**Research Question**

Traffic jam is a common problem as well as a hot research topic that every driver has to face at least once in their life time. Multiple factors are involved in the cause of this issue e.g. driver’s behavior, quantity of vehicles, weather…etc. To avoid such inefficient and time-wasting circumstance, the driver normally prefers to stay informed about the traffic situation before they depart. However, the information is not always up-to-date due to the fact that traffic jam is not absolute predictable and is usually not timely reported. If the newest information can be delivered to every driver/vehicle in real time, the ongoing traffic can then be diverted to the other route, instead of all arriving at the same jam. Therefore, how to construct an ideal updating and communicating system which helps the vehicles with avoiding the traffic jam in advance is the main goal of this project.

**State of the Art**

* Gipps Model
* Psychophysical Model
* **Cloud based communication**

Tesla has not only made pure electric cars possible on the market, but also introduce the swarm intelligence learning network among their Tesla vehicles. This implantation, for example, collects the traffic information (construction, accident, speeding camera…) from each car while they are being driven around the globe, and then uploads it to a global server so that every other car can access to it.

* V2X communication
* Sensors for collision avoidance

**Methods**

A multilane traffic scenario with different vehicles (agents) will be implemented in ROS (Robot Operating System). The integrated Stage simulator is chosen to be the testing environment because of its readily available models such as laser scanner and ultrasonic sensors, which are going to significantly reduce the time we invest in building up basic functions and in turn focusing more on designing agent’s behavior.

The simulation is split into main three parts, such as modeling of the world, the vehicle, and traffic scenarios. According to different scenarios, one or more lanes may be blocked by an obstacle that either slightly or heavily impact the traffic flow. While the former arriving group of vehicles might be stuck in the traffic jam, the later coming traffic will need to coordinate with each other in order to bypass the obstacle or choose another route in a most efficient manner. In addition, the vehicle model will consist of the dynamics of real vehicle aptly scaled for simulation so that the results shall be realistic.

**Timeline**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | April | | | May | | | | | June | | |
| 4/10 | 4/17 | 4/24 | 5/1 | 5/8 | 5/15 | 5/22 | 5/29 | 6/5 | 6/12 | 6/19 |
| Expose |  |  |  |  |  |  |  |  |  |  |  |
| - Research questions |  |  |  |  |  |  |  |  |  |  |  |
| - Project timeline |  |  |  |  |  |  |  |  |  |  |  |
| - Research State of the art |  |  |  |  |  |  |  |  |  |  |  |
| - Project structure |  |  |  |  |  |  |  |  |  |  |  |
| Model the system |  |  |  |  |  |  |  |  |  |  |  |
| - UML-diagrams |  |  |  |  |  |  |  |  |  |  |  |
| Implementation |  |  |  |  |  |  |  |  |  |  |  |
| - Set up platform |  |  |  |  |  |  |  |  |  |  |  |
| - Implement the world |  |  |  |  |  |  |  |  |  |  |  |
| - Implement a single car |  |  |  |  |  |  |  |  |  |  |  |
| - Test run |  |  |  |  |  |  |  |  |  |  |  |
| - Expand the population |  |  |  |  |  |  |  |  |  |  |  |
| Project Report |  |  |  |  |  |  |  |  |  |  |  |
| Project Presentation |  |  |  |  |  |  |  |  |  |  |  |