## *System description*

# The project can be distributed over 6 main tasks:

## Development environment preparation

1. Create Layers folders
2. Create driver / modules folders in each layer
3. Create .c and .h file for each module
4. Add header file guards
5. Create the main.c file that will call your application

## Implement the MCAL layer

1. Create folders for each driver: DIO, Interrupts, Timers

### Implement DIO module

2. Fill in DIO.h file with functions' prototypes and typedefs
3. Implement DIO.c functions

### Implement Interrupts module

1. Fill in Interrupts.h file with functions' prototypes and typedefs
2. Implement Interrupt0_init () function

### Implement Timers module

1. Fill in Timers.h file with functions' prototypes and typedefs
2. Implement Timer0_Init() function
3. Implement Timer0_delay() function

## Implement the ECUAL layer

1. Create folders for each driver: LEDs, Buttons

### Implement LEDs module

1. Fill in LEDs.h file with functions' prototypes and typedefs
2. Implement LED_INIT functions
3. Implement LED_ON functions
4. Implement LED_OFF functions
5. Implement LED_TOGGLE functions

### Implement Buttons module

1. Fill in Buttons.h file with functions' prototypes and typedefs
2. Implement BUTTON_INIT functions
3. Implement BUTTON_READ functions

## Implement the application

1. Fill in application.h file with functions' prototypes
2. Implement appStart function

## Testing the application

1. Pedestrians press when cars green light is on user story
2. Pedestrians press when cars yellow light is blinking user story
3. Pedestrians press -> short press user story
4. Pedestrians press -> long press user story
5. Pedestrians press -> double press user story

## *Functionality:*

In normal mode:

1. Cars' LEDs will be changed every five seconds starting from Green then yellow then red then yellow then Green.
2. The Yellow LED will blink for five seconds before moving to Green or Red LEDs.

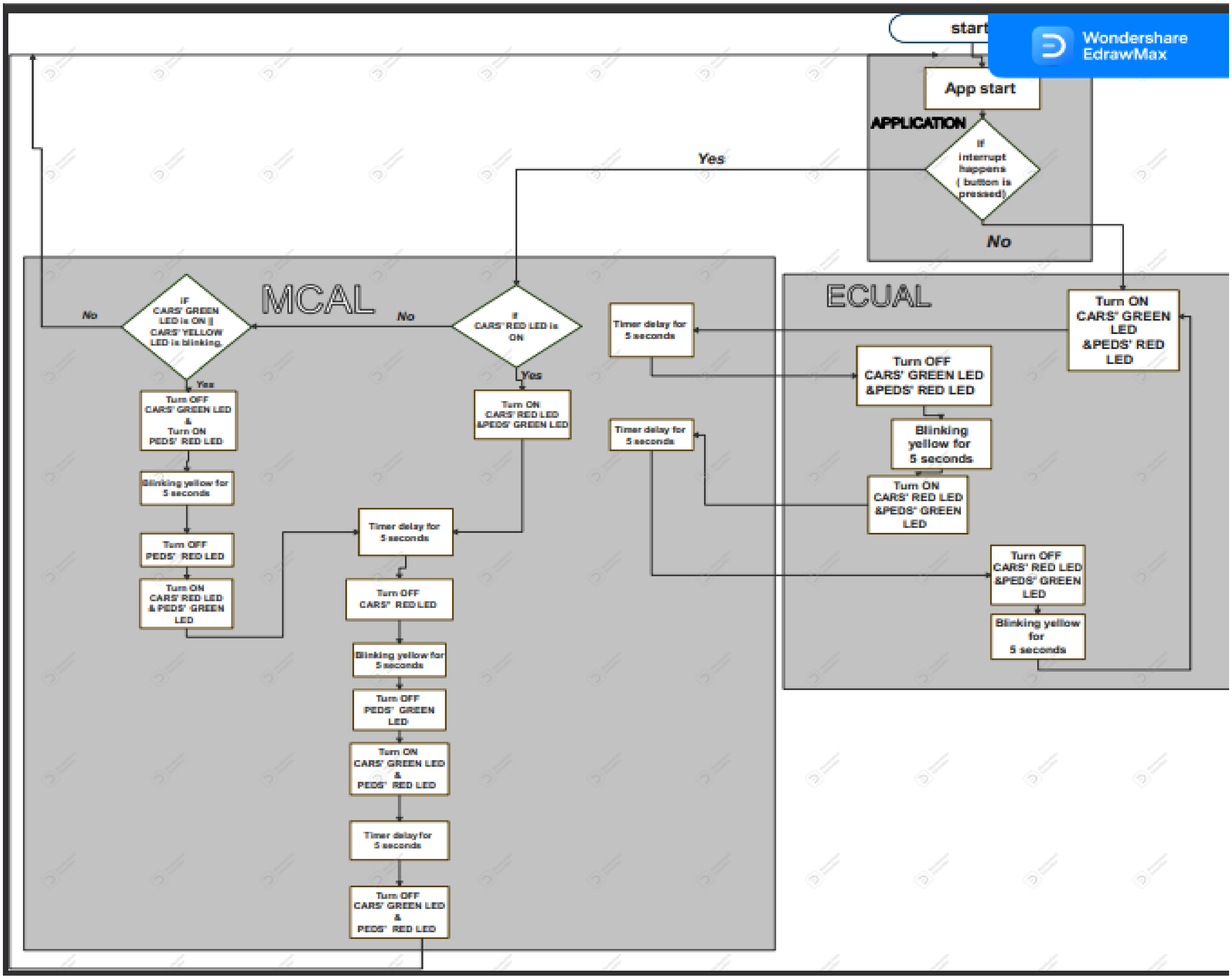
In pedestrian mode:

