

# **ON-DEMAND TRAFFIC LIGHT CONTROL**

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# System Description

On-Demand Traffic Light system organize the Movement of Cars and Pedestrians on street crossing using two traffic lights, one for Cars and One for Pedestrians to direct them while crossing the street.

- Car's traffic light contains three LEDs.  
Green LED (Move).  
Yellow LED (Wait).  
Red LED (Don't Move).
- Pedestrian's traffic light contains three LEDs and one push button.  
Red LED (Don't Walk).  
Yellow LED (Wait).  
Green LED (Walk).  
Push button: Used to enter Pedestrian's mode when needed.

Both of traffic lights work together but in reverse.

Pedestrian's mode gives priority to pedestrians at the following cases:

- Case 1: When Car's Green LED is ON.  
Toggle Yellow LEDs in both traffic lights for 5 seconds then turn ON Car's Red LED and Pedestrian's Green LED.
- Case 2: When Car's Red LED is ON.  
Reset the timer so the Car's Red LED and Pedestrian's Green LED will be on for another 5 seconds.
- Case 3: When Car's Yellow LED is toggling before the Car's Green LED.  
Toggle Yellow LEDs in both traffic lights for 5 seconds then turn ON Car's Red LED and Pedestrian's Green LED.

# System Design

The system is divided to 4 Layers.

- Application: main project.
- ECUAL: Electronic components used in the project.
- MCAL: Internal peripherals of the microcontroller.
- Microcontroller: Hardware.

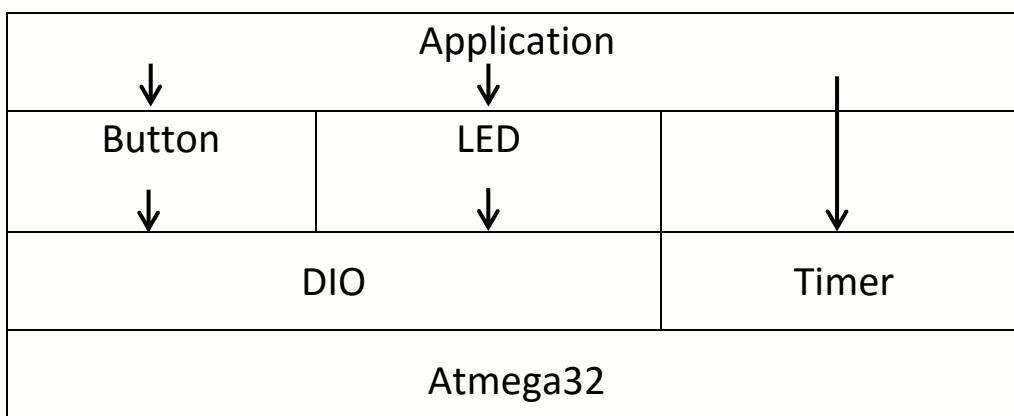
Application
ECUAL
MCAL
Microcontroller

MCAL Layer contains 2 Drivers.

- DIO Driver
- Timer Driver

ECUAL Layer contains 2 Drivers.

- Button Driver
- LED Driver



## DIO APIs

```
EN_DIOError_t DIO_init(uint8_t pinNumber, uint8_t portNumber,  
uint8_t pinDirection);  
  
EN_DIOError_t DIO_Write(uint8_t pinNumber, uint8_t portNumber,  
uint8_t pinValue);  
  
EN_DIOError_t DIO_read(uint8_t pinNumber, uint8_t portNumber,  
uint8_t *pinValue);  
  
EN_DIOError_t DIO_toggle(uint8_t pinNumber, uint8_t  
portNumber);
```

## Timers APIs

```
EN_Timer0_Error_t Timer0_init(uint8_t timer_Mode, uint32_t  
timer_init_value);  
  
EN_Timer0_Error_t Timer0_start(uint8_t timer_Prescaler);  
void Timer0_stop(void);
```

