# Traffic Signal Simulation Project Report

## Abstract

The Traffic Signal Simulation project is designed to simulate the behavior of traffic signals at an intersection using Java. It helps understand how traffic lights operate in real time and manage the flow of vehicles efficiently. The project models the sequence of lights—Green, Yellow, and Red—and ensures that only one direction has a green light at a time.

## Introduction

Traffic management is one of the major challenges in modern cities. The purpose of this project is to simulate the working of a traffic signal system to demonstrate its basic logic and time-based control. This simulation helps visualize how automated traffic lights function to control vehicle movement at intersections.

## Full Java Code

public class TrafficSignalConsole {  
  
 enum LightState { RED, YELLOW, GREEN }  
  
 public static void main(String[] args) {  
 LightState northSouth = LightState.GREEN;  
 LightState eastWest = LightState.RED;  
  
 int greenDuration = 5000; // 5 seconds  
 int yellowDuration = 2000; // 2 seconds  
  
 System.out.println("=== TRAFFIC SIGNAL SIMULATION (CONSOLE) ===\n");  
  
 for (int i = 0; i < 3; i++) { // Runs for 3 full cycles  
 northSouth = LightState.GREEN;  
 eastWest = LightState.RED;  
 printStatus(northSouth, eastWest);  
 sleep(greenDuration);  
  
 northSouth = LightState.YELLOW;  
 eastWest = LightState.RED;  
 printStatus(northSouth, eastWest);  
 sleep(yellowDuration);  
  
 northSouth = LightState.RED;  
 eastWest = LightState.GREEN;  
 printStatus(northSouth, eastWest);  
 sleep(greenDuration);  
  
 northSouth = LightState.RED;  
 eastWest = LightState.YELLOW;  
 printStatus(northSouth, eastWest);  
 sleep(yellowDuration);  
 }  
 }  
  
 static void printStatus(LightState ns, LightState ew) {  
 System.out.println("------------------------------------------");  
 System.out.println("North–South Signal: " + ns);  
 System.out.println("East–West Signal: " + ew);  
 System.out.println("------------------------------------------\n");  
 }  
  
 static void sleep(int ms) {  
 try {  
 Thread.sleep(ms);  
 } catch (InterruptedException e) {  
 Thread.currentThread().interrupt();  
 }  
 }  
}

## Sample Output

=== TRAFFIC SIGNAL SIMULATION (CONSOLE) ===  
  
------------------------------------------  
North–South Signal: GREEN  
East–West Signal: RED  
------------------------------------------  
  
------------------------------------------  
North–South Signal: YELLOW  
East–West Signal: RED  
------------------------------------------  
  
------------------------------------------  
North–South Signal: RED  
East–West Signal: GREEN  
------------------------------------------  
  
------------------------------------------  
North–South Signal: RED  
East–West Signal: YELLOW  
------------------------------------------

## Existing System

In the existing system, traffic lights are controlled manually or by pre-set timers without simulation or visualization. There is no easy way to test different timing configurations without real-world experimentation.

## Proposed System

The proposed system introduces a Java-based traffic signal simulator that replicates real-time light changes in a console environment. This approach allows for understanding signal behavior, adjusting light durations, and visualizing the timing pattern effectively.

## Software Requirements

• Operating System: Windows / Linux / macOS  
• Language: Java (JDK 8 or above)  
• IDE: Eclipse / IntelliJ IDEA / Notepad++ / Command Line

## Hardware Requirements

• Processor: Intel i3 or above  
• RAM: Minimum 2 GB  
• Hard Disk: Minimum 100 MB free space  
• Display: Any standard display supporting console output

## Conclusion

The Traffic Signal Simulation project effectively demonstrates how traffic signals operate using simple Java logic and time delays. It provides a foundational understanding of signal sequencing and can be further expanded with sensors, vehicle detection, or GUI-based visualization.