Abstract

Traffic congestion has increased tremendously due to overpopulation and urbanization. Current day traffic congestion results in wasted energy and pollution, which is harmful to the environment. The future of transportation is self-driving electric vehicles, and although they do not pollute the atmosphere with fuel, they still use energy. Thus, it will be important in the future to minimize unnecessary energy consumption caused by electric vehicles in traffic. This can be achieved by improving traffic flow, a factor that is controlled by traffic signals. One way that traffic signals can be enhanced is by connecting them with autonomous vehicles, improving flow. Specifically, traffic signals could improve their adaptability by receiving real-time traffic information from the electric vehicle, whereas the vehicle could improve its route planning by knowing what the traffic signal will do ahead of time. Therefore, this proposal's objective is to create a model for a centralized system that synchronizes electric vehicles with traffic signals in order to decrease network wide energy consumption. This model was created by building off a previous traffic signal optimization model by adapting it for electric vehicles and a continuous flow of traffic. This model and the status quo was simulated and energy consumption was measured. A t-test found that the average energy consumption was significantly lower for this model, indicating that my model was indeed successful. This is relevant because in the future where all vehicles will be electric, it is critical to ensure that they don’t worsen the rising problem of global warming.

Keywords: traffic congestion, energy consumption, electric vehicles, route guidance, traffic signal optimization, dynamic traffic assignment