24783 Advanced Engineering Computation

Project Proposal

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1. SimCity (Traffic simulator)

We want to simulate a city using OpenGL engine as the first choice of project.

For every crossroad in the simulator, we plan to realize the traffic lights control and make every vehicle obey the traffic rules (straight cars first). For every vehicle in the road, we plan to attach as more details as possible to them, such as turn signals and brake signals. Also, the "intelligence" of every vehicle is important in this demo and we are going to make these vehicles more intelligent such as realizing car follow and automatic braking.

If time permitting us to dive in deeper, we prefer to realize a whole city, like the game SimCity.

For the whole city, more details need to be considered, such as building assignment, population growth, employment issues, accidents and natural disasters etc.. Due to the complexity of simulating a big city, we prefer to realize a city of moderate size. Also, for the simulating purpose, we prefer to assign more "intelligence" to everything in the city, which is more difficult than above traffic simulator. For a city, the map should be generated randomly and reasonable enough like a real city.

For both SimCity and traffic simulator, the scene should be 2.5D, which combines the performance with enough reality.

2. Vehicle Simulator

The main idea is to implement a vehicle simulator like car-race game with OpenGL. This include a modelling of vehicle as well as its surroundings. We may add a destination where the game ends or just wandering around the virtual city. Many more details can be added, like dashboard, traffic lights, etc. This simulator can also include perception modules and motion planning modules, which will facilitate the research on autonomous driving.

3. Temple run

This is an implementation of popular temple-run game using OpenGL. The goal of the game is to arrive at the destination collecting as much reward as possible. On the one way road to destination player will have to avoid potential obstacles which depend on specific scenarios. Depends on different levels of the obstacles, the player may lose reward, or directly game over. This is a 2.5 D game where player will always be running forward, player can jump, dive, go left or go right by arrow keys in the keyboard. There will be randomly allocated reward which player can collect by passing through. The game will record history of player name, running distance and reward, and make a rank based on the comprehensive achievement calculation regarding all three factors.

We will set different scenarios like urban city, jungle, dessert, etc. Each scenario has different game rules. For example, in the urban city scenario, player may game over by hitting coming vehicles or lose reward by hitting pedestrians, in jungle scenario player may game over by falling into a swamp.