

ABSTRACT

Traffic congestion around SAMSAT Buahbatu, Bandung, is caused by high vehicle volumes, long queues, and limited road capacity, especially during peak hours. This issue requires data-driven solutions to improve traffic efficiency. This study proposes optimizing Traffic Scheduling and Load Balancing using SUMO simulation and a Reinforcement Learning (RL) approach. The simulation utilizes actual traffic data to test strategies such as adaptive traffic light duration and vehicle flow redistribution. The results indicate that RL implementation significantly enhances traffic performance: the average vehicle waiting time is reduced from 120 seconds to 45 seconds, the maximum queue length decreases from 250 meters to 100 meters, vehicle Throughput increases from 800 to 1200 vehicles per hour, and traffic volume distribution becomes more balanced (from 60%-40% to 50%-50%). Additionally, congestion levels decrease from 8/10 to 4/10, and the average travel time is reduced from 180 seconds to 90 seconds.

Keywords: *Traffic Congestion, SUMO, Reinforcement Learning.*