Embedded Systems Professional Track

EgFWD - Udacity

On-demand Traffic Light control

Project Documentation

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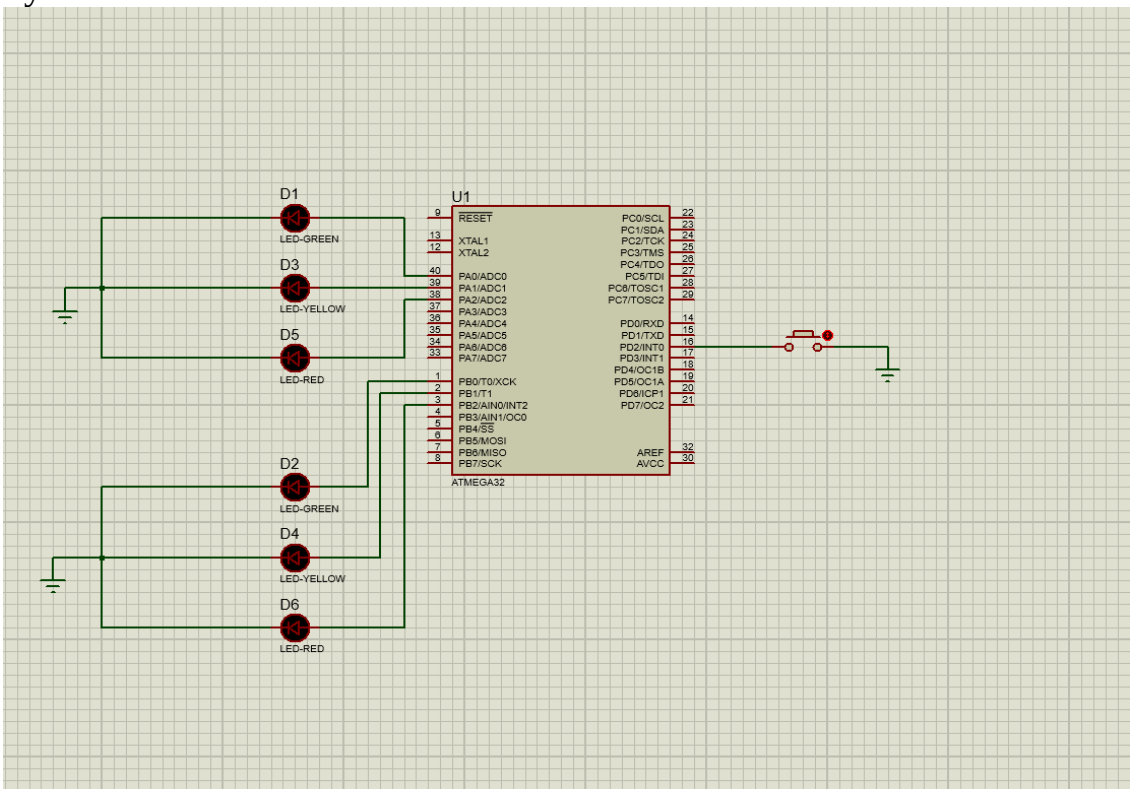
1. System Description

1.1 System Overview



The system aims to provide an on-demand traffic control system. It includes a pedestrian button to allow for pedestrians to pass.

Constraints:

-can configure pin by pin only

-timer work in normal mode

-work in external interrupt 0 only

1.2 System Functionality

The system can detect when the button is pressed. Afterwards, based on current state it would decide what to do. It allows pedestrians to walk by making sure cars are stopped first.

