System description

Hardware requirements:

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 requirements:
In normal mode:

1. Cars' LEDs will be changed every five seconds starting from Green then yellow then red then yellow then Green.
2. The Yellow LED will blink for five seconds before moving to Green or Red LEDs.

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.

High level design

System modules and component:

1. DIO driver
2. Timer driver
3. Interrupt library
4. LED driver
5. Button driver

Each of them contain definitions and function prototypes and functions itself.

Interfaces between modules:

When one of the lights is on, timer starts counting then lights turns off and another turned on. If the user pressed button mode will be changed and order of turning lights On or off will be changed.

System timing constraints:

in general there always five seconds interval between lights.

System in action behavior:

In normal mode: green light will be on for five seconds then off, yellow starts blinking for five seconds then off, and red light is on for five seconds.

When a user press the button pedestrian mode will be activated.

If user pressed while cars red light is on:

 pedestrian green light will be on for five seconds , then cars red light is off and yellow light for cars and pedestrian starts blinking for five seconds and green pedestrian still on,.

Then pedestrian green light off, on pedestrian red light, on cars green light and then get back to normal mode again

When the user press the button while cars green light or cars yellow light is turn on:

Turn on pedestrian red light, then both of cars and pedestrian yellow lights starts blinking for five seconds

Then cars red light is on and pedestrian green light is on for five seconds.

then cars red light is off and yellow light for cars and pedestrian starts blinking for five seconds and green pedestrian still on,.

