  - Sample both wheel sensors, get an average from the count, then compute: DC motor RPMs and Car-speed (Km/h)
- Add standard-car lighting
  - Employ Change-State & ISR to activate it
  - Also use, LDR-sensor activation
  - Two white front lights & two red rear lights
- Add standard Police-car features
  - Employ Change-State & ISR activate it
  - Siren-like lighting & Siren-sound
- Apply hardware selection (Electronics)
  - The μController may need help to meet all power needs.

Software Requirements

- Use Pointers, external ISR ports, pin-change ISR ports
- Use *static* and *volatile variable types* as required.
- Create and use your own library in the program
- Use software scalability in all your software implementation.

Operation of the Prototype

- Display Data
  - RPM: Rev per minute of DC motor, KM/H: Speed of car, CC: Cruise Control, Lit: standard lights, SIR: Siren
  - The following image is just an illustration. Set up your own way to display all the data that is signaled in such image.

RPM	KM/H	CC	LIT	SIR
22.5	50	ON/OFF	ON/OFF	ON/OFF

- System is always ready to listen the ON/OFF button
- Control motor as specified in the document of Laboratory 6
- About standard car lights
  - Turns ON both white and red LEDs if the change-state-ISR-based button is pressed. (Manual activation of lights)
    - In this case, LDR-sensor activation feature is OFF
  - Turns ON both white and red LEDs based on LDR-sensor
    - You decide & set your own light level.
    - It works IF AND ONLY IF manual activation is OFF.
  - Turns OFF via manual deactivation or light intensity level.
- About police siren feature (both red-&blue LED + siren)
  - Turns ON if the change-state-ISR button is pressed.
- ISR features must works as expected any time they are activated.

Prototype Requirements

1. **Use the 3D Printed stand for embedded system prototyping**
2. Make sure **cables are well routed** within the prototype
   a. Route cables and clean the interface area so the user can use buttons or see displayed data with ease.