

Project Details

Components(objects):

1. Roads - Single, double, triple lanes
2. Scenery
3. Intersections
4. Curves
5. Joints
6. Vehicles - Cars, Trucks
7. Traffic lights
8. Speed breakers

Simulation managers:

1. Traffic controlling units
2. Optimal route finding units
3. Local vehicle maneuvering units
4. Congestion detecting units
5. Traffic source units
6. Traffic sink units
7. Speed controlling units
8. Environment generator

Interface (I/O):

Traffic :

Traffic source units and traffic sink units are responsible for this job. Input of traffic will be made at a rate specified by the user. Users will have the option to specify traffic generating points as well as specify sink points through click interface (see https://www.glfw.org/docs/3.3/input_guide.html#input_mouse). Alert symbols from congestion detecting units in case of overflows.

Drawing Tool:

Will provide free hand drawing of road networks in the UI (see https://sumo.dlr.de/docs/Networks/SUMO_Road_Networks.html#internal_edges). Then we will use curve interpolation to generate a solid 3D road model from the drawing. The curve generated by the user will be in the form of control points sampled at specific instances by the user. These control points will be later used in a Bezier/b-spline curve interpolation. Border cases, like at curve ends, or road joints, will be duly handled. Cross like Intersections provided by the user will be automatically rendered as either round or square intersections.

Will give control to the user to set up traffic signals at joints, crossings.
Will give controls to specify speed breakers at road points.

Feedbacks:

1. Main feedback will be the visual experience provided through texture mapping, appropriate lighting, etc.
2. Users will have hovering and other rotation controls to view the entire road network.
3. Signal alerts and other feedback will be provided later.

Scenery:

After providing a road network, we will provide the option of choosing between 2 scenery to fill void polygons left between the road networks. These will be randomly filled using preprocessed texture mapped sceneries. Users can choose such a filling as provided in MS paint. To fill in between spaces.

Vehicle models

2 options based on previously rendered and stored vehicle models. Large will correspond > 4 wheelers and small will be 4 wheelers of the same model. Traffic sources can have a combination of either vehicles.

Camera animation

Users will be provided all 6 degrees of freedom, with a switch between perspective and orthographic projections. Fast switching between heavily congested areas as indicated by the congestion manager will also be provided.

Object Models:

Roads

Implementation details:

- ❑ (TODO) Provide I/O to the user to generate a road network as a chain of connected control points. Simple point clicking interface to be provided to the user. Automatically fill in points in between control points for better curve approximation. Give controls of undo, switch between control points, delete control points, insert control points etc.
- ❑ (TODO) Provide texture mapping, and 3D road generation for the control points provided. This will be done using one of the many curve interpolation methods. For now, 2 boundary cases, like very sharp turns and intersections will be handled and others will be handled later as needed.