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Traffic Light System

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Overview

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- Traffic Light System
- The problematic
- The Requirements of the system

II Software Implementation

- State Machine Diagram
- C implementation

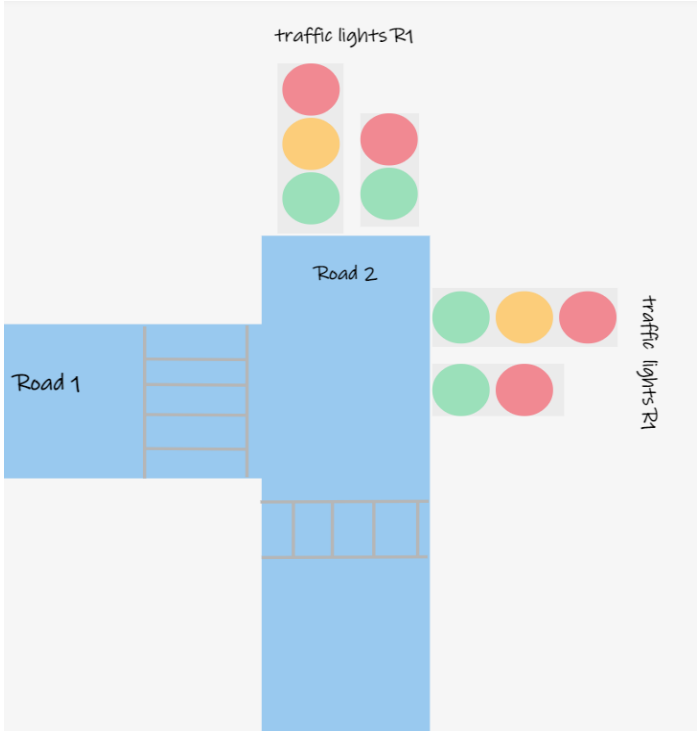
III Hardware Simulation

•Arduino simulation with TinkerCad

Introduction

1 What kind of traffic light system we want to develop?

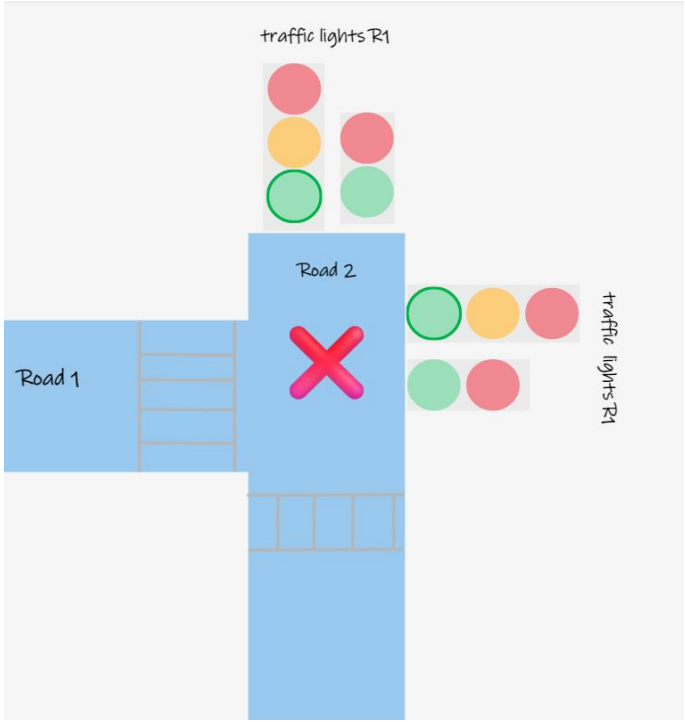
- ✓ Two traffic light systems
- ✓ Two pedestrian light systems
- ✓ Two crossing buttons for pedestrians



Introduction

2 The Problematic

• It is forbiden to have two traffic lights in the green state at the same time.



