

Project Documentation

On-DEMAND TRAFFIC LIGHT CONTROL

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Nano-degree

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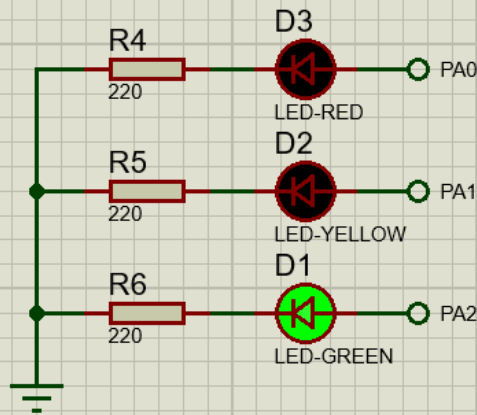
System description

- The system will help to regulate traffic on a road, using lighting and some sensors (we will represent them with a button) that are used to know if there is a pedestrian on the side of the road who wants to pass, so we make a certain decision according to the movement of the cars.

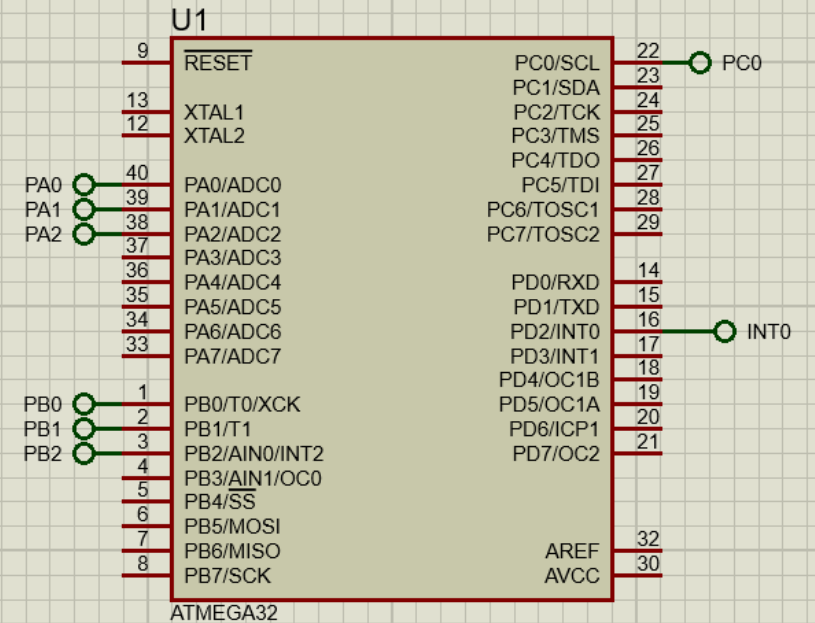
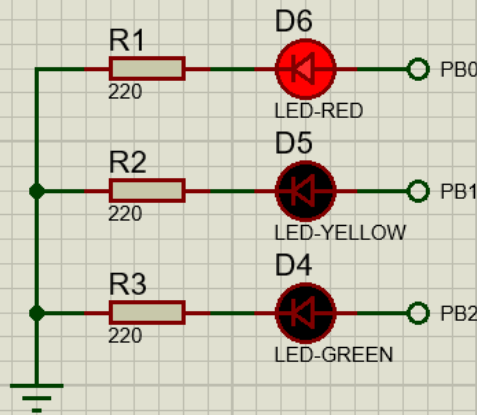
System Design

- **Hardware design :**
 - AVR Atmega32
 - 2 Green LEDs
 - 2 Yellow LEDs
 - 2 Red LEDs
 - 6 (220) Ohm resistors
 - 1 10k Ohm resistor
 - 1 Push Button

Car LEDS



Pedestrian LEDS



System Design

- **Software design :**

Designed using the Static Architecture to describe the sys. component and interfaces, following :

1-Modular Programming to separate the project into small units called drivers

2-Layered Architecture to represent the system as layers, each layer describes a part of the sys.

