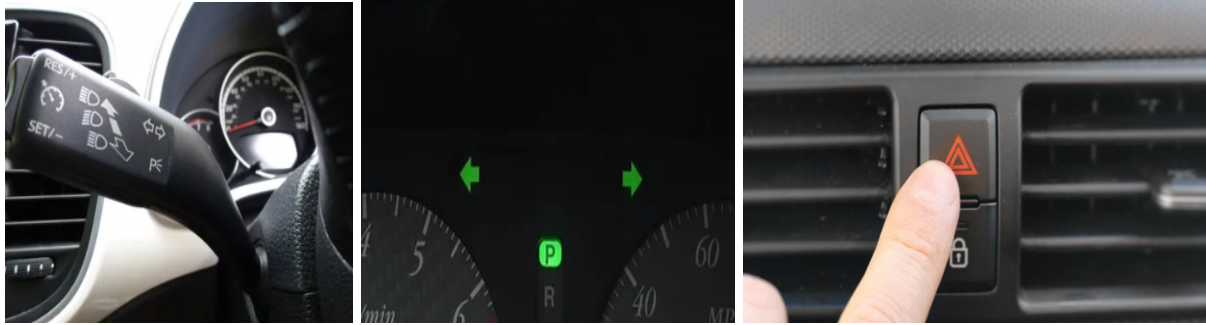# Coding For Embedded Final project

Project Title:

vehicle direction and hazard indicator controller.

Project Description:

The project requires the design and implementation of a Vehicle direction and hazard indicator control system. The system controls the vehicle indicator LEDs based on the state of the indicator arm and the hazard button.

System architecture:
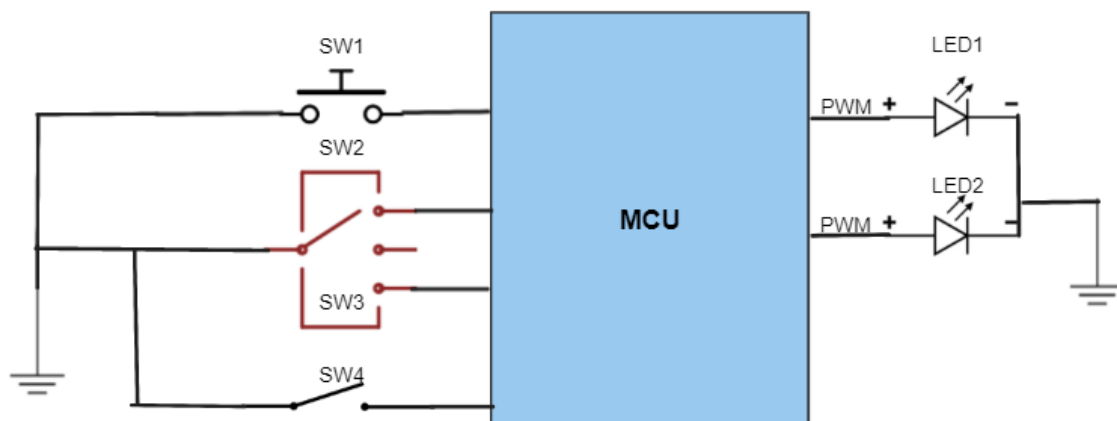
The system has four inputs. One Push button is referred to as SW1. This button simulates the input coming from the hazard button. Two on off switch inputs. They are combined in an SP3T connection. Two terminals are connected to the MCU and are referred to as SW2 and SW3. The

third terminal is not connected. So, when selected, no input will be applied from the two switch inputs. The combination simulates the input coming from the indicator arm with the three selections, right indicator, left indicator and no indicator. The last input is an ON/OFF switch with one terminal. The switch simulates the ignition key of the vehicle.

The system has two outputs. LED1 which represents the right indicator LED and LED2 which indicates the left indicator LED. The two LEDs shall be driven through PWM signals.

System behavior requirements:

Req_ID	Requirement Description
REQ_001	System shall periodically check the state of the three switches.
REQ_002	If a valid press is detected from the right indicator button, System shall blink Right indicator LED.
REQ_003	If a valid press is detected from the left indicator button, the system shall blink the left indicator LED.
REQ_004	If no valid press is detected from the two indicator buttons, the system shall not blink both LEDs.
REQ_005	If a valid press is detected from the hazard button and at least one of the two LEDs is off, the system shall blink both LEDs.
REQ_006	If a valid press is detected from the hazard button and both LEDs are blinking, the system shall set each LED state to its previous one.
REQ_007	A press shall be considered valid from the right and left indicator button if its signal is set to ground for at least 50 ms.
REQ_008	A press shall be considered valid from the hazard button if a rising edge is detected on its pin.
REQ_009	The LED blinking shall be a state switching between high and low.
REQ_010	The LED high time shall be 500ms.
REQ_011	The LED Low time shall be 500ms.
REQ_012	During the LED high time, the System shall derive the LED with a PWM signal with a preconfigured duty cycle and frequency.
REQ_013	The preconfigured duty cycle shall range from 10% to 80%.
REQ_014	The preconfigured frequency shall range from 10Khz to 100Khz

REQ_015	Upon a detection of a button press, system shall switch the LEDs blinking state within 100ms without waiting to the end of the blinking period.
REQ_016	If valid press is detected from the ignition switch, system shall consider ignition is on.
REQ_017	A press shall be considered valid from the ignition switch if it is set to ground for 50 ms.
REQ_018	If ignition is off, system shall not consider the inputs from the right and left indicator buttons.

Deliverables format:

You are required to provide a complete source code covering all the mentioned requirements and constraints with a simulation file.
Your source code must be free from unjustified MISRA issues.
A simulation project must be provided for testing purpose
A presentation shall be provided to describe the complete software static architecture, real time analysis and selected design patterns with justification.