

# On Demand Traffic Light

## system description

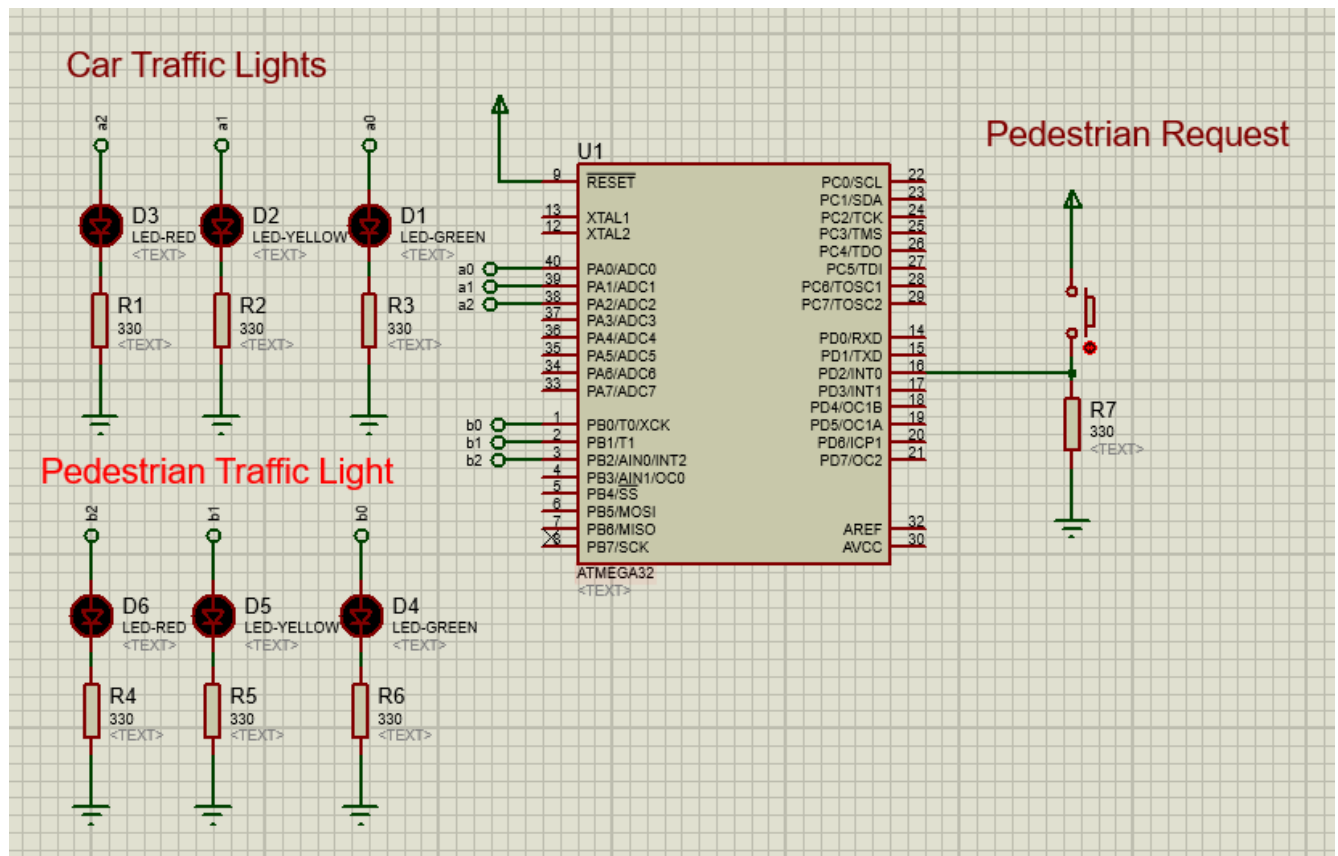
on Demand traffic light system is consisted of two modes

- 1- Normal mode: where cars are moving depend on traffic light LEDs sequence  
Cars' LEDs will be changed every five seconds starting from Green then yellow then red then yellow then Green.  
The Yellow LED will blink for five seconds before moving to Green or Red LEDs.
- 2- Pedestrian mode: where cars are moving depend on pedestrian traffic light LEDs sequence  
Change from normal mode to pedestrian mode when the pedestrian button is pressed.  
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.  
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.  
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.  
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.  
Traffic lights signals are going to the normal mode again.