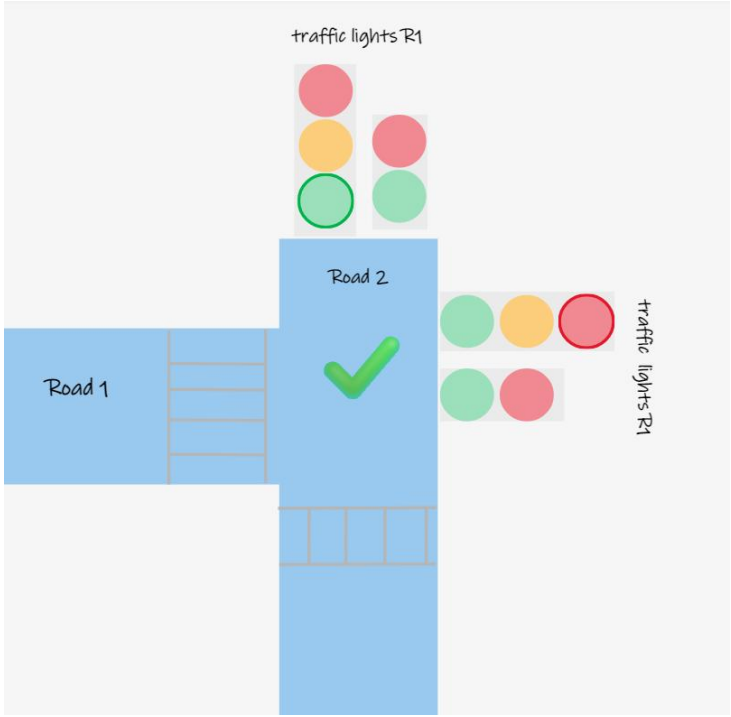
Introduction

3 The System requirements

• If one traffic light is in the green state, the other must be in the red state.

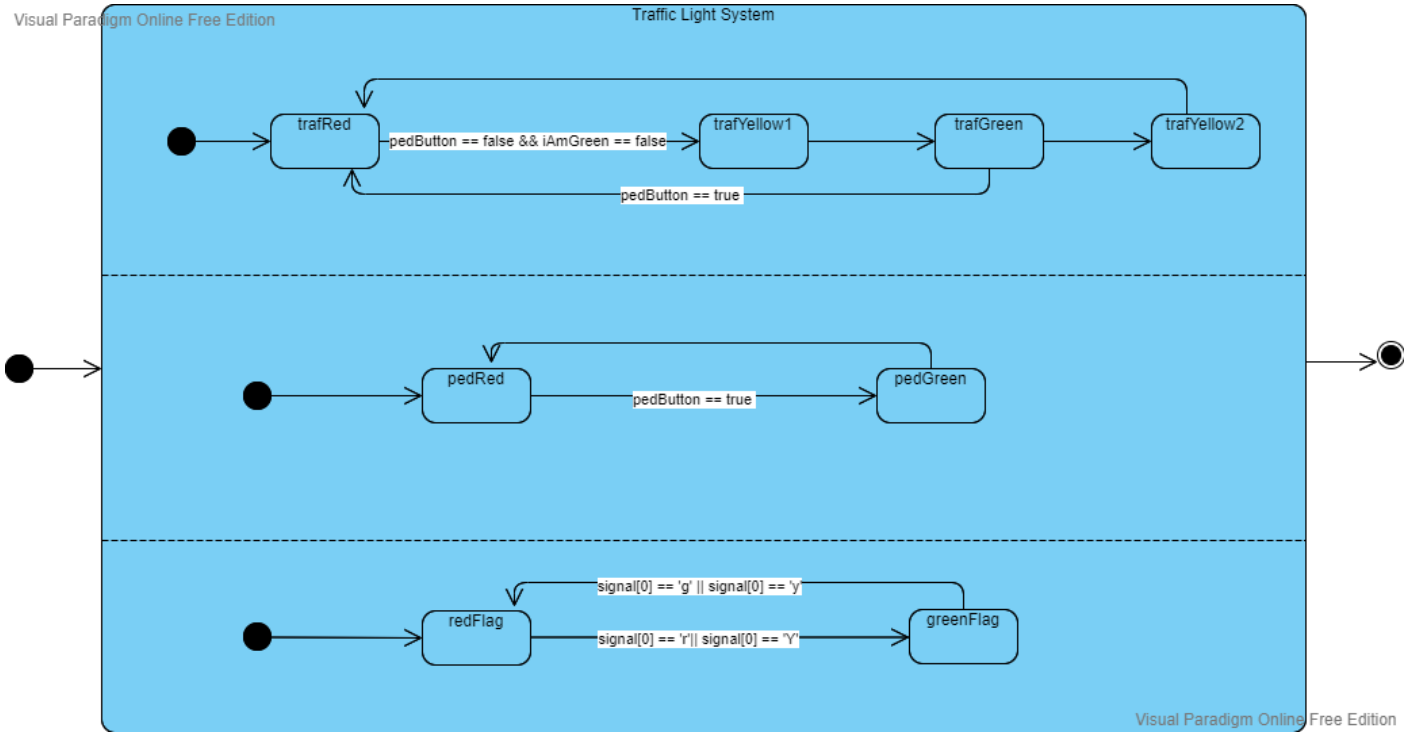
•If traffic light R1 is on green state, the pedestrian light must be in red state and vice versa.

