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Embedded Systems – Professional Track

On-demand Traffic Light Control

Name: Rafik Emad Ayad

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System description

This project called on-demand traffic light control where pedestrian can cross the street by pressing a push button. This project is simulated using proteus by selecting suitable hardware (pushbutton, LEDs, resistors, supply, and microcontroller: Atmega32).

We have two modes:

- **Normal mode:**

  where cars are controlled only by 3 LEDs with the following sequence (no pushbutton pressed):

  1. green for 5 seconds
  2. green with blinking yellow for 5 seconds
  3. green and yellow turned off and red is on for 5 seconds
  4. red with blinking yellow for 5 seconds then both turned off
  5. then repeat from step 1

- **Pedestrian mode:**

  Once the pushbutton pressed, depending on which car's LED was operating, a certain sequence will be followed.

  If car's red LED was on:

  1. pedestrian's green LED will be on immediately and car's red led is still on for another 5 seconds

  If car's green LED was on or car's yellow LED was blinking:

  1. pedestrian's red LED will be on then both yellow LEDs start blinking for 5 seconds
  2. car's red led and pedestrian green led will be on for 5 seconds

  at the end of each state:

  1. car's red led is off
  2. both yellow LEDs start blinking for 5 seconds while pedestrians green LED is still on
  3. pedestrian's green LED is off and red led in on
  4. car's green led is on

system design

The project consists of:

- microcontroller Atmega 32
- 1 push button
- 6 LEDs (red, yellow, green), each 3 for car and pedestrian
- 1 10k ohm resistor for pushbutton
- 6 100-ohm resistors for the LEDs

Microcontroller is operated at 1MHz and a timer used for different delays.

we used 3 ports:

- portA for cars LEDs
- portB for pedestrians LEDs
- portD for pushbutton (pulldown) for interrupt source (INT0)