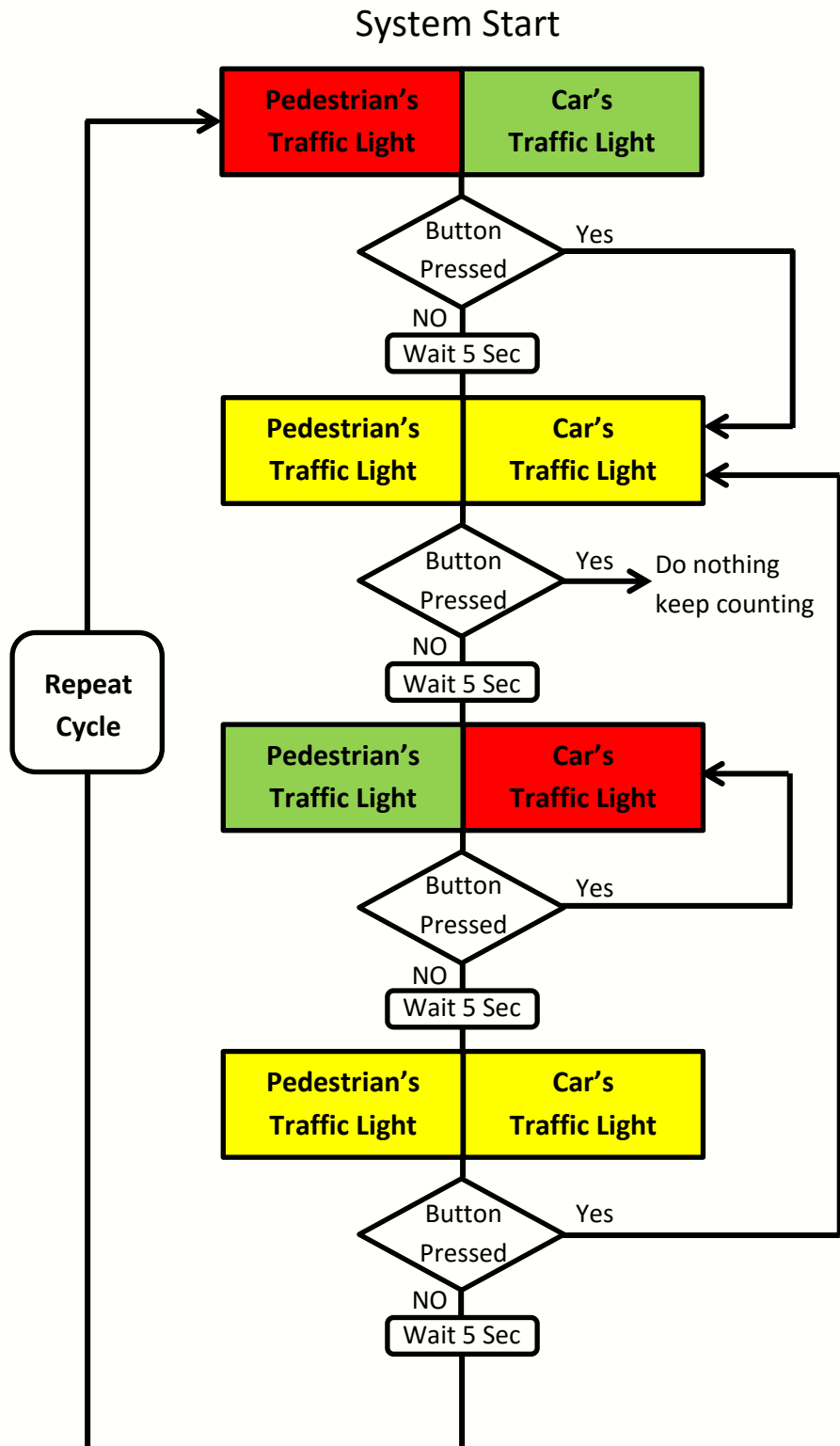
## Button APIs

```
void BUTTON_init(uint8_t ButtonpinNumber, uint8_t  
buttonportNumber);  
  
void BUTTON_read(uint8_t ButtonpinNumber, uint8_t  
buttonportNumber, uint8_t *pinValue);
```

## LED APIs

```
void LED_init(uint8_t ledpinNumber, uint8_t ledportNumber);  
void LED_ON(uint8_t ledpinNumber, uint8_t ledportNumber);  
void LED_OFF(uint8_t ledpinNumber, uint8_t ledportNumber);  
void LED_toggle(uint8_t ledpinNumber, uint8_t ledportNumber);
```

# System Flow Chart



## System Constrains

1. Long Press on Pedestrians push button does nothing until the button is released.
2. Double Press on Pedestrians push button does nothing only the first press will do the action.