•If the crossing button is pressed, the pedestrian light have to change immediately to green state.



Software Implementation

1 State Machine Diagram



Software Implementation

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2 C Implementation

```
89  void communication()
90  {
91   if(Serial.available()>0)
92        {
93          Serial.readBytes(signal,1);
94        }
95          if(signal[0] == 'g' || signal[0] == 'r'|| signal[0] == 'y'|| signal[0] == 'Y')
96            {
97              Serial.print(" the other arduino state is:\t ");
98              Serial.println(signal);
99          }
100
101         if(signal[0] == 'g'|| signal[0] == 'y')
102          {
103               iAmGreen = true;
104               Serial.println(redFlag);
105               tState = trafRed;
106
107           }
108           else
109           {
110             if(signal[0] == 'r' || signal[0] == 'Y')
111             {
112               iAmGreen = false;
113               Serial.println(greenFlag);
114
115             }
116           }
117
118 }
```

Software Implementation

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2 C Implementation

```
void trafStateMachine()
{
    switch(tState)
    {
       case trafRed:

          digitalWrite(yellowLed, LOW);
          digitalWrite(greenLed, LOW);
          digitalWrite(redLed, HIGH);

          Serial.write('r');
          Serial.println();
          Serial.println("I am red now");
          delay (t20);

          digitalWrite(redLed, LOW);

         if (pedButton == false && iAmGreen == false)
          {
            tState = trafYellow1;
          }

      break;

       case trafYellow1:

          digitalWrite(redLed, LOW);
          digitalWrite(greenLed, LOW);
          digitalWrite(yellowLed, HIGH);

          Serial.write('y');
          Serial.println();
          Serial.println(" I am switching to green");

          delay (t10);
          digitalWrite(yellowLed, LOW);



          tState = trafGreen;


        break;

        break;

        case trafGreen:
          digitalWrite(pedRedLed, HIGH);

          digitalWrite(yellowLed, LOW);
          digitalWrite(greenLed, LOW);
          digitalWrite(greenLed, HIGH);

          Serial.write('g');
          Serial.println();
          Serial.println(" I am green now");

          delay (t20);

          digitalWrite(pedRedLed, LOW);
          digitalWrite(greenLed, LOW);

          tState = trafYellow2;

        break;

      case trafYellow2:

          digitalWrite(redLed, LOW);
          digitalWrite(greenLed, LOW);
          digitalWrite(yellowLed, HIGH);


          Serial.write('Y');
          Serial.println();
          Serial.println(" I am switching to red");

          delay (t10);

          digitalWrite(yellowLed, LOW);

          tState = trafRed;


        break;


       default:
        break;
    }
}
```

Hardware Simulation

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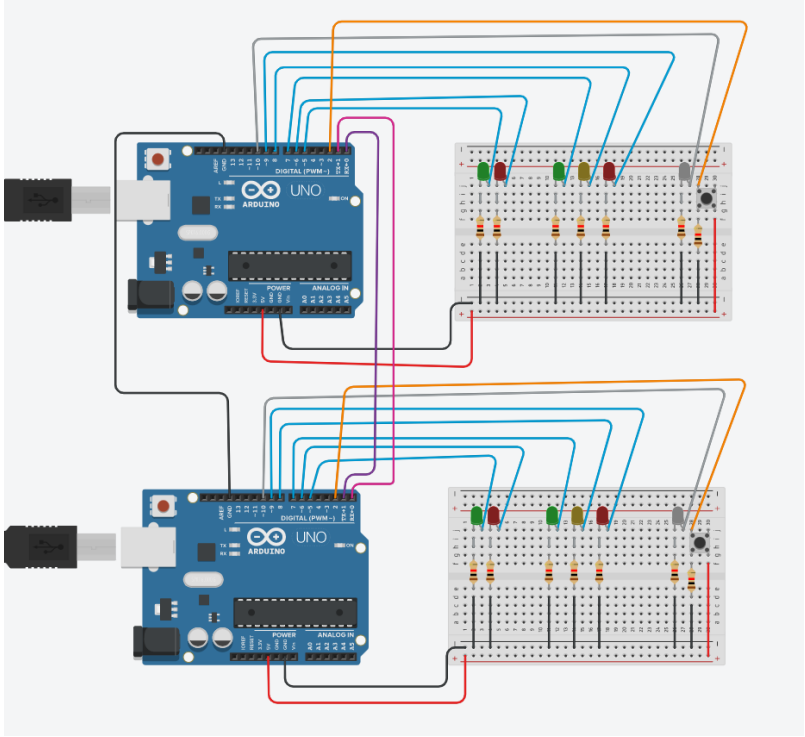
2 TinkerCard Arduino Simulation