2. System Design

2.1 System Requirements

The system consists of:

- AVR Atmega32 (1MHz)
- 2 Green LEDs
- 2 Yellow LEDs
- 2 Red LEDs
- 1 Push Button

2.2 Operating Environment

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

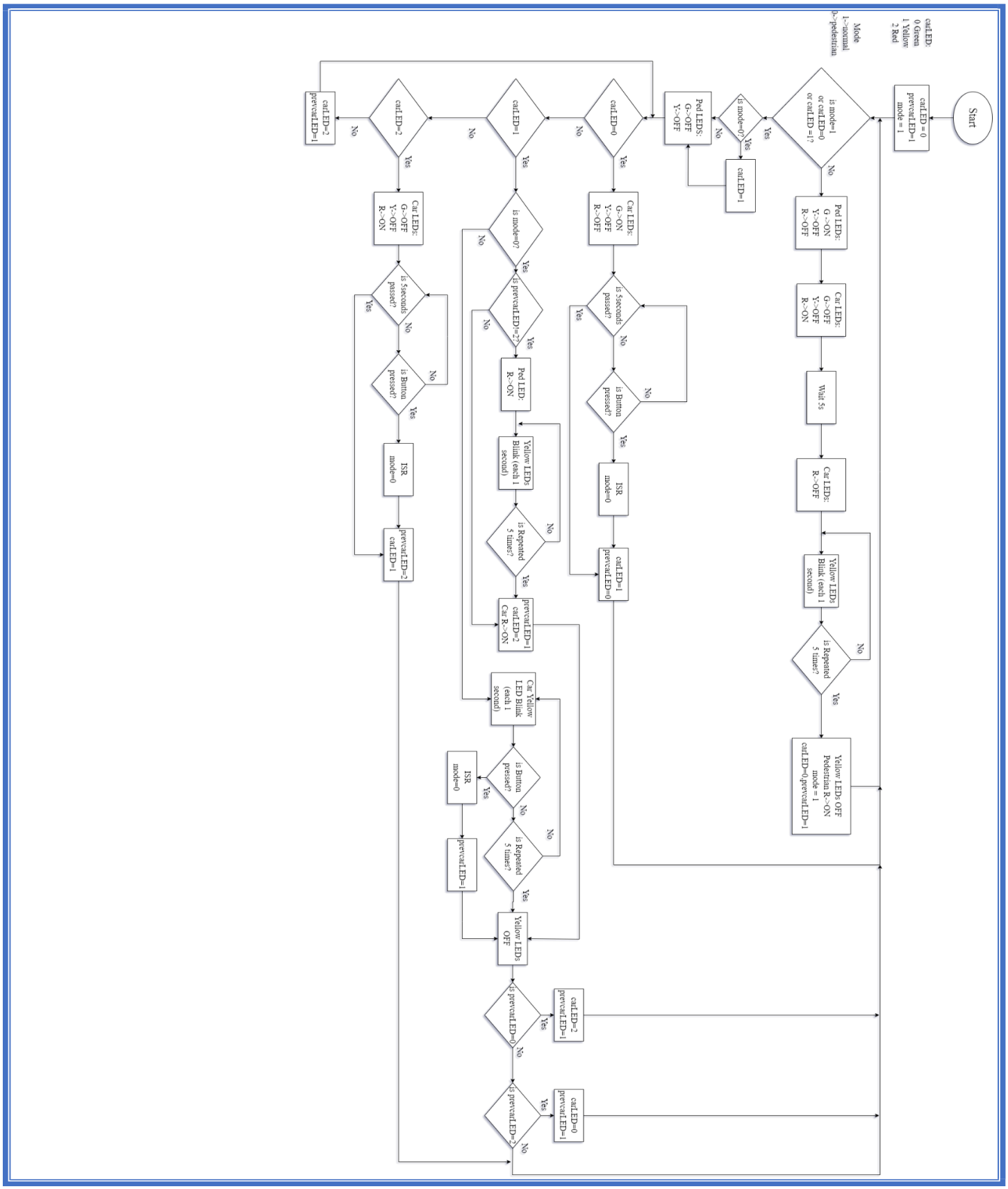
2.3 Input & Output Formats

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 Constraints:

- the pedestrian when he make a short press on the crosswalk button while the cars red light is on And pedestrian green light is on, ***nothing to is done***
- The pedestrian when make a long press on the crosswalk button, ***nothing to is done***.
- The pedestrian when he made a double press on the crosswalk button, ***the first press will do The action and nothing is done after the second press.***

4.Flow Chart


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

5.System Layer: