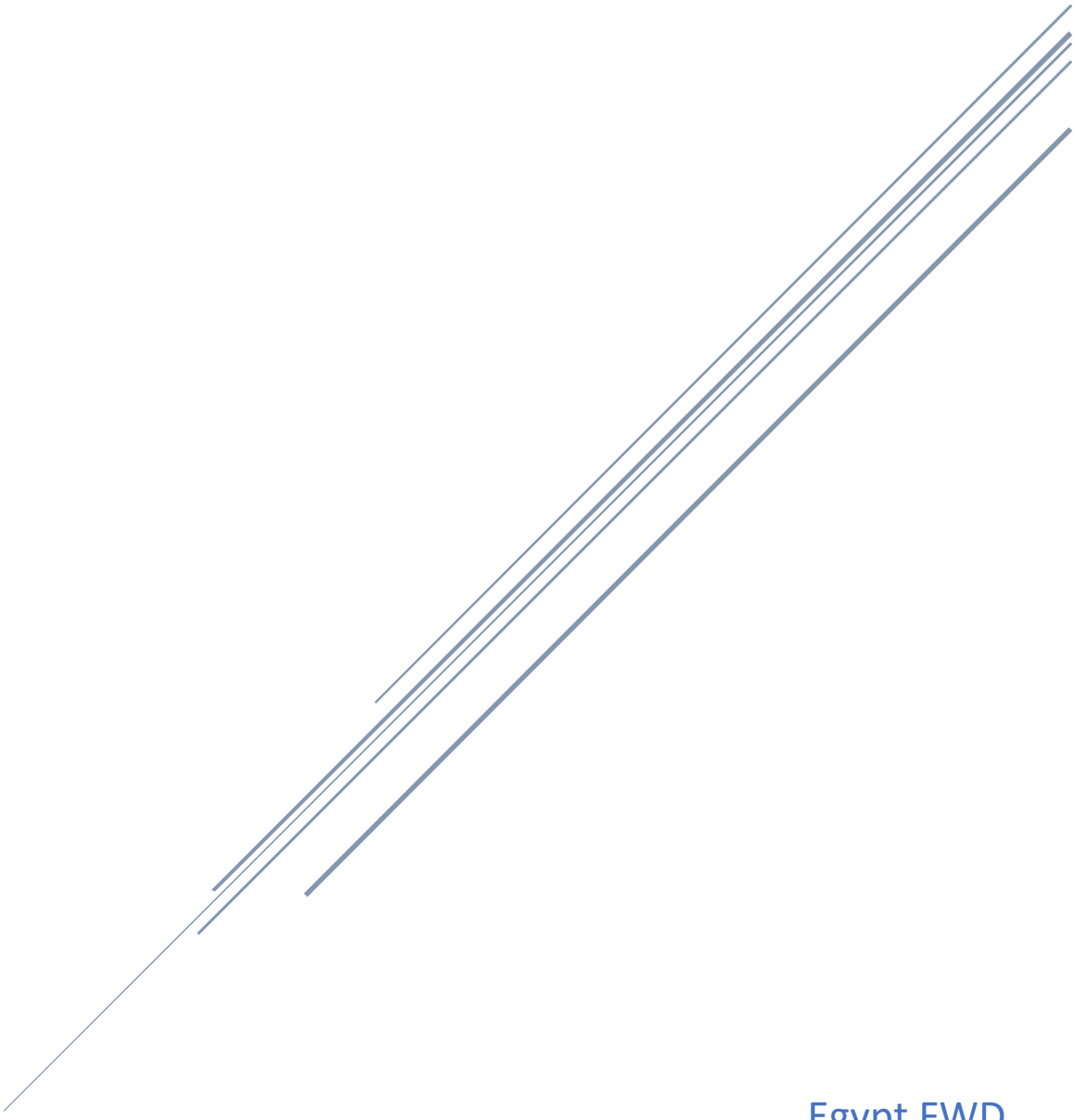
AVR PROJECT

On-demand Traffic light control



Egypt FWD

Embedded Systems Professional Track

On-demand Traffic light control

1. System description:

This system consists of a traffic light for cars and another for pedestrians. The traffic light is in its default mode. It works on cars, and when someone wants to cross, he presses a button that makes this button start to turn on the traffic light of pedestrians.

In pedestrian mode:

1. Change from normal mode to pedestrian mode when the pedestrian button is pressed.
2. 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.
3. 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.
4. 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.
5. 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.
6. Traffic lights signals are going to the normal mode again.