# System design

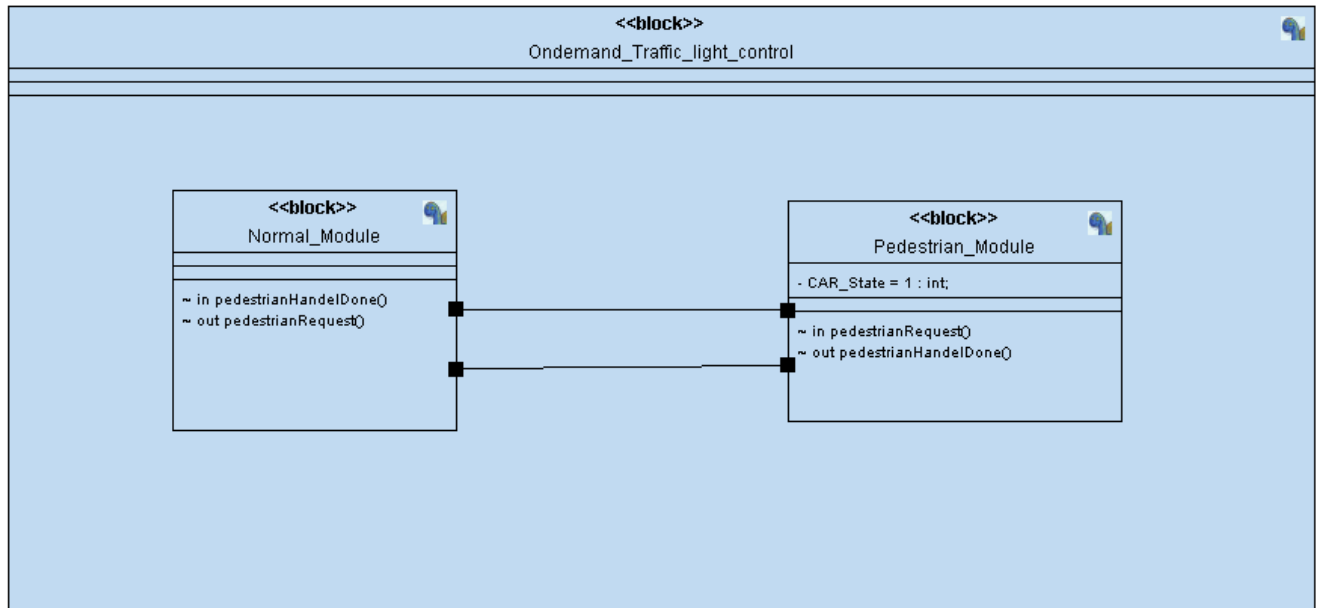
## Hardware:

- 1- ATmega32 microcontroller
- 2- One push button connected to INT0 pin for pedestrian
- 3- Three LEDs for cars - Green, Yellow, and Red, connected on port A, pins 0, 1, and 2
- 4- Three LEDs for pedestrians - Green, Yellow, and Red, connected on port B, pins 0, 1, and 2



Software:

Software design is based on state machines. system is consisted of 2 modules Normal mode module and Pedestrian mode module. The movement of between two modules is done by *pedestrianRequest()* and *pedestrianHandelDone()*



Normal Mode Module States

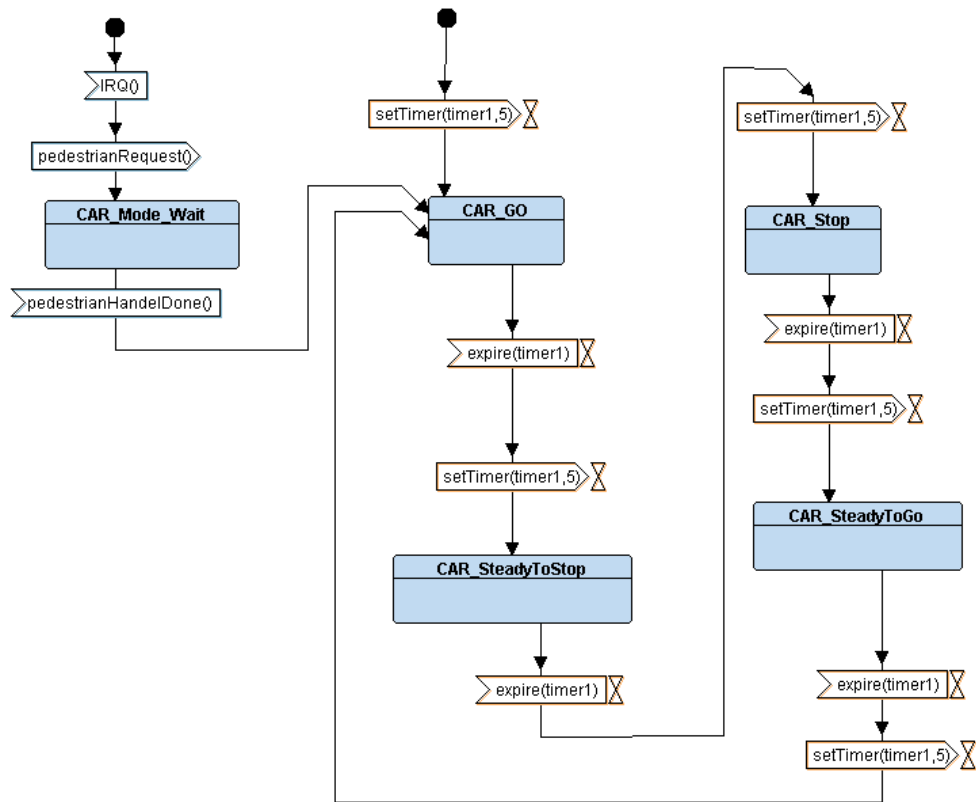
CAR\_Go,  
CAR\_SteadyToStop,  
CAR\_Stop,  
CAR\_SteadyToGo,  
CAR\_Wait,

