**Research Question**

Public transportation plays an important role in terms of efficiently moving crowd from A to B. Each kind of vehicles e.g. tram, bus, taxi have different characteristics which in turn provides diverse functionalities. The one drives faster usually take less people, while other slow moving vehicles carry more passengers. With all these distinct elements working together, a traffic system is formed. Resembling the ants moving foods back to the nest, a group of different transportations roaming in the city can also be treated as agents transporting passengers individually. In this project, the main interest is to study the emergent behavior of three kinds of vehicles transporting people at the same time. These agents, namely, the tram, bus and taxi are set in a scenario where a concert is over and crowds are waiting to be lifted to some destinations. The overall dynamics of transportation process will be simulated, and it is influenced by the number of people (audience in concert), the performance of collision avoidance as well as some random factors introduced.

**State of the Art**

More popular models include to follow. Models such as the cellular automata model designed by Nagel and Schreckenberg treats the vehicles as individual agents with a set of given rules, also exhibit the complex phenomena associated with real traffic [1][2]. The interactions are largely governed by car-following and lane-changing logic [3][4][5]. One well-known model, among various vehicle following models, which attempt to describe vehicle following based on anti-collision concept is the “Gipps model”, developed in 1981 [5][6]. In this model a vehicle always aims to be able to stop safely if the vehicle it is following performs an emergency stop [6]. Another class of models, known as the “Psycho-physical” vehicle models attempt to capture both the physical and human components of vehicle control. They do this by maintaining a vehicle state, where the current state is determined through the differences in speed and distance to the leading vehicle [4].

Chen and Zhan evaluate simultaneous and staged evacuation strategies in their paper related to urban evacuation. This problem is analogous to our goal to evaluate the time taken by all attendees of a concert to reach their home/destination. In the paper Chen and Zhan, models the roads as links and junctions as nodes with two different types of networking – ring and grid as they are widely used in many cities. They modeled the agents to know the shortest route to reach their destination and also had a timing plan implemented for the agents leaving the site. However, the paper only evaluates two types of driver – aggressive and conservative, thus simplifying the real world scenario. There was no best evacuation strategy found using simulation, but for high population density in a grid networked city staged evacuation works better. For free flow traffic situation with no traffic, the simultaneous evacuation strategy yielded better result [11].

**Methods**

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**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 |  |  |  |  |  |  |  |  |  |  |  |