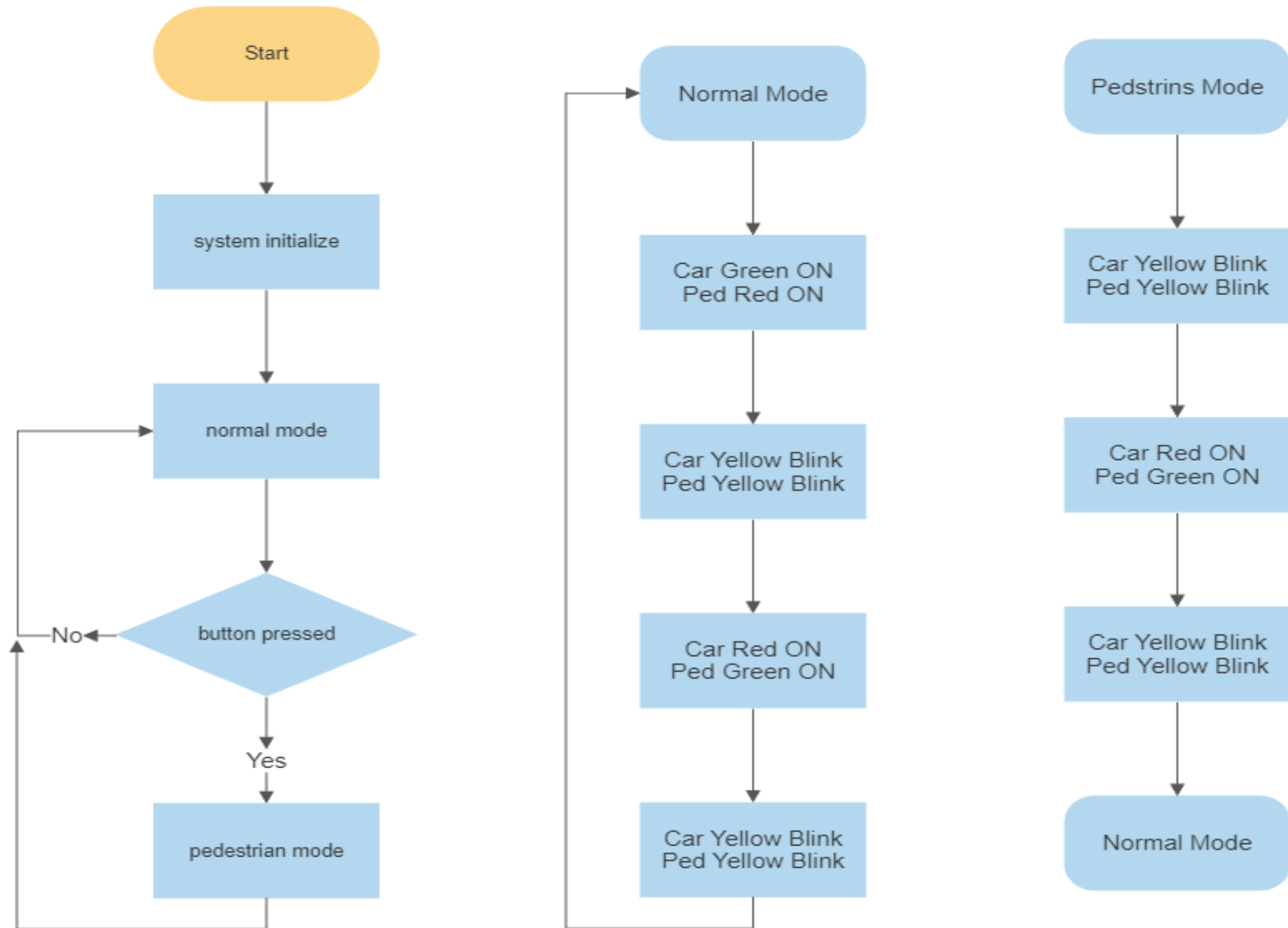
3-SOLID principle to describe how will be every layer and driver and how and when everyone can contact each other.

System Design

System Layers :

- Microcontroller Abstraction Layer (MCAL) :
contains on-chip MCU peripherals, and their modules :
1. DIO driver **2.** External Interrupt driver **3.** Timer driver
- Hardware Abstraction Layer (HAL) :
It allows the program to communicate with the electrical component, its modules :
1. LEDs driver **2.** Button Driver
- C-Application Layer :
It contains a sequence to achieve our project functionality.

System Flowchart



System Constraints

1-Long press :

The long press and the short press on the pedestrian's button should have the same effect.

2-Double press:

If a double press or more than one press on the button, only the first press will be enough to make the effect.

3-If pressed while the pedestrian mode

If any pedestrian pressed the button while the pedestrian mode, it should have no effect.