Then pedestrian green light off, on pedestrian red light, on cars green light and then get back to normal mode again.
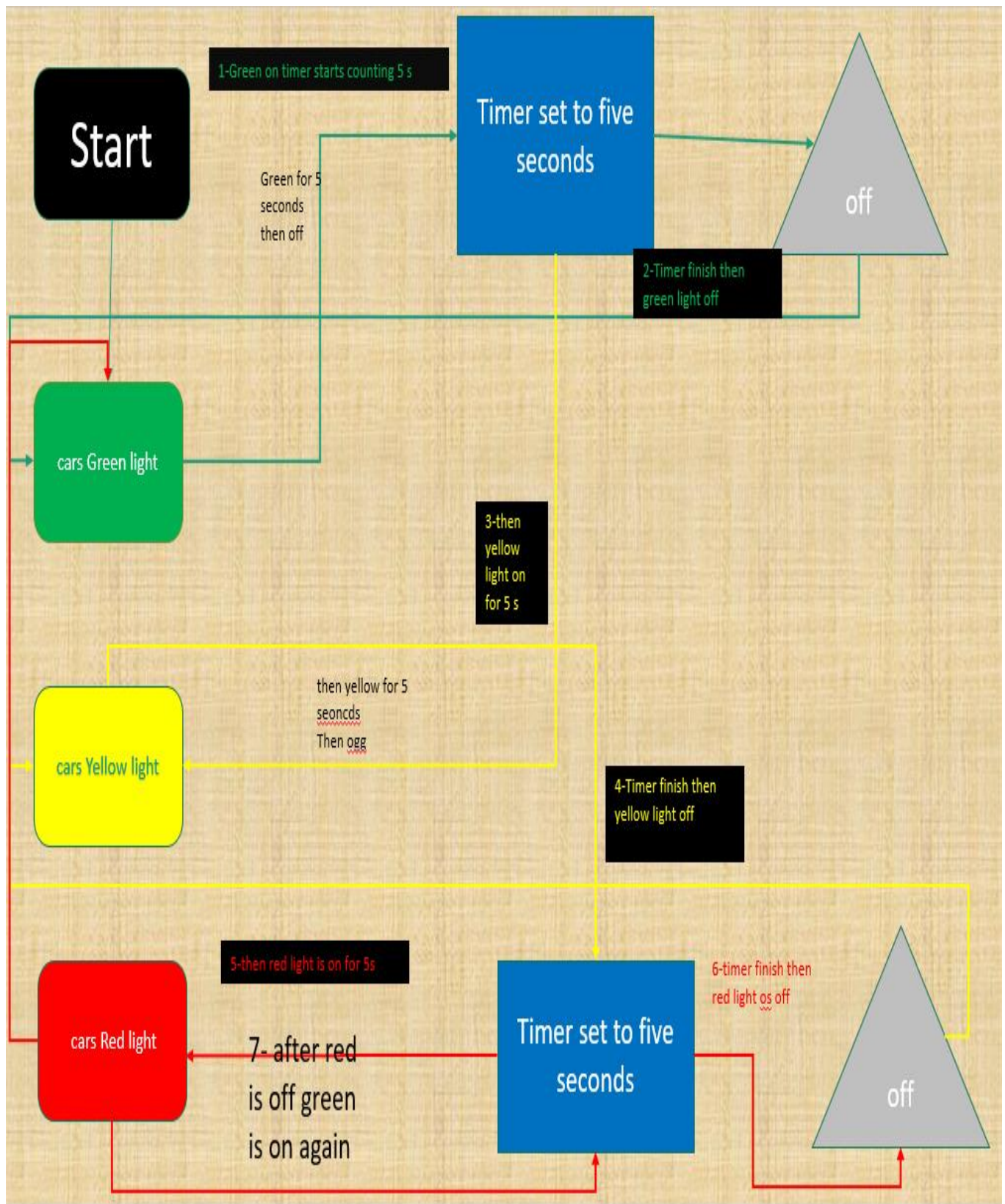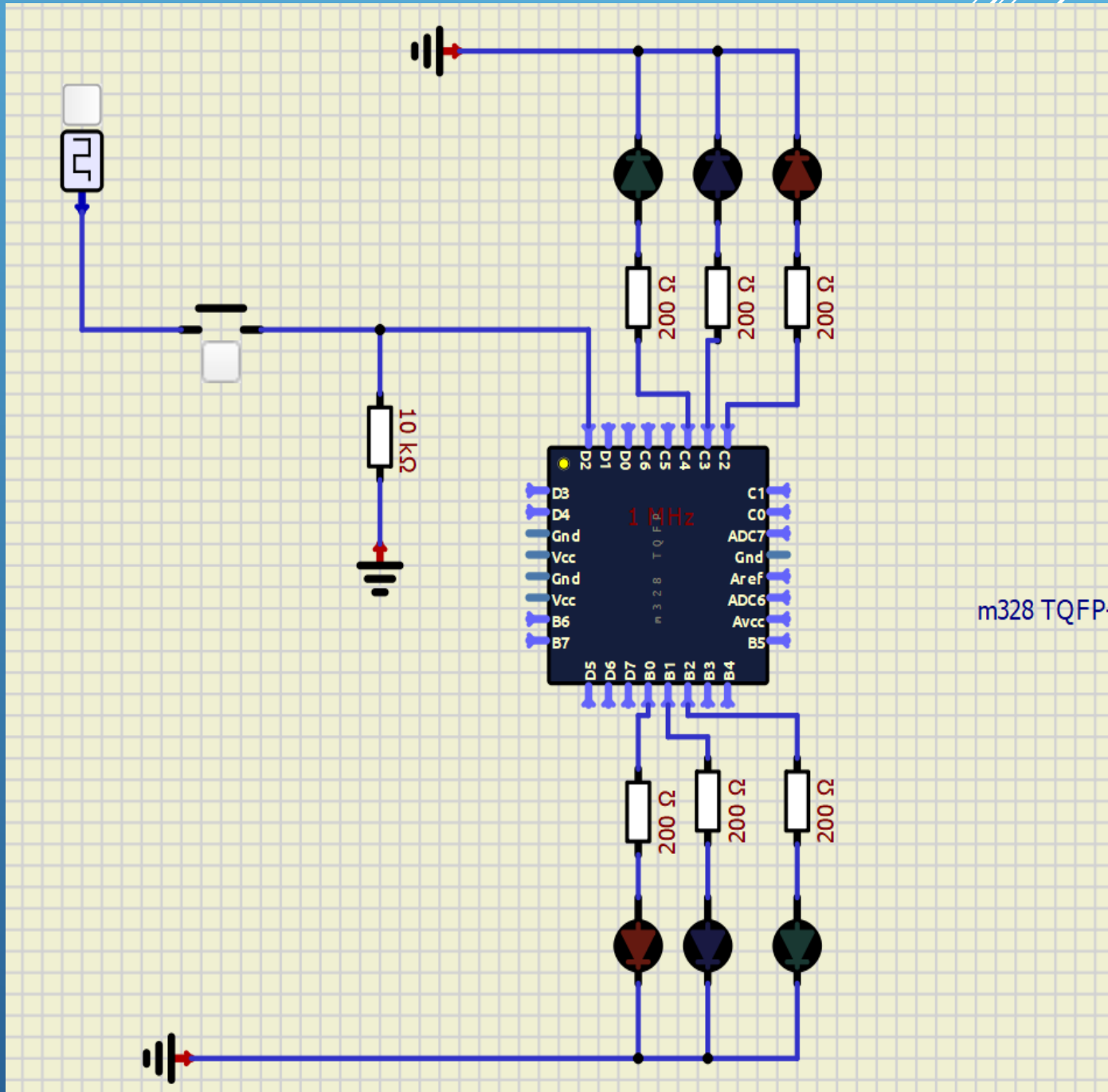
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System constraints

There are not any system constraints

FLOW CHART

Start

1-Green on timer starts counting 5 s

Timer set to five seconds

off

Green for 5 seconds then off

2-Timer finish then green light off

cars Green light

3-then yellow light on for 5 s

then yellow for 5 seoncds
Then ogg

cars Yellow light

4-Timer finish then yellow light off

5-then red light is on for 5s

6-timer finish then red light os off

cars Red light

7- after red is off green is on again

Timer set to five seconds

HARDWARE DESIGNE