1. Change from normal mode to pedestrian mode when the pedestrian button is pressed.
2. If pressed when the cars' Red LED is on, the pedestrian's Green LED and the cars' Red LEDs will be on for five seconds, this means that pedestrians can cross the street while the pedestrian's Green LED is on.
3. If pressed when the cars' Green LED is on or the cars' Yellow LED is blinking, the pedestrian Red LED will be on then both Yellow LEDs start to blink for five seconds, then the cars' Red LED and pedestrian Green LEDs are on for five seconds, this means that pedestrian must wait until the Green LED is on.
4. At the end of the two states, 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.
5. After the five seconds the pedestrian Green LED will be off and both the pedestrian Red LED and the cars' Green LED will be on.
6. Traffic lights signals are going to the normal mode again.

## *System Design*

| | |
|---|---|
| ***Layer 1*** | ***MCAL***<br>DIO, INTERRUPTS, Timers |
| ***Layer 2*** | ***ECUAL***<br>Buttons, leds |
| ***Layer 3*** | ***APPLICATION*** |
| ***Layer 4*** | ***MAIN*** |

## *Flowchart*


start
Wondershare EdrawMax
App start
APPLICATION
If interrupt happens ( button is pressed)
Yes
No
MCAL
ECUAL
IF CARS' GREEN LED is ON || CARS' YELLOW LED is blinking.
No
Yes
If CARS' RED LED is ON
No
Yes
Turn OFF CARS' GREEN LED & Turn ON PEDS' RED LED
Blinking yellow for 5 seconds
Turn OFF PEDS' RED LED
Turn ON CARS' RED LED & PEDS' GREEN LED
Turn ON CARS' RED LED &PEDS' GREEN LED
Timer delay for 5 seconds
Turn OFF CARS' RED LED
Blinking yellow for 5 seconds
Turn OFF PEDS' GREEN LED
Turn ON CARS' GREEN LED & PEDS' RED LED
Timer delay for 5 seconds
Turn OFF CARS' GREEN LED & PEDS' RED LED
Timer delay for 5 seconds
Timer delay for 5 seconds
Turn ON CARS' GREEN LED &PEDS' RED LED
Turn OFF CARS' GREEN LED &PEDS' RED LED
Blinking yellow for 5 seconds
Turn ON CARS' RED LED &PEDS' GREEN LED
Turn OFF CARS' RED LED &PEDS' GREEN LED
Blinking yellow for 5 seconds

## *System constraints*

Timing constraints: each mode remains only 5 seconds

Pedestrians have the priority over the cars