**Software Design**

1. **System Description**

In this project we need to make a traffic light control for both cars and pedestrians to be able to manage the road flow for both.

To deliver this project, we should have:

* Atmega32 MCU
* One Push Button
* 6 LEDs (2 Red – 2 Green – 2 Yellow)

The project goes as follows 🡪 we have two traffic lights, one for cars and another for pedestrians.

* When the cars’ traffic lights became red, it means that they should stop.
* When the cars’ traffic lights became yellow, it means that they will wait for a few seconds and then move.
* When the cars’ traffic lights became green, it means that they will move immediately.

And for the pedestrians:-

* When the pedestrians’ traffic lights became red, it means that the pedestrians should stop.
* When the pedestrians’ traffic lights became yellow, it means that the pedestrians will wait for a few seconds and then move.
* When the pedestrians’ traffic lights became green, it means that the pedestrians will move immediately.

In addition, if the pedestrian is on hurry, he/she will press a push button to be able to stop the car and cross the road.

1. **System Design**

In this section, we will make a full static architecture for the system.

* System Layers

They will be divided into 4 layers:

* Application 🡪 Contains the main file.
* ECUAL 🡪 Contains the electronics we need in the project.
* MCAL 🡪 Contains the internal peripherals of the MCU.
* Microcontroller 🡪 Contains the hardware (MCU).

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| --- |
| **Application** |
| **ECUAL** |
| **MCAL** |
| **Microcontroller** |

* System Drivers

Every module we use in the MCAL layer will have a driver which splits to file.c and file.h .

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| **Application** |
| **LED – Button** |
| **DIO – Timer** |
| **Microcontroller** |

* Text

  Description automatically generated with medium confidenceDIO APIs
* Text

  Description automatically generatedLED APIs
* Button APIs

Text

Description automatically generated

* Text

  Description automatically generated with medium confidenceTimer APIs

1. **System State Machine**

C 🡪 Car || P 🡪 Pedestrian || Don’t care means if button pressed or not

Don’t Care

Don’t Care

Pressed

Pressed

Pressed

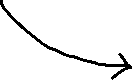
Don’t Care

Pressed

Pressed



Don’t Care



**Simple Flowchart**

**Diagram

Description automatically generated**

1. **System Constrains**

* Long or double button press has no effect for the system.
* Delays are prohibited to be used and we should use timer instead.