2. System design:

2.1 System Requirements

The system consists of:

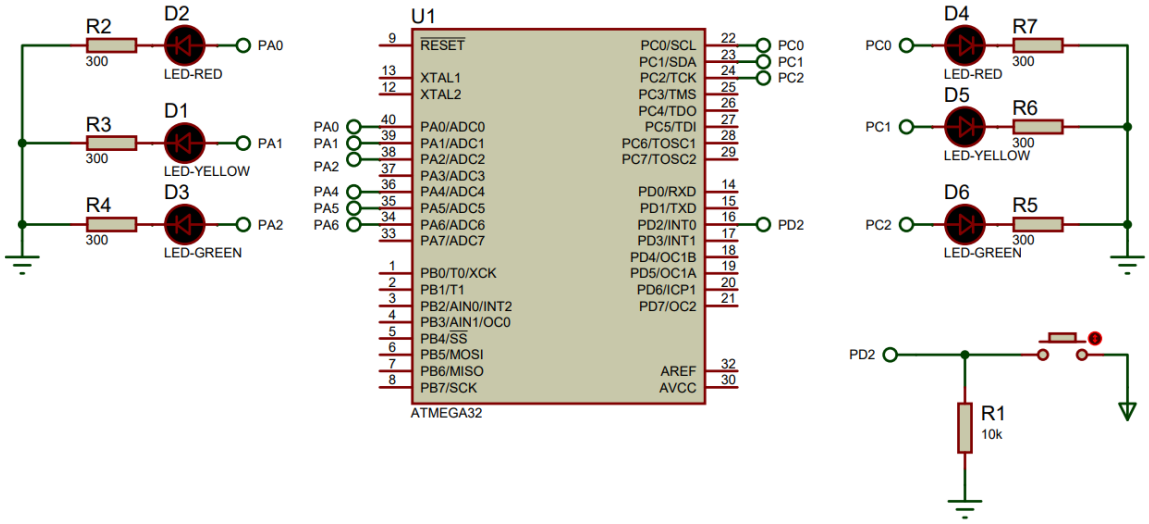
- AVR Atmega32 (1MHz)
- 2 Green LEDs
- 2 Yellow LEDs
- 2 Red LEDs
- 6 300 Ohm resistors
- 1 10k Ohm resistor
- 1 Push Button

2.2 Operating Environment

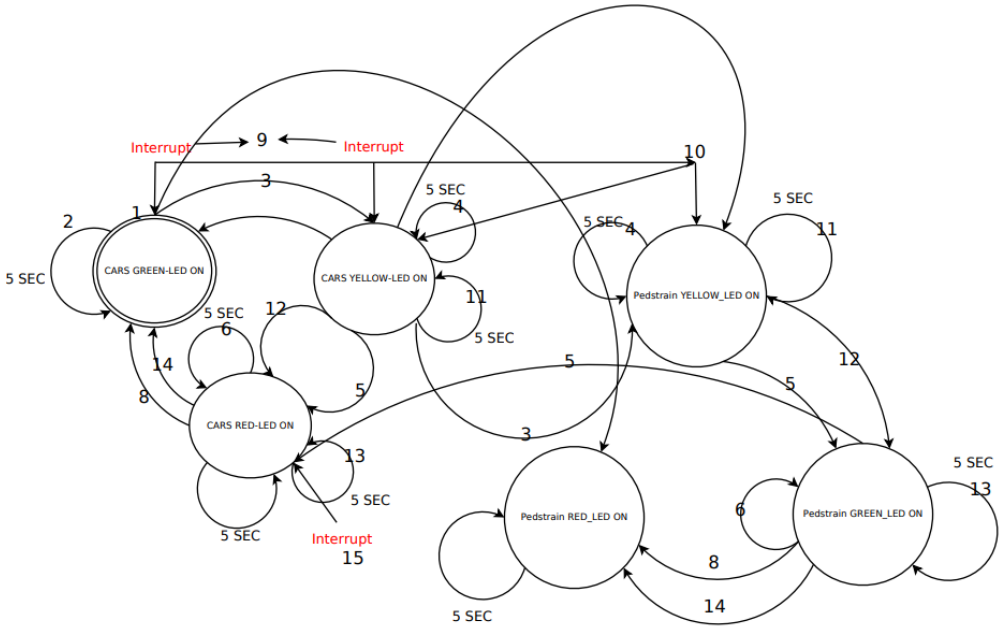
The program has been tested on Proteus simulator provided by LaCenter. It should be used in traffic light control systems on streets with a pedestrian push button included to allow for full system functionality.

