Traffic Light Control System

Circuit Design and its function :

This is a project based on a real life traffic control system. It is not the real one but this project gives us an idea about traffic light controlling systems.

For this project I use,
- Arduino Uno R3
- LEDs (3 green, 3 yellow, 3 red)
- 7-segment display
- Resistors (x30)
- Ground.

At the beginning the green LED of road-1 will be active and in other two roads the red LED will be active. This condition will stay until the 7-segment display counts 9 to 0.

After this countdown, yellow LEDs on road-1 and road-2 will be activated. This condition will be active until the 7-segment display counts from 4 to 0. At the same time the red led in road-3 will stay active.

After that the green LED of road-2 will be active and this condition will continue until the 7-segment display counts from 9 to 0.

After this countdown, yellow LEDs on road-2 and road-3 will be activated. This condition will be active until the 7-segment display counts from 4 to 0. At the same time the red led in road-3 will stay active.

After that the green LED of road-3 will be active and this condition will continue until the 7-segment display counts from 9 to 0.
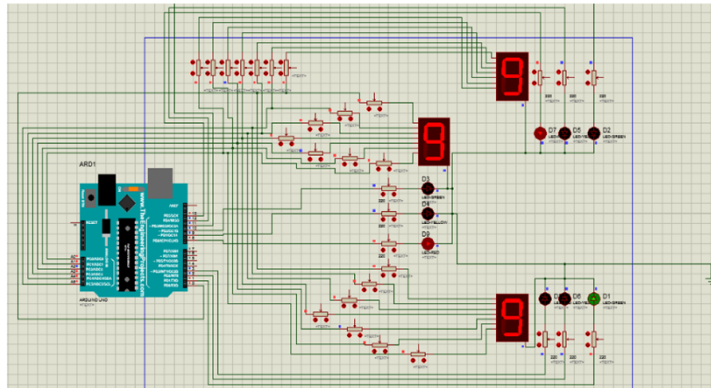
After this countdown, yellow LEDs on road-3 and road-1 will be activated. This condition will be active until the 7-segment display counts from 4 to 0. At the same time the red led in road-2 will stay active.

Then the green LED of road-1 will be active again.

This whole thing will continue as a loop.

Codding :

First, select the pins for 7-segment display and for LEDs

```
//select Arduino pins for 7 segment display
int led1=0;
int led2=A5;
int led3=A4;
int led4=A3;        // Conncet a resistor of 330 ohms with each pin
int led5=A2;
int led6=A1;
int led7=A0;

//select Arduino pins for WAY-1
//Way-1
int green1=11;      // connect 220 ohm resistor with LEDs
int yellow1=12;
int red1=13;

//select Arduino pins for WAY-2
//way-2
int green2=1;       // connect 220 ohm resistor with LEDs
int yellow2=2;
int red2=3;

//select Arduino pins for WAY-3
//way-3
int green3=10;      // connect 220 ohm resistor with LEDs
int yellow3=9;
int red3=8;
```

Then in void setup I declare that all pins are for OUTPUT.

```cpp
void setup() {
  //declare 7 segment pins for output
  pinMode(led1, OUTPUT);
  pinMode(led2, OUTPUT);
  pinMode(led3, OUTPUT);
  pinMode(led4, OUTPUT);
  pinMode(led5, OUTPUT);
  pinMode(led6, OUTPUT);
  pinMode(led7, OUTPUT);

  //set selected pin for output
  pinMode(green1, OUTPUT);
  pinMode(yellow1, OUTPUT);
  pinMode(red1, OUTPUT);

  pinMode(green2, OUTPUT);
  pinMode(yellow2, OUTPUT);
  pinMode(red2, OUTPUT);

  pinMode(green3, OUTPUT);
  pinMode(yellow3, OUTPUT);
  pinMode(red3, OUTPUT);

}
```

Inside void loop,

Here is the code when road-1 is active and road-2 and road-3 are not active. This will continue until the 7-segment display count 9 to 0.

```cpp
void loop() {
  //green signal enable for way-1. way-2 and way-3 stay red
  //9
  digitalWrite(led1, HIGH);
  digitalWrite(led2, HIGH);
  digitalWrite(led3, HIGH);
  digitalWrite(led4, HIGH);
  digitalWrite(led5, LOW);
  digitalWrite(led6, HIGH);
  digitalWrite(led7, HIGH);

  digitalWrite(green1, HIGH);
  digitalWrite(yellow1, LOW);
  digitalWrite(red1, LOW);

  digitalWrite(green2, LOW);
  digitalWrite(yellow2, LOW);
  digitalWrite(red2, HIGH);

  digitalWrite(green3, LOW);
  digitalWrite(yellow3, LOW);
  digitalWrite(red3, HIGH);

  delay(500);

  .............................................................
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```

```cpp
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  //0
  digitalWrite(led1, HIGH);
  digitalWrite(led2, HIGH);
  digitalWrite(led3, HIGH);
  digitalWrite(led4, HIGH);
  digitalWrite(led5, HIGH);
  digitalWrite(led6, HIGH);
  digitalWrite(led7, LOW);

  digitalWrite(green1, HIGH);
  digitalWrite(yellow1, LOW);
  digitalWrite(red1, LOW);

  digitalWrite(green2, LOW);
  digitalWrite(yellow2, LOW);
  digitalWrite(red2, HIGH);

  digitalWrite(green3, LOW);
  digitalWrite(yellow3, LOW);
  digitalWrite(red3, HIGH);

  delay(500);
```

Code when yellow LED is active on road-1 and road-2. This will continue until the 7-segment display count 4 to 0.

```
// enable yellow light for way-1 and way-2; way-3 stay red
//Yellow light
  //4
  digitalWrite(led1, LOW);
  digitalWrite(led2, HIGH);
  digitalWrite(led3, HIGH);
  digitalWrite(led4, LOW);
  digitalWrite(led5, LOW);
  digitalWrite(led6, HIGH);
  digitalWrite(led7, HIGH);

  digitalWrite(green1, LOW);
  digitalWrite(yellow1, HIGH);
  digitalWrite(red1, LOW);

  digitalWrite(green2, LOW);
  digitalWrite(yellow2, HIGH);
  digitalWrite(red2, LOW);

  digitalWrite(green3, LOW);
  digitalWrite(yellow3, LOW);
  digitalWrite(red3, HIGH);

  delay(500);
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```

```
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  //0
  digitalWrite(led1, HIGH);
  digitalWrite(led2, HIGH);
  digitalWrite(led3, HIGH);
  digitalWrite(led4, HIGH);
  digitalWrite(led5, HIGH);
  digitalWrite(led6, HIGH);
  digitalWrite(led7, LOW);

  digitalWrite(green1, LOW);
  digitalWrite(yellow1, HIGH);
  digitalWrite(red1, LOW);

  digitalWrite(green2, LOW);
  digitalWrite(yellow2, HIGH);
  digitalWrite(red2, LOW);

  digitalWrite(green3, LOW);
  digitalWrite(yellow3, LOW);
  digitalWrite(red3, HIGH);

  delay(500);
```

Then the green LED of road-2 will be active and the other two road red LEDs will be active.

```
//green signal enable for way-2. way-1 and way-3 stay red
  //9
  digitalWrite(led1, HIGH);
  digitalWrite(led2, HIGH);
  digitalWrite(led3, HIGH);
  digitalWrite(led4, HIGH);
  digitalWrite(led5, LOW);
  digitalWrite(led6, HIGH);
  digitalWrite(led7, HIGH);

  digitalWrite(green1, LOW);
  digitalWrite(yellow1, LOW);
  digitalWrite(red1, HIGH);

  digitalWrite(green2, HIGH);
  digitalWrite(yellow2, LOW);
  digitalWrite(red2, LOW);

  digitalWrite(green3, LOW);
  digitalWrite(yellow3, LOW);
  digitalWrite(red3, HIGH);

  delay(500);
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```

```
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  //0
  digitalWrite(led1, HIGH);
  digitalWrite(led2, HIGH);
  digitalWrite(led3, HIGH);
  digitalWrite(led4, HIGH);
  digitalWrite(led5, HIGH);
  digitalWrite(led6, HIGH);
  digitalWrite(led7, LOW);

  digitalWrite(green1, LOW);
  digitalWrite(yellow1, LOW);
  digitalWrite(red1, HIGH);

  digitalWrite(green2, HIGH);
  digitalWrite(yellow2, LOW);
  digitalWrite(red2, LOW);

  digitalWrite(green3, LOW);
  digitalWrite(yellow3, LOW);
  digitalWrite(red3, HIGH);

  delay(500);
```

Yellow LEDs are active on road-2 and road-3. This will continue until the 7-segment display count 4 to 0.

```
// enable yellow light for way-2 and way-3; way-1 stay red
//Yellow light
  //4
digitalWrite(led1, LOW);
digitalWrite(led2, HIGH);
digitalWrite(led3, HIGH);
digitalWrite(led4, LOW);
digitalWrite(led5, LOW);
digitalWrite(led6, HIGH);
digitalWrite(led7, HIGH);

digitalWrite(green1, LOW);
digitalWrite(yellow1, LOW);
digitalWrite(red1, HIGH);

digitalWrite(green2, LOW);
digitalWrite(yellow2, HIGH);
digitalWrite(red2, LOW);

digitalWrite(green3, LOW);
digitalWrite(yellow3, HIGH);
digitalWrite(red3, LOW);

delay(500);
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```

```
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//0
digitalWrite(led1, HIGH);
digitalWrite(led2, HIGH);
digitalWrite(led3, HIGH);
digitalWrite(led4, HIGH);
digitalWrite(led5, HIGH);
digitalWrite(led6, HIGH);
digitalWrite(led7, LOW);

digitalWrite(green1, LOW);
digitalWrite(yellow1, LOW);
digitalWrite(red1, HIGH);

digitalWrite(green2, LOW);
digitalWrite(yellow2, HIGH);
digitalWrite(red2, LOW);

digitalWrite(green3, LOW);
digitalWrite(yellow3, HIGH);
digitalWrite(red3, LOW);

delay(500);
```

Then the green LED of road-3 will be active. In road-1 and road-2 red LEDs will be active.

```
// enable green light for way-3; way-1 and way-2 stay red
//9
digitalWrite(led1, HIGH);
digitalWrite(led2, HIGH);
digitalWrite(led3, HIGH);
digitalWrite(led4, HIGH);
digitalWrite(led5, LOW);
digitalWrite(led6, HIGH);
digitalWrite(led7, HIGH);

digitalWrite(green1, LOW);
digitalWrite(yellow1, LOW);
digitalWrite(red1, HIGH);

digitalWrite(green2, LOW);
digitalWrite(yellow2, LOW);
digitalWrite(red2, HIGH);

digitalWrite(green3, HIGH);
digitalWrite(yellow3, LOW);
digitalWrite(red3, LOW);

delay(500);
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```

```
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//0
digitalWrite(led1, HIGH);
digitalWrite(led2, HIGH);
digitalWrite(led3, HIGH);
digitalWrite(led4, HIGH);
digitalWrite(led5, HIGH);
digitalWrite(led6, HIGH);
digitalWrite(led7, LOW);

digitalWrite(green1, LOW);
digitalWrite(yellow1, LOW);
digitalWrite(red1, HIGH);

digitalWrite(green2, LOW);
digitalWrite(yellow2, LOW);
digitalWrite(red2, HIGH);

digitalWrite(green3, HIGH);
digitalWrite(yellow3, LOW);
digitalWrite(red3, LOW);

delay(500);
```

Then yellow LEDs are active on road-3 and road-1. This will continue until the 7-segment display count 4 to 0.

```
//enable yellow light foe way-1 and way-3; way-2 stay red
//Yellow light
 //4
 digitalWrite(led1, LOW);
digitalWrite(led2, HIGH);
digitalWrite(led3, HIGH);
digitalWrite(led4, LOW);
digitalWrite(led5, LOW);
digitalWrite(led6, HIGH);
digitalWrite(led7, HIGH);

digitalWrite(green1, LOW);
digitalWrite(yellow1, HIGH);
digitalWrite(red1, LOW);

digitalWrite(green2, LOW);
digitalWrite(yellow2, LOW);
digitalWrite(red2, HIGH);

digitalWrite(green3, LOW);
digitalWrite(yellow3, HIGH);
digitalWrite(red3, LOW);

delay(500);
.........................................................
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```

```
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.....................................
//0
digitalWrite(led1, HIGH);
digitalWrite(led2, HIGH);
digitalWrite(led3, HIGH);
digitalWrite(led4, HIGH);
digitalWrite(led5, HIGH);
digitalWrite(led6, HIGH);
digitalWrite(led7, LOW);

digitalWrite(green1, LOW);
digitalWrite(yellow1, HIGH);
digitalWrite(red1, LOW);

digitalWrite(green2, LOW);
digitalWrite(yellow2, LOW);
digitalWrite(red2, HIGH);

digitalWrite(green3, LOW);
digitalWrite(yellow3, HIGH);
digitalWrite(red3, LOW);

delay(500);
```

Then the green LED of road-1 will be active again and the whole code will be run sequentially as a loop.