On Demand Traffic Light Control

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Abstract

Traffic lights are signaling devices positioned at road intersections, pedestrian crossings, and other locations to control the flow of traffic.

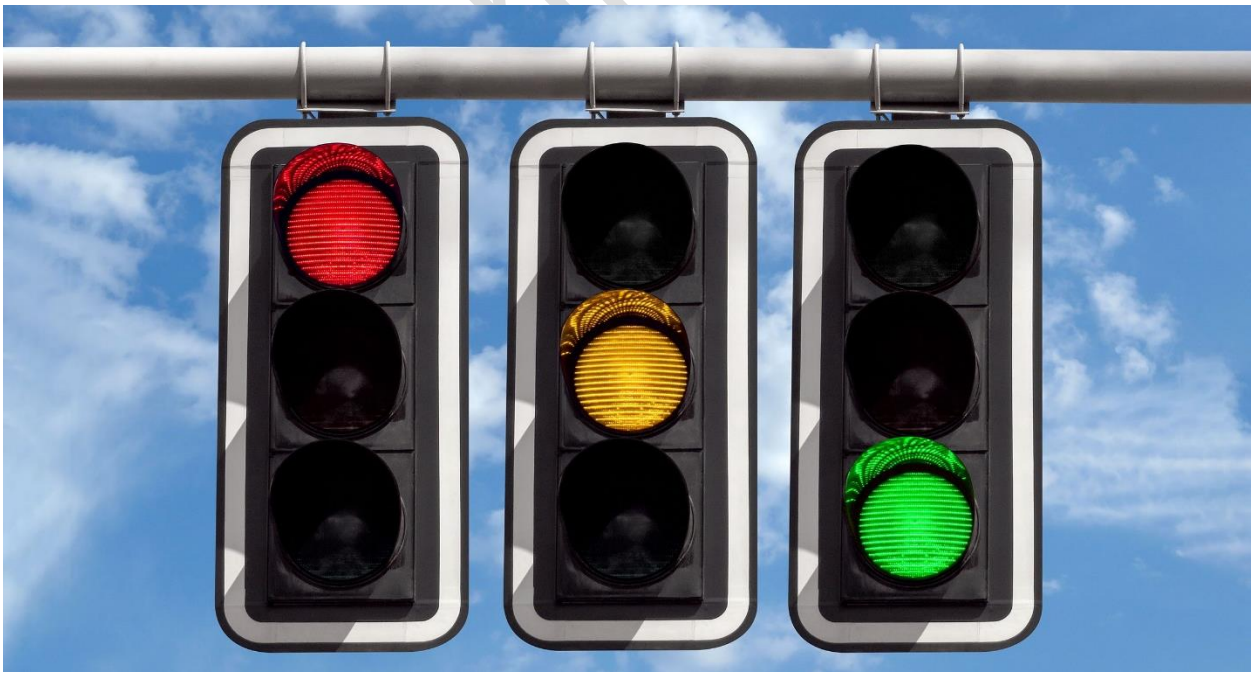
Traffic lights normally consist of three signals, transmitting meaning to drivers and riders through colors and symbols including arrows and bicycles.

The regular traffic light colors are red, yellow, and green arranged vertically or horizontally in that order.

Although this is internationally standardized, variations exist on national and local scales as to traffic light sequences and laws.

In this project we are required to implement a traffic lights system with an on-demand crosswalk button.

Crosswalk buttons let the signal operations know that someone is planning to cross the street, so the light adjusts, giving the pedestrian enough time to get across.