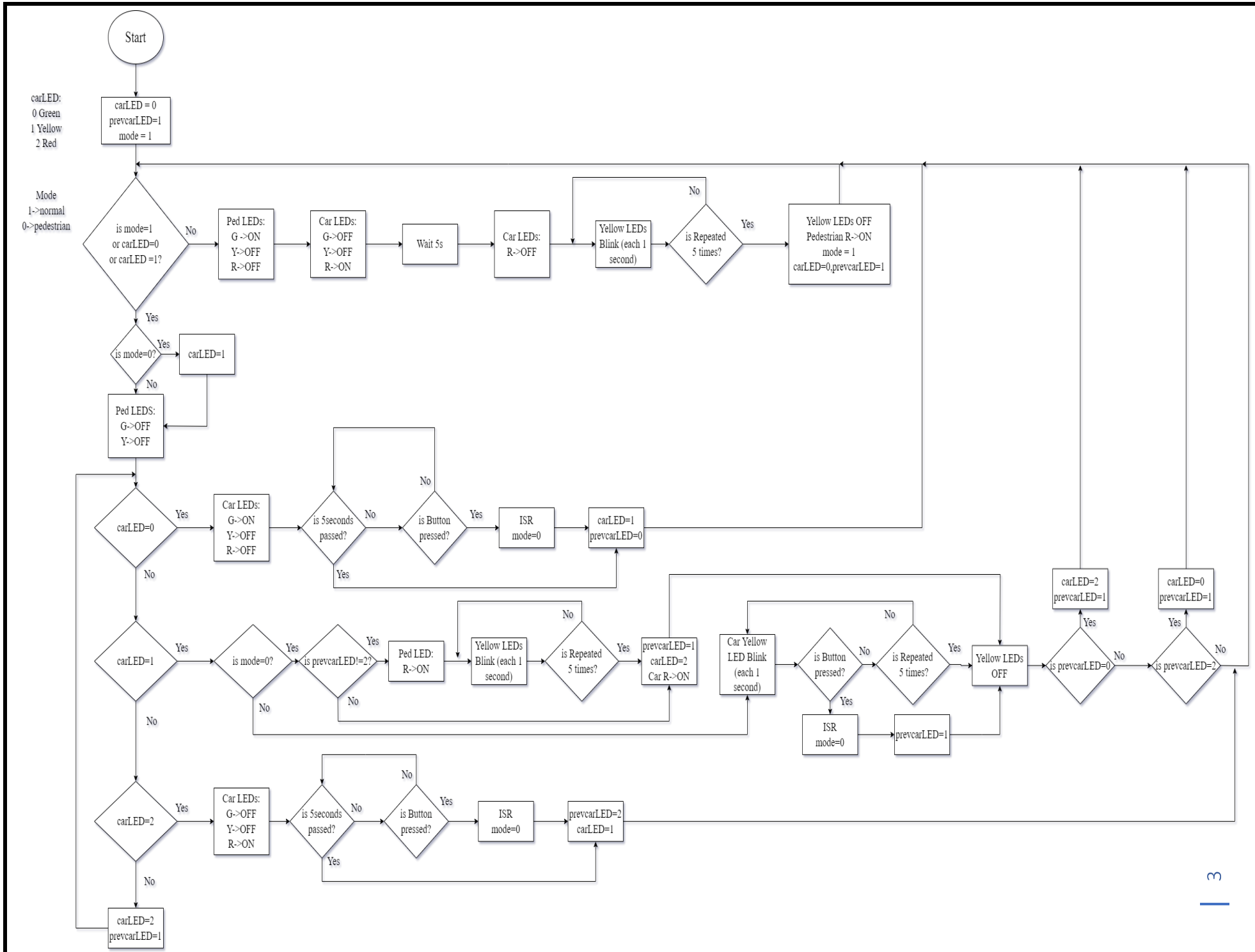
2.3 Input & Output Formats

The only system input is in the form of the pedestrian push button. When it comes to output it handles 6 LEDs at once given the current state, time and push button press state



3. System state machine:




Start
carLED:
0 Green
1 Yellow
2 Red
carLED = 0
prevcarLED=1
mode = 1
Mode
1->normal
0->pedestrian
is mode=1
or carLED=0
or carLED =1?
No
Ped LEDs:
G ->ON
Y->OFF
R->OFF
Car LEDs:
G->OFF
Y->OFF
R->ON
Wait 5s
Car LEDs:
R->OFF
Yellow LEDs
Blink (each 1
second)
is Repeated
5 times?
No
Yes
Yellow LEDs OFF
Pedestrian R->ON
mode = 1
carLED=0,prevcarLED=1
Yes
is mode=0?
Yes
carLED=1
No
Ped LEDS:
G->OFF
Y->OFF
carLED=0
Yes
Car LEDs:
G->ON
Y->OFF
R->OFF
is 5seconds
passed?
No
Yes
is Button
pressed?
No
Yes
ISR
mode=0
carLED=1
prevcarLED=0
No
carLED=1
Yes
is mode=0?
Yes
is prevcarLED!=2?
Yes
No
No
Ped LED:
R->ON
Yellow LEDs
Blink (each 1
second)
No
is Repeated
5 times?
Yes
prevcarLED=1
carLED=2
Car R->ON
Car Yellow
LED Blink
(each 1
second)
is Button
pressed?
No
Yes
ISR
mode=0
No
is Repeated
5 times?
Yes
prevcarLED=1
Yellow LEDs
OFF
carLED=2
prevcarLED=1
Yes
is prevcarLED=0
No
carLED=0
prevcarLED=1
Yes
is prevcarLED=2
No
No
carLED=2
Yes
Car LEDs:
G->OFF
Y->OFF
R->ON
is 5seconds
passed?
No
Yes
is Button
pressed?
No
Yes
ISR
mode=0
prevcarLED=2
carLED=1
No
carLED=2
prevcarLED=1

Video:

1. Folder structure.
2. Testing the driver of the Timer 0.
3. Testing the driver of the DIO.
4. Testing the drive of the EXTI.
5. User story 1.
6. User story 2.
7. User story 3.
8. User story 4.
9. User story 5.

Thanks