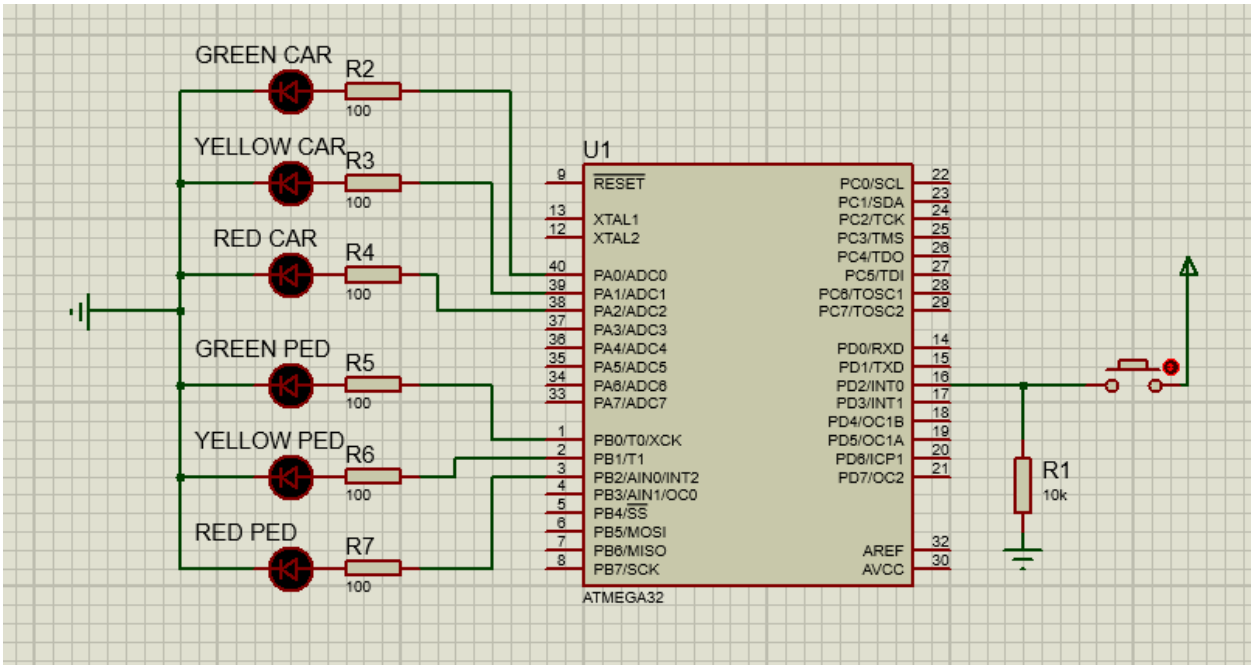

Figure 1: Proteus Simulation

System flowchart

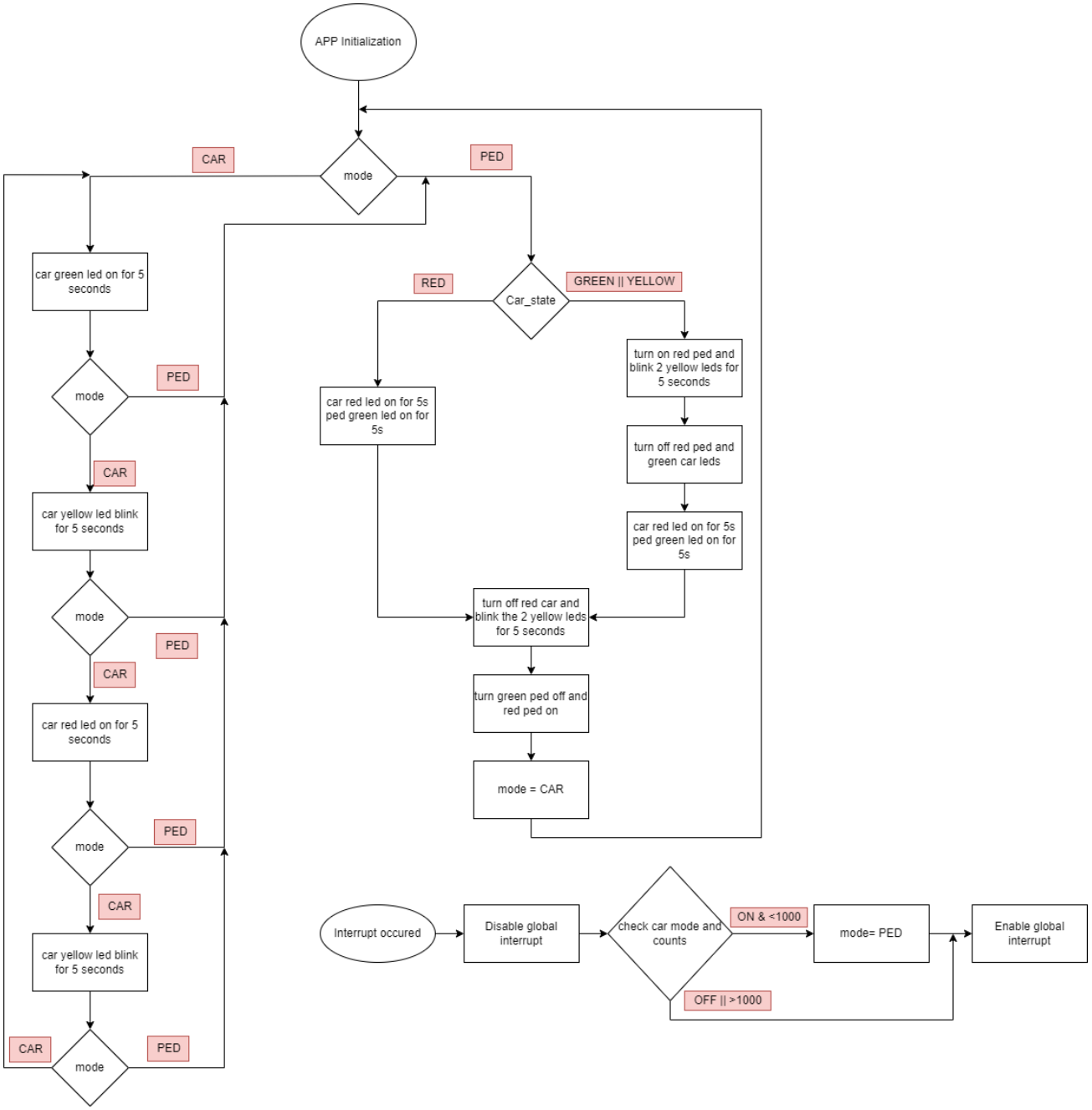

Figure 2: System Flowchart

System constraints

- If a pedestrian pressed the pushbutton with long press nothing will happen. This is controlled by incrementing a counter while the button pin is reading HIGH, the checking this counter with a certain value. If counter value less than predefined value, the mode will change, otherwise nothing will happen.
- If pedestrian pressed the button 2 times, second one will be neglected.
- If pedestrian pressed the button while pedestrian's green LED is on, nothing will happen.