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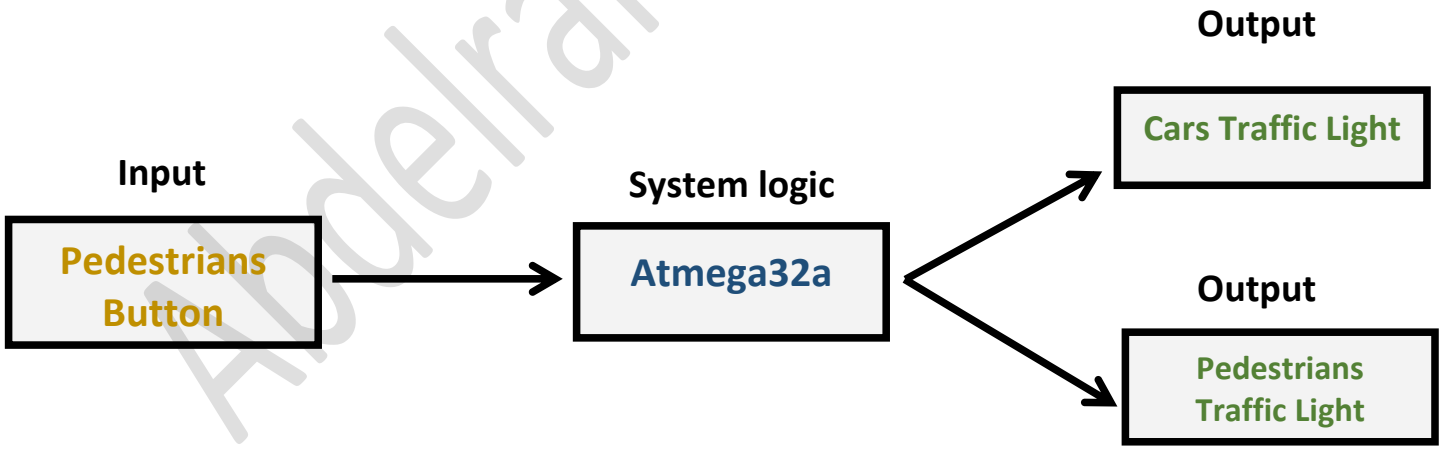
1. System Description

Our embedded system depends mainly on the Atmega32a microcontroller to do the system logic.
With input devices: Pedestrians push button
And output devices: 3 LEDs for each traffic light
We are required to perform the normal operation of a traffic light, which transmitting signals to cars and pedestrians to organize the traffic motion.
The addition here is we add a button for pedestrians to push whenever they want to cross the road. It should make the cars stop, let the pedestrians pass, then back to normal.
The following is a simple illustration of the system components.



2. system design

System Layers:

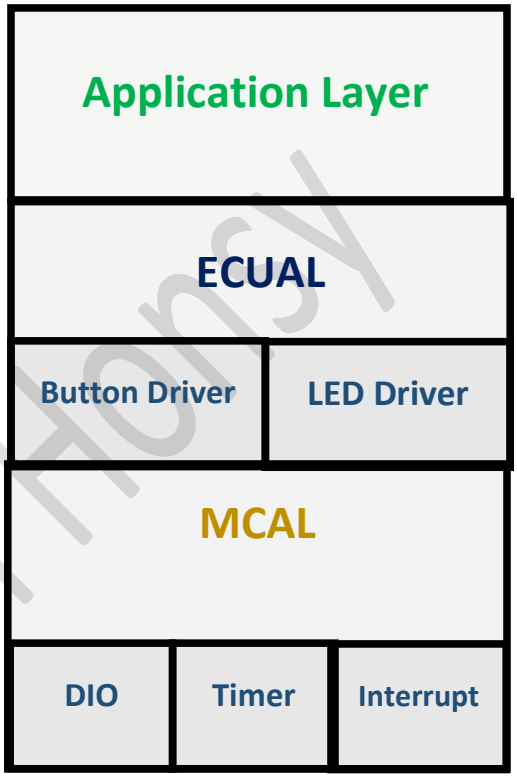
MCAL:

- DIO Driver
- Timer Driver
- Interrupt Driver

ECUAL:

- LED Driver
- Button Driver

Application Layer



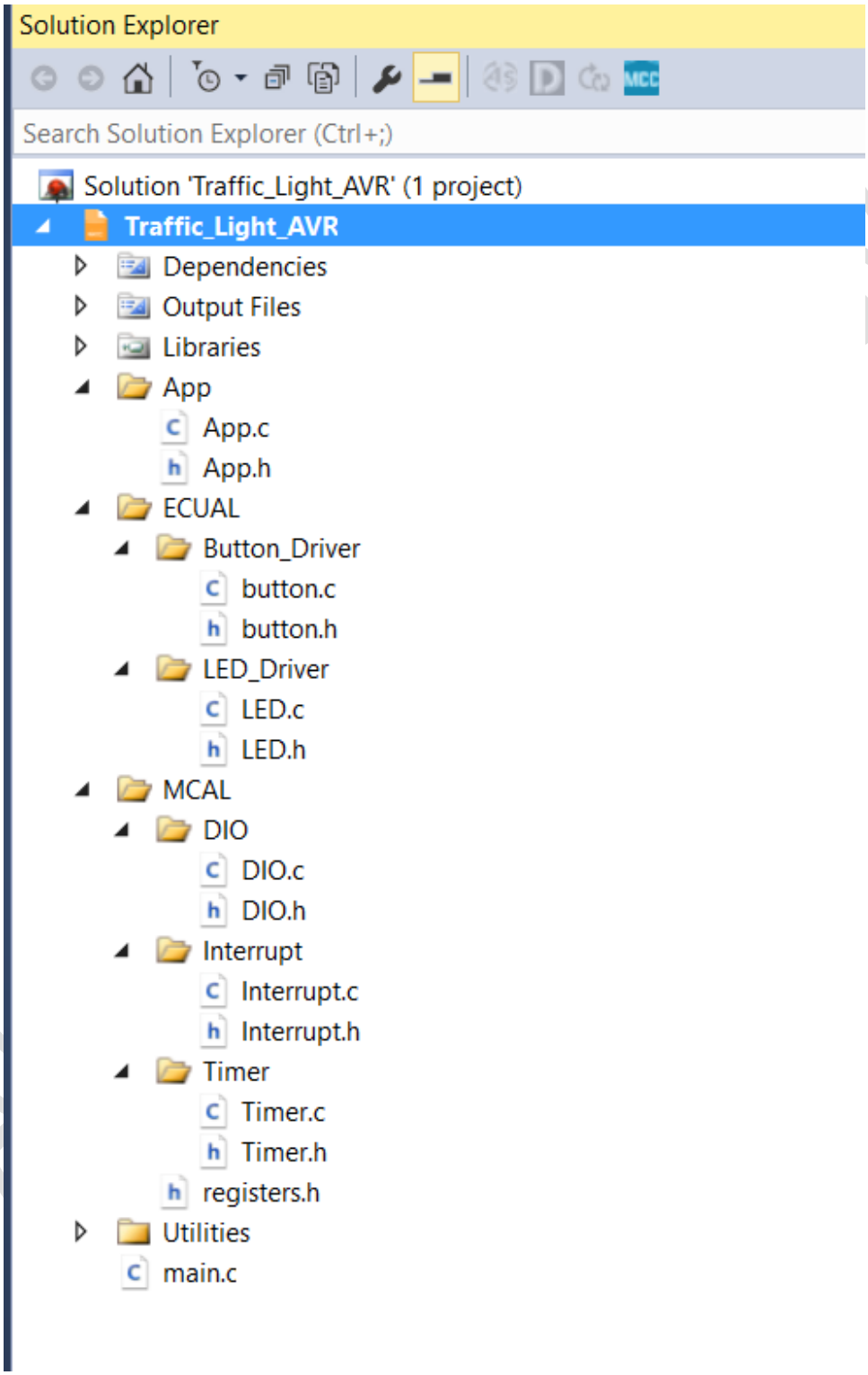
System modules :

- Cars Traffic Light
- Pedestrians Traffic Light
- Pedestrians button

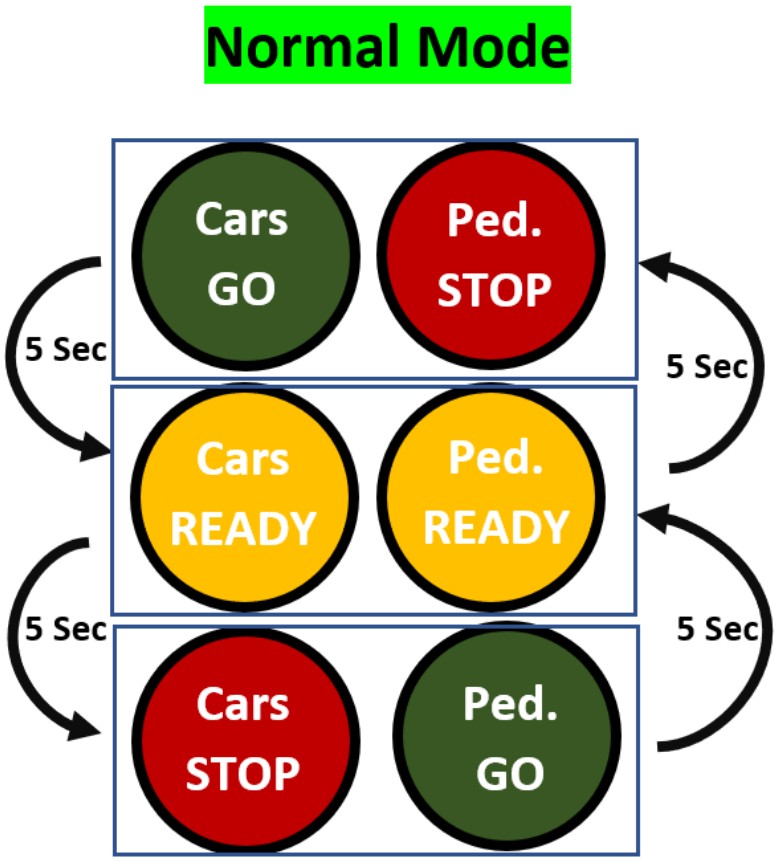
Hardware components:

- Atmega32a as our main microcontroller
- 3 LEDs (Green – Yellow – Red) for cars traffic light
- 3 LEDs (Green – Yellow – Red) for pedestrians traffic light
- 1 Push button for pedestrians

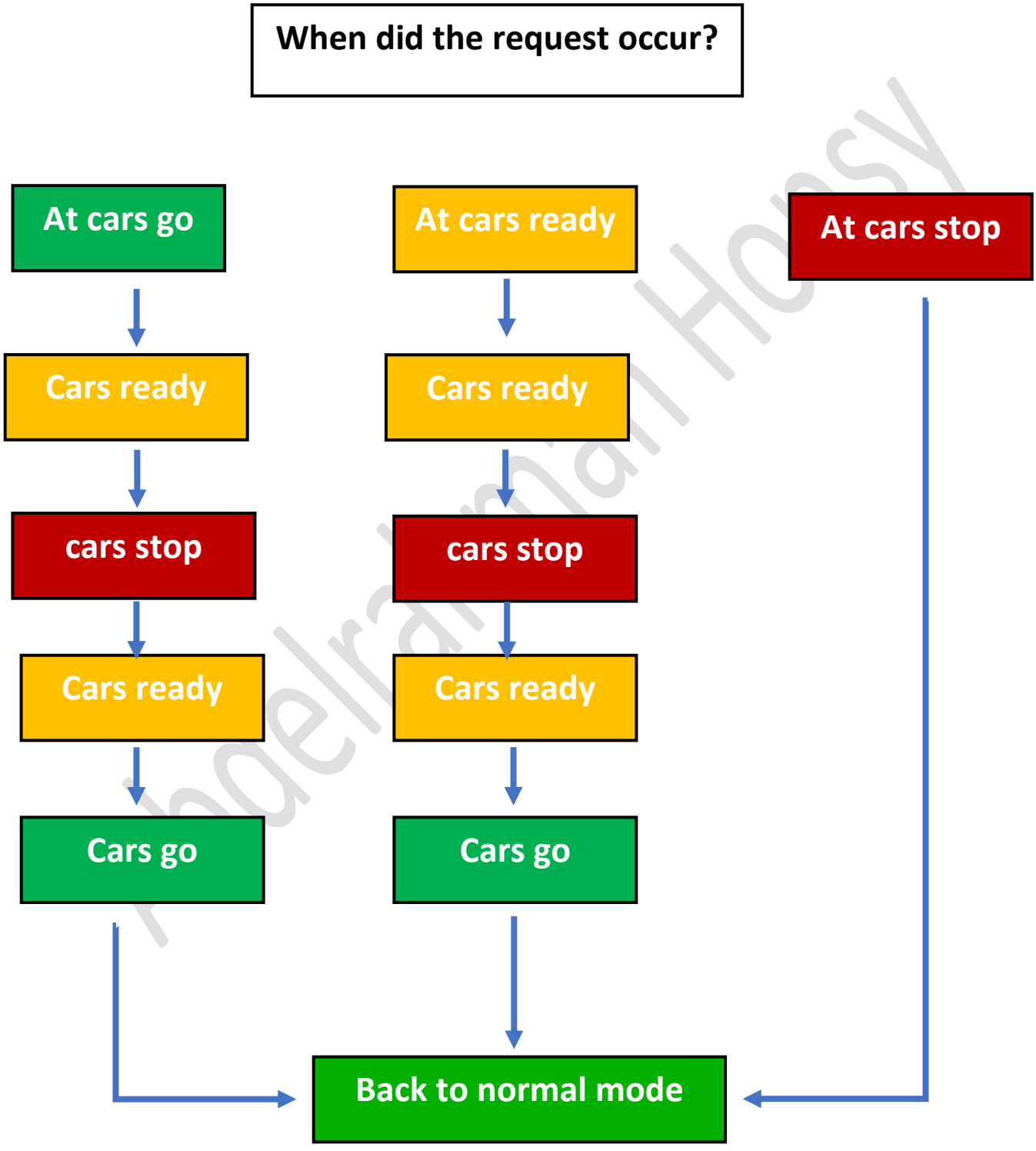
Folder Structure:



3. system flow chart



Pedestrian Mode



4- System Constrains

- **Short Press**

  A short press is handles as a trigger to the interrupt. A short press on the push button gets the system to the pedestrian mode so the pedestrian can cross.

- **Long Press**

  A long press does not give any response to the pedestrians, the system stays in the normal mode

- **Double press**

  A double press is handled as a one single press, the second press is neglected. Only the first short press triggers the interrupt and gets the system in the pedestrian mode

5- Development Tools

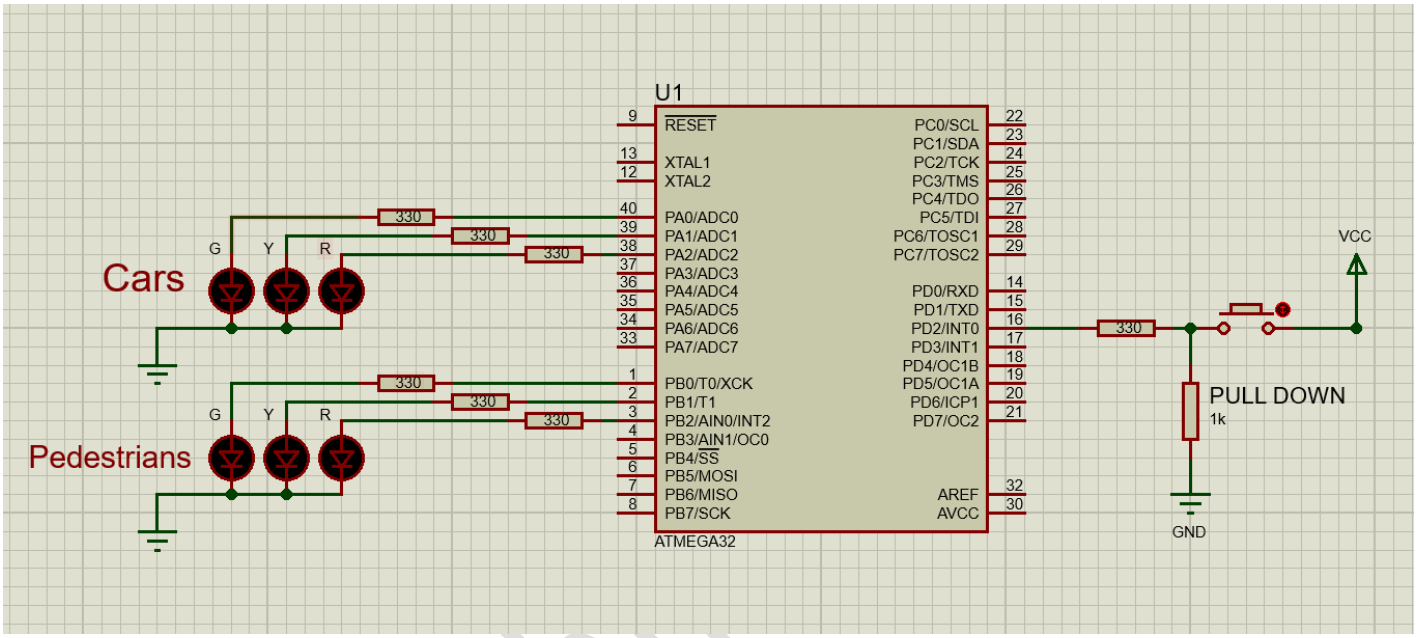
- **Microchip Studio** 

  Integrated Development Environment

- **Proteus 8 Professional** 

  For Simulation

6- System Simulation



Using Portus 8 professional