Embedded Systems Professional Track
EGFWD – Udacity

On-demand Traffic Light control

Project Documentation

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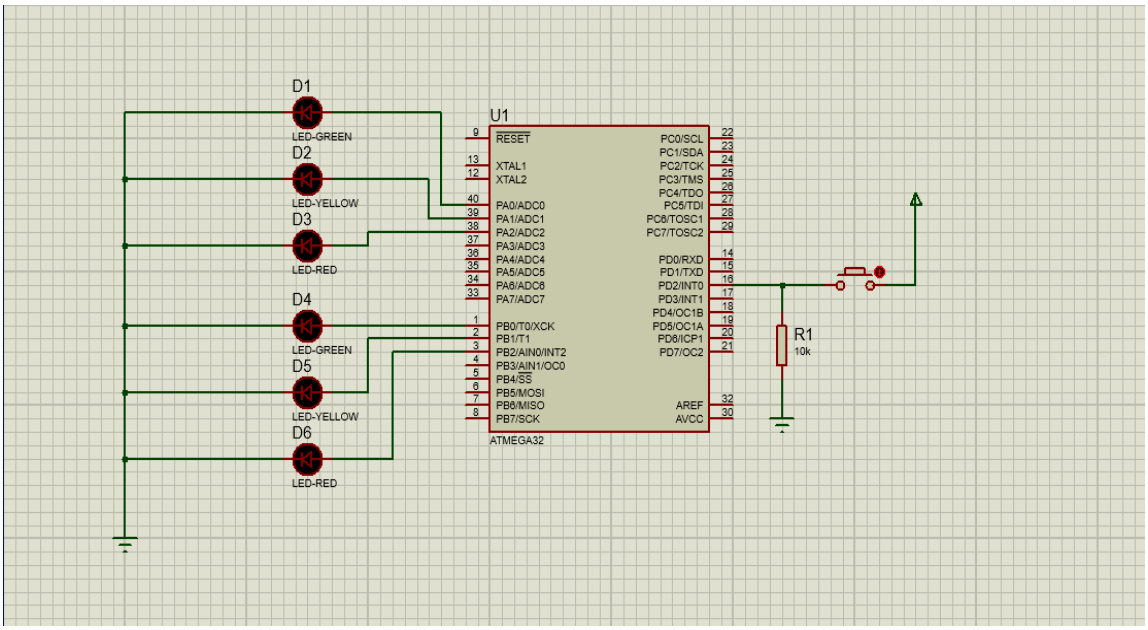
Contents

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.

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. Refer to Flow Chart for more information. For source code, visit the GitHub repo.

2. System Design

2.1 System Requirements

The system consists of:

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

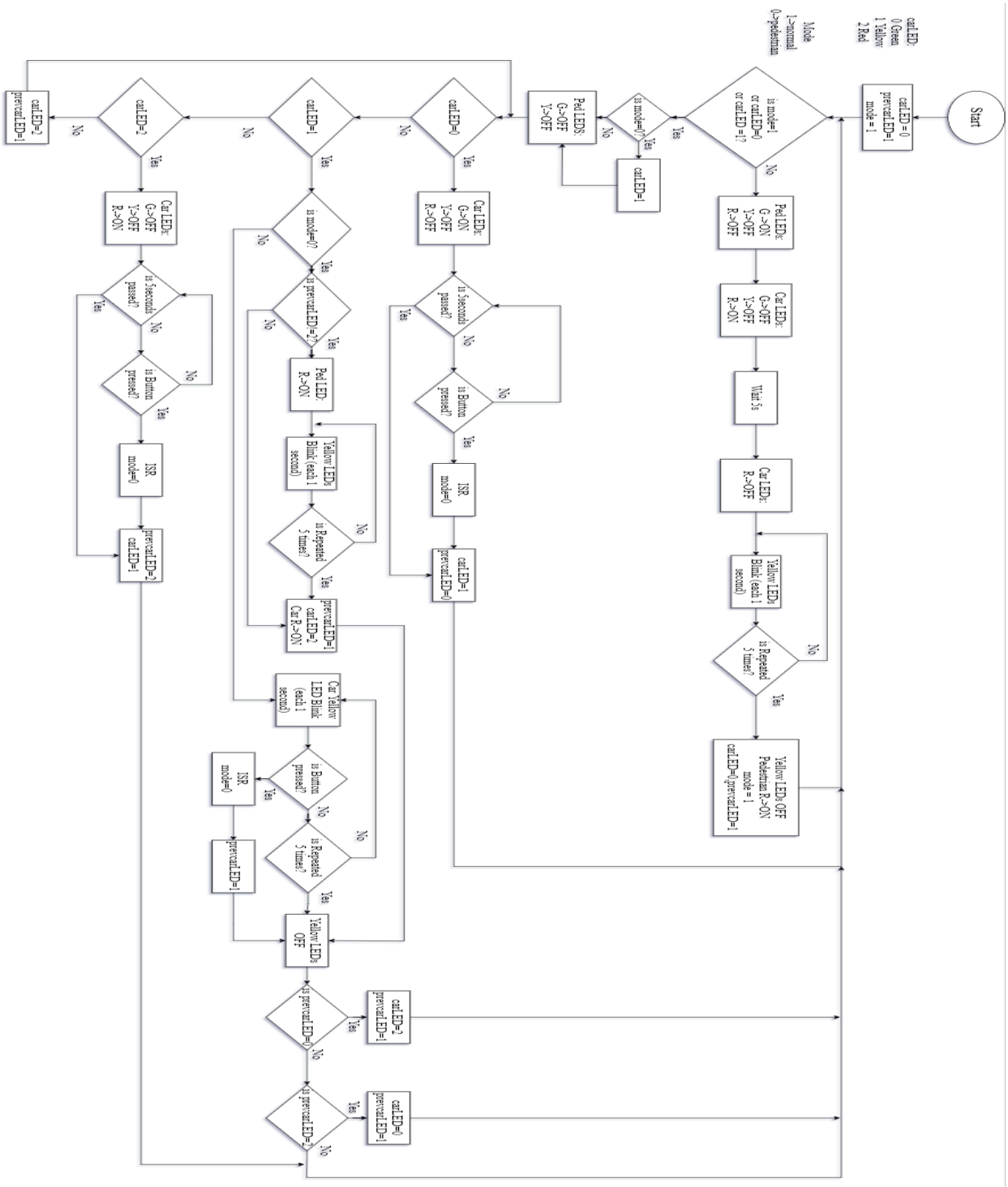
2.2 Operating Environment

The program has been tested on Proteus simulator provided by Lab Center. 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

3. Flow Chart


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

4. State machine