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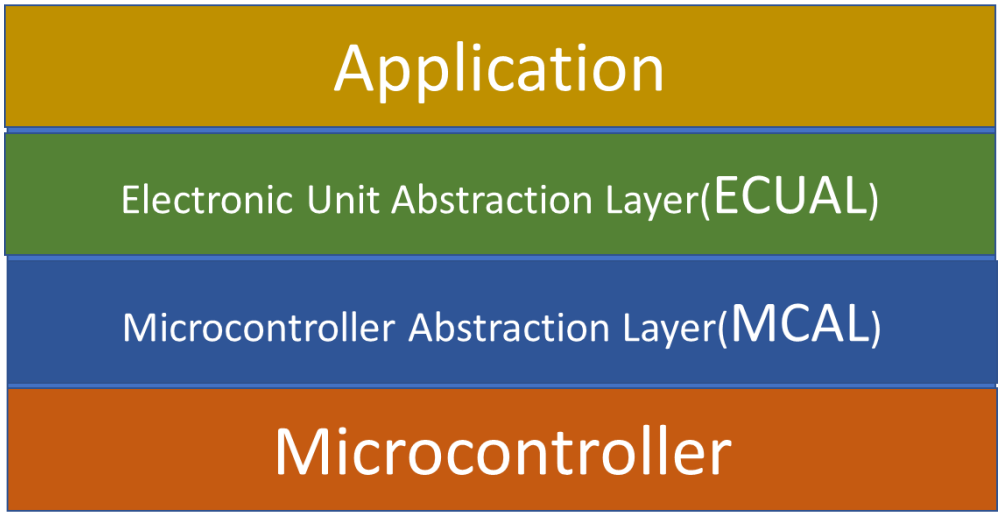
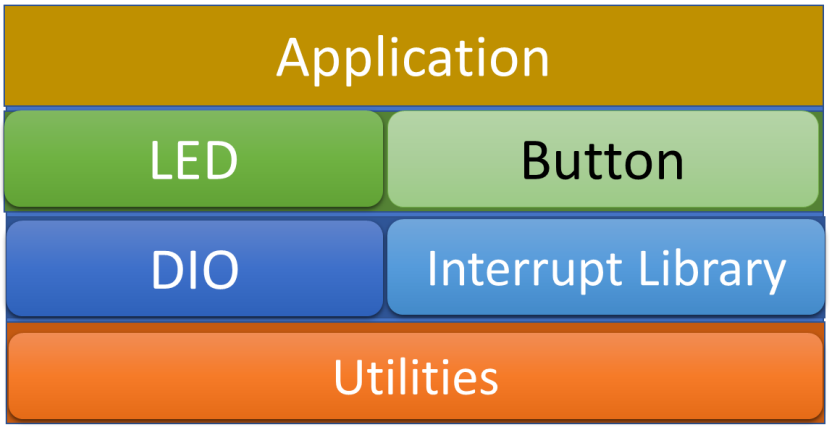
System Design

System Layers



Drivers in each layer



system description

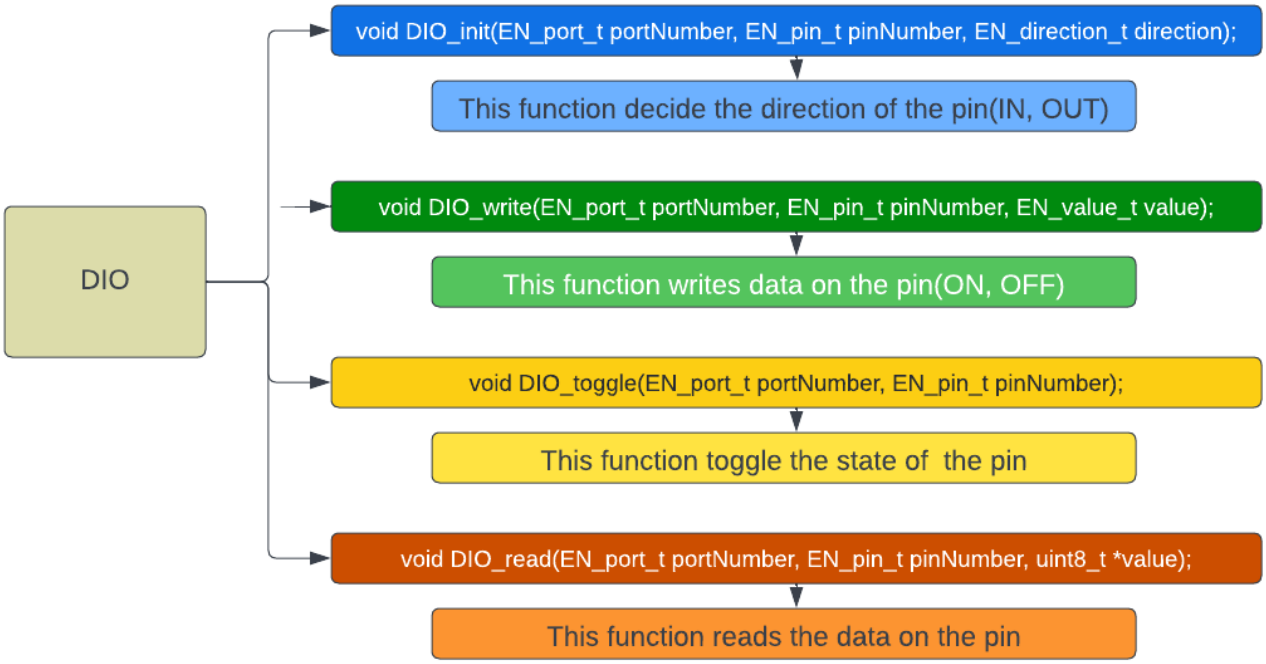
Microcontroller layer

Utilities Driver

- This driver contains mainly two header files(registers.h, types.h)
  - registers.h
    - i/o registers(PORTA, PORTB, PORTC, PORTD)
    - timer0 registers
    - external interrupts registers
  - types.h
    - Defines important data types

MCAL Layer

DIO Driver

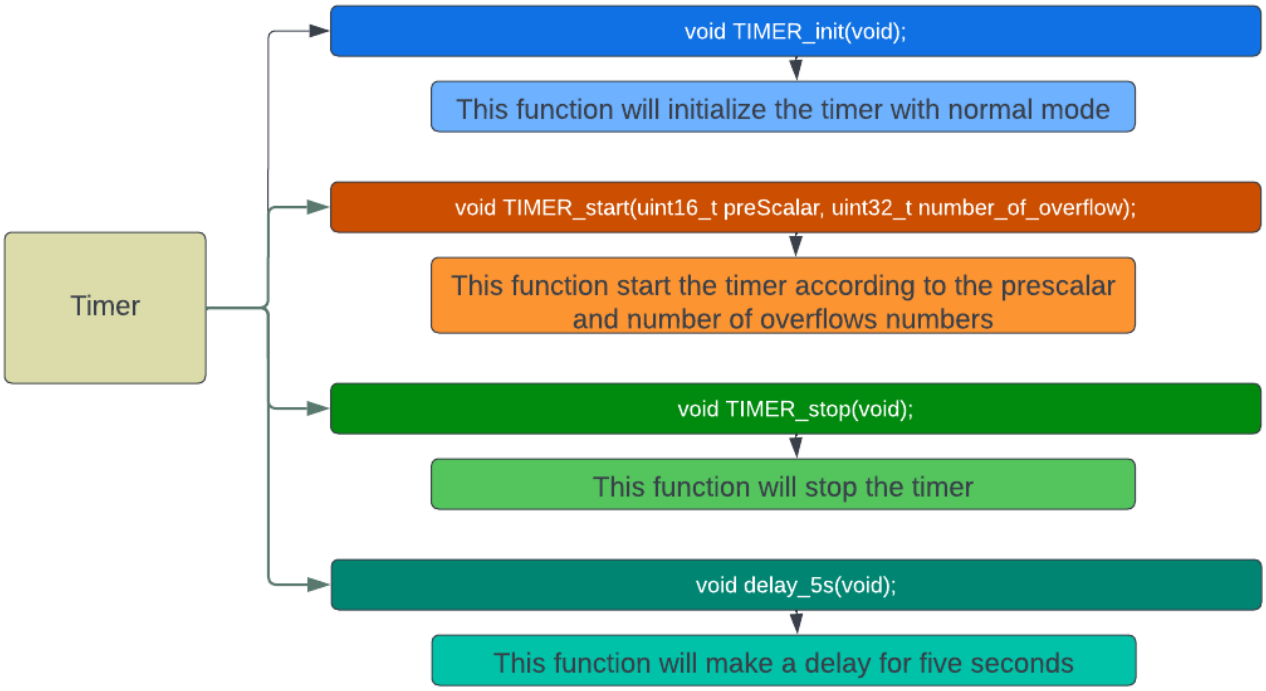


- Has helpful macros to easiest the programming
- Has enums to define the directions, pins and ports

Interrupt Library

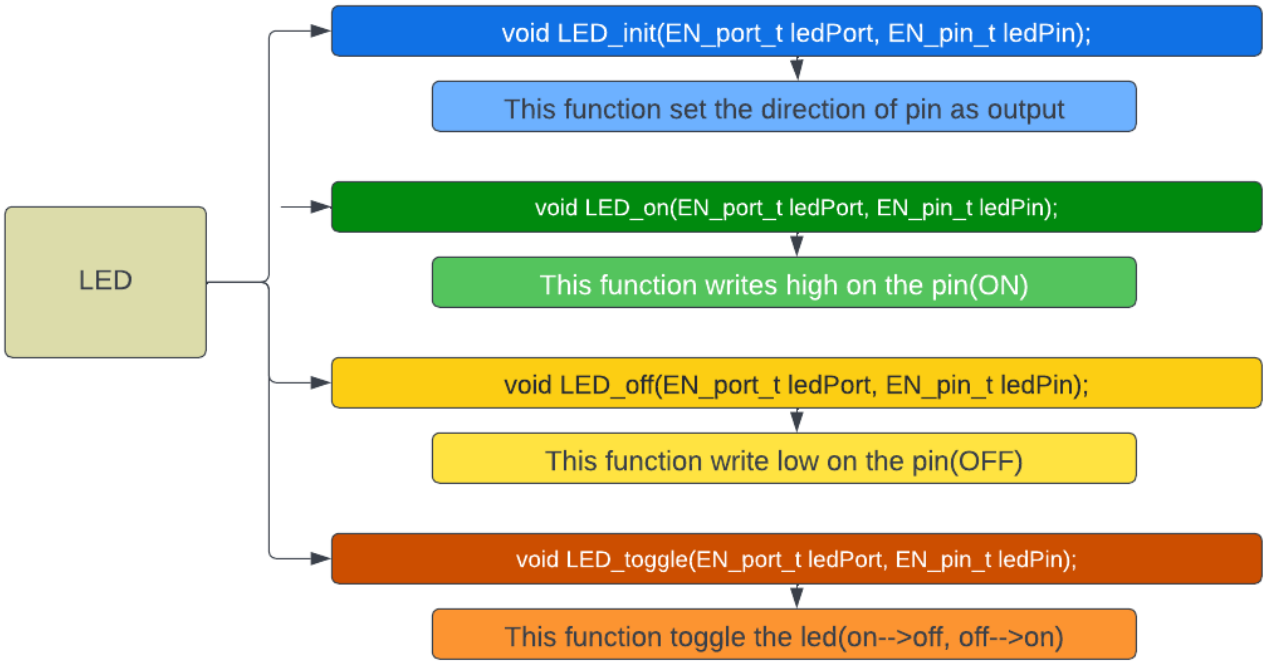
1. This library defines the external interrupt vectors, macros to set OR clear global register and ISR macro
    - Make function to initialize the interrupt

