**Traffic Light Control System Using State Machine**

**System Design:**

**Task 7.1: Design a traffic light control system for a standard intersection with two roads**

**crossing (four sets of lights).**

**State Machine Design:**

**Task 7.3: Define the states and transitions for the traffic light system. For example, states**

**could include GreenRoad1, YellowRoad1, RedRoad1, GreenRoad2, YellowRoad2, and**

**RedRoad2.**

**State Definitions:**

* GreenRoad1: North-South main road has a green light.
* YellowRoad1: North-South main road has a yellow light.
* RedRoad1: North-South main road has a red light.
* GreenRoad2: East-West side road has a green light.
* YellowRoad2: East-West side road has a yellow light.
* RedRoad2: East-West side road has a red light.

**State Transitions:**

* From GreenRoad1, transition to YellowRoad1 after a set duration.
* From YellowRoad1, transition to RedRoad1 after a set duration.
* From RedRoad1, transition to GreenRoad2 after a set duration.
* From GreenRoad2, transition to YellowRoad2 after a set duration.
* From YellowRoad2, transition to RedRoad2 after a set duration.
* From RedRoad2, transition to GreenRoad1 after a set duration.

**Task 7.4: Develop a state transition diagram to visually represent the system.**

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**| GreenRoad1 +----->+ YellowRoad1 |**

**| | | |**

**+-------------+ +-------------+**

**| |**

**| |**

**v v**

**+-------------+ +-------------+**

**| | | |**

**| RedRoad1 +----->+ GreenRoad2 |**

**| | | |**

**+-------------+ +-------------+**

**| |**

**| |**

**v v**

**+-------------+ +-------------+**

**| | | |**

**| YellowRoad2+----->+ RedRoad2 |**

**| | | |**

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**Task 7.5: Write the code for the traffic light control system. The code should implement the**

**state machine to control the sequence of the lights.**

/\*Traffic light control system\*/

#include <stdio.h>

#include <unistd.h>

// Define states for the traffic light state machine

typedef enum {

    GREEN\_ROAD1,

    YELLOW\_ROAD1,

    RED\_ROAD1,

    GREEN\_ROAD2,

    YELLOW\_ROAD2,

    RED\_ROAD2

} TrafficLightState;

// Function to simulate the traffic light sequence

void operateTrafficLight(TrafficLightState initial\_state) {

    TrafficLightState current\_state = initial\_state;

    while (1) {

        switch (current\_state) {

            case GREEN\_ROAD1:

                printf("North-South Main Road: Green\n");

                sleep(30); // Green light duration

                current\_state = YELLOW\_ROAD1;

                break;

            case YELLOW\_ROAD1:

                printf("North-South Main Road: Yellow\n");

                sleep(5); // Yellow light duration

                current\_state = RED\_ROAD1;

                break;

            case RED\_ROAD1:

                printf("North-South Main Road: Red\n");

                sleep(30); // Red light duration

                current\_state = GREEN\_ROAD2;

                break;

            case GREEN\_ROAD2:

                printf("East-West Side Road: Green\n");

                sleep(20); // Green light duration for side road

                current\_state = YELLOW\_ROAD2;

                break;

            case YELLOW\_ROAD2:

                printf("East-West Side Road: Yellow\n");

                sleep(5); // Yellow light duration

                current\_state = RED\_ROAD2;

                break;

            case RED\_ROAD2:

                printf("East-West Side Road: Red\n");

                sleep(30); // Red light duration

                current\_state = GREEN\_ROAD1;

                break;

            default:

                // Handle unexpected state

                break;

        }

    }

}

int main() {

    // Start the traffic light control system with an initial state

    operateTrafficLight(GREEN\_ROAD1);

    return 0;

}