•Communication of two arduinos via serial monitor, where each of them send receive data using UART protocol to the other.



Hardware Simulation

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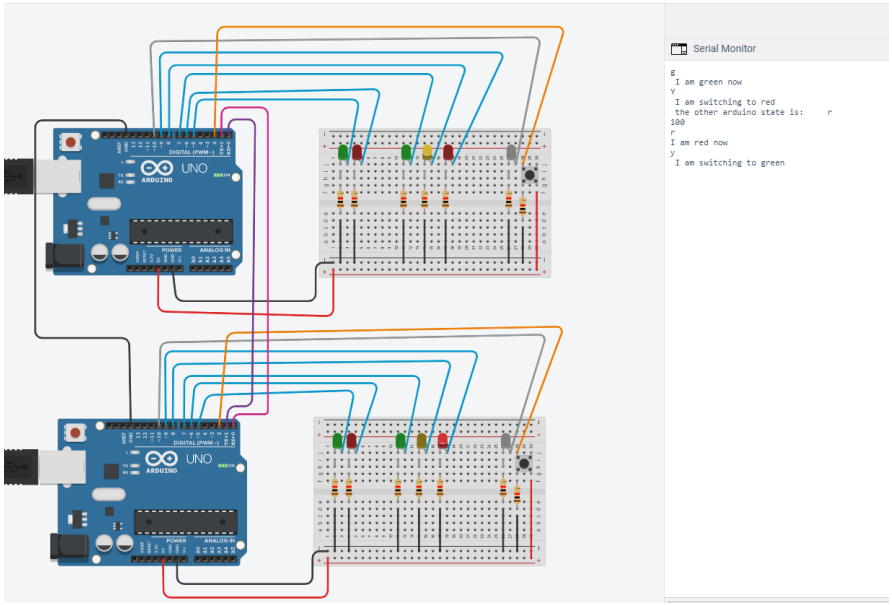
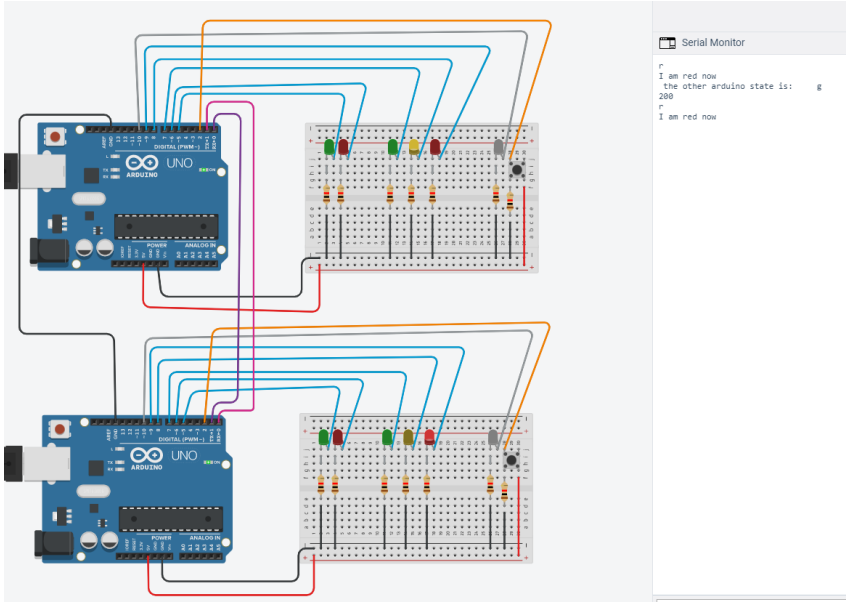
2 Arduino Simulation with TinkerCard





Thank you for your attention