Timer Driver

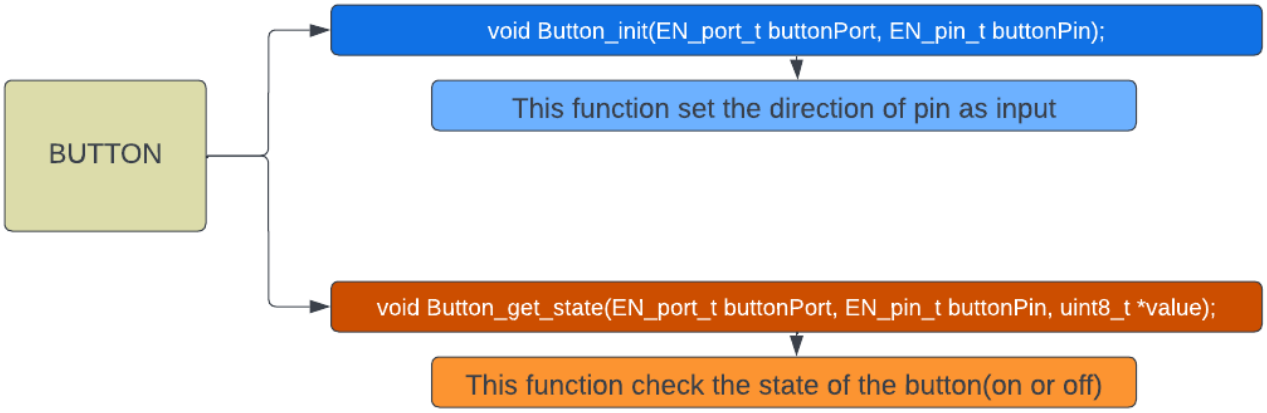


ECUAL Layer

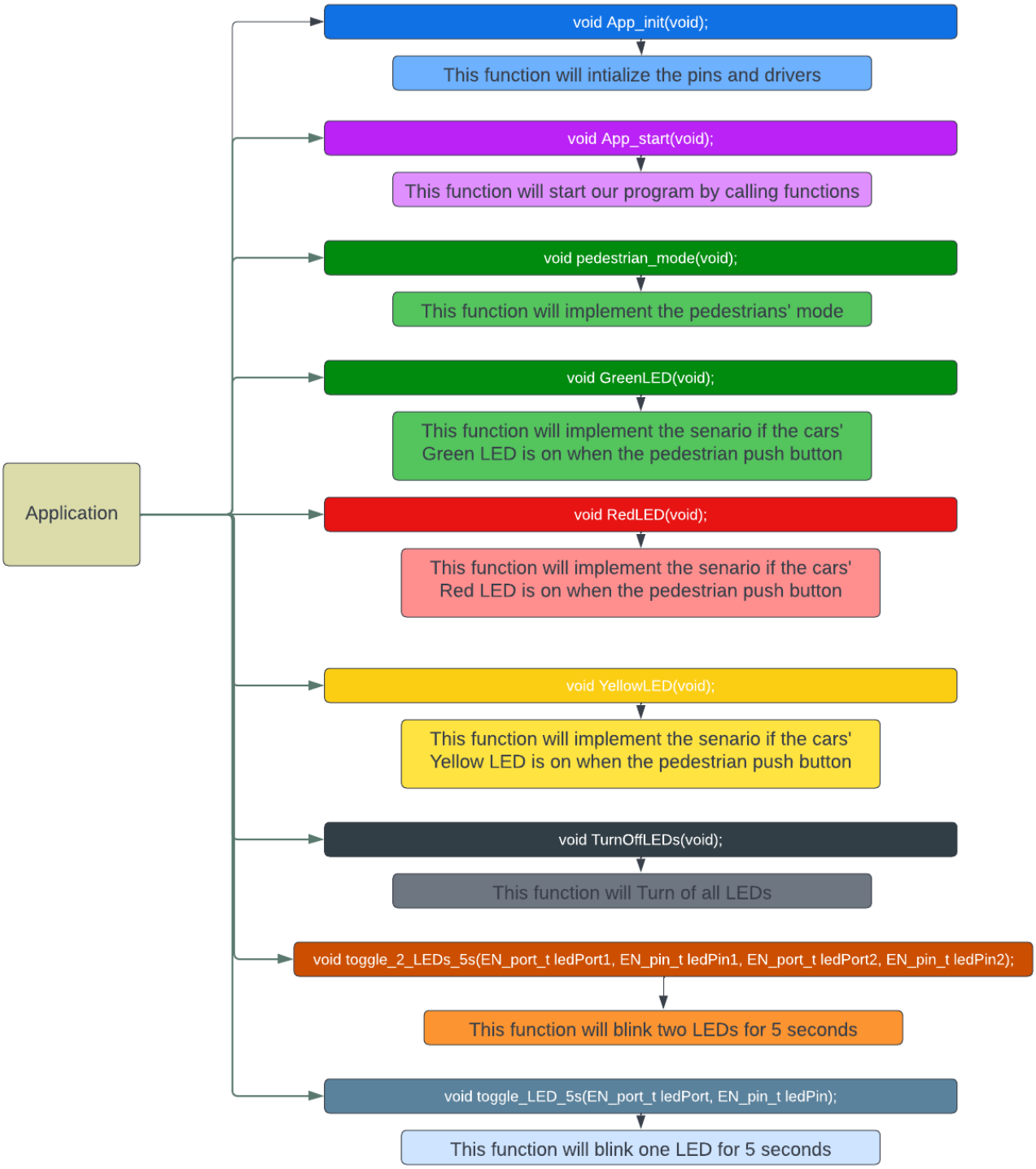
LED Driver



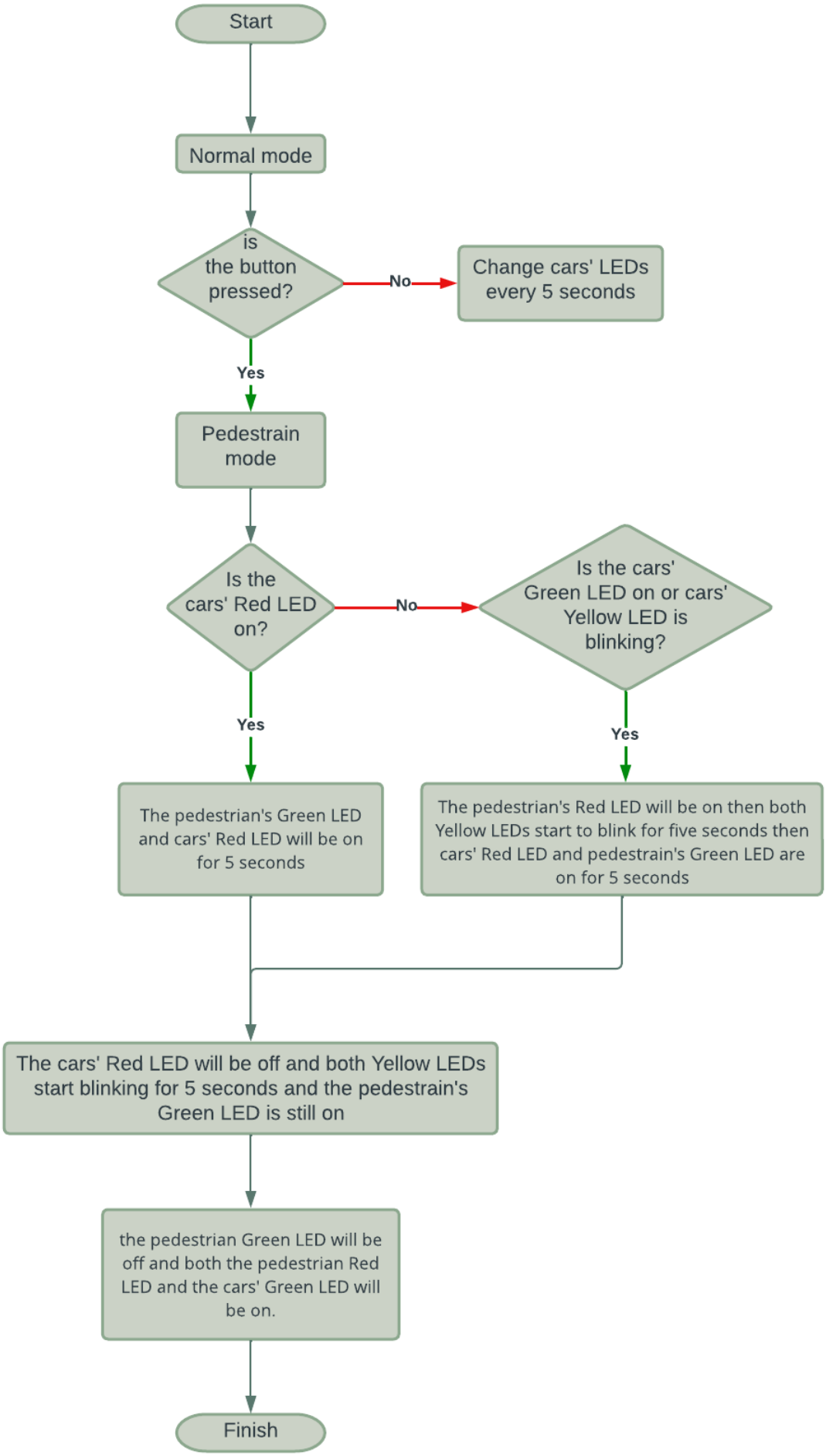
BUTTON Driver



Application Layer
Application Driver



system flow chart



Description

1. Checking the mode(Normal, Pedstrians)
2. Assuming Normal mode
    1. turn off all LEDs, to prevent the errors if it return from the pedestrain's mode
    2. turn on cars' Red LED and the pedestrian's Green LED
        - check if the user push the button during this duration or not, to call the pedestrian's mode
    3. blink cars' Yellow LED and turn on the pedestrians' Red LED
        - check if the user push the button during this duration or not, to call the pedestrian's mode
    4. Trun on cars' Green LED and blink the pedestrians' Yellow LED
3. Assuming Pedestrians' mode
    1. check the color of cars' LED when the pedestrian push the button
    2. implement the mode according to the cars' LED color
    3. continue the pedestrain mode until led cars pass
        1. turn off cars' Red LED
        2. blink cars' Yellow LED and pedestrians' Yellow LED for 5 s
        3. Turn off Pedestrian's Yellow and Green LEDs and cars' Yellow LED
        4. Turn on cars' Red LED and the pedestrian's Green LED, to let cars pass
    - After finishing the pedestrian mode the normal mode will be run