On-demand Traffic light control

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System Description

Designing and implementing a traffic light system with priority given to pedestrian by implementing a button that, when pressed, turns off the traffic light for cars for a few seconds, which provides safety for pedestrians.

System Design

We have two main modes:

• Normal Mode: Cars' LEDs will be changed every five seconds starting from Green then yellow then red then yellow then Green.

• Pedestrian Mode: Change when the pedestrian button is pressed, so we have 3 cars traffic states:

Red: The pedestrian's Green LED and the cars' Red LEDs will be on for five seconds.
Green-Yellow: The pedestrian Red LED will be on, both Yellow LEDs start to blink for five seconds then Red LED and pedestrian Green LEDs are on for five seconds.
The cars' Red LED will be off, and both Yellow LEDs start blinking for 5 seconds and the pedestrian's Green LED is still on.
Pedestrian Green LED will be off, and both the pedestrian Red LED and the cars' Green LED will be on.

System Layers

- Library
- Hardware Abstraction Layer(HAL)
- Microcontroller Abstraction Layer(MCAL)
- Application

Modules & Drivers

- DIO Driver(MCAL)
- External Interrupt Driver(MCAL)
- Timer Driver(MCAL)
- LED Module(HAL)
- Button Module(HAL)

System Constraints

When a pedestrian presses the button for a long time, we expect nothing to happen, except the first press will affect as we use Rising-Edge interrupt, and if we turned to Falling Edge Interrupt there will be no effect till the end of the press.

When a pedestrian presses the button twice or more, expect that the first press will do the action and nothing to be done after the second press.

System Flow Chart