Pedestrian Mode Module States

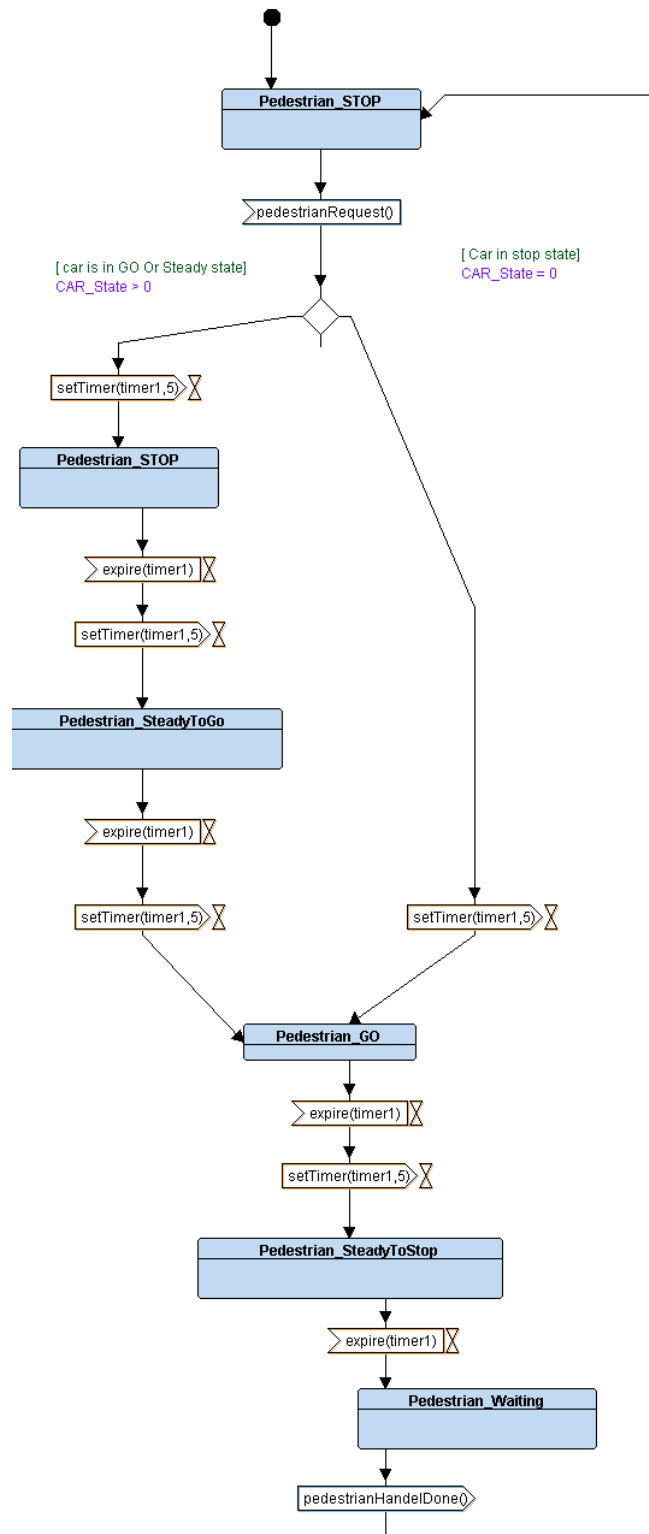
PEDESTRIAN\_Go,  
PEDESTRIAN\_SteadyToStop,  
PEDESTRIAN\_Stop,  
PEDESTRIAN\_SteadyToGo,  
PEDESTRIAN\_Waiting,

# System state machine

## Normal Mode Module State machines



## Pedestrian Mode Module State machine



## System Constrains

- Pedestrian request is sensitive only for single press (double or long press is neglected)
- Pressing button while servicing pedestrian mode has no effect.
- Pedestrian mode is higher priority than normal mode so car may stay at stop state for long time
- Normal mode always interrupted and may work only on CAR\_GO state for 5 secs if many pedestrian requests is occurred