

Robert Grier

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Simple Traffic Sim V1

Overview

The game allows the player to view the world from a flying camera. The player can switch between tools for viewing, spawning buildings, spawning roads, and erasing. Each tool has a gizmo that appears when in that mode which follows the mouse. When left clicking, the tools may spawn or remove objects from the world. Objects are spawned onto a 2D grid overlayed on the floor plane. Objects can only be spawned if the grid is not occupied at that location.

As roads and buildings are constructed and removed, a graph network is updated to reflect the state of the world. This graph network is queried by vehicles to calculate a path from one building to another. Vehicles follow their path by moving across road segments and turning at intersections.

Camera

Rotate – (Middle Mouse) or [Q / E] or [Left Control] + (Left Mouse)

Panning – (Right Mouse) or [WASD] or [Left Alt] + (Left Mouse)

Zoom – (Scroll Wheel)

Grid

Toggle Visualization – [G]

The grid is represented as a 2d array of `Option<Entity>`. Queries to the grid take the form `Result<Option<Entity>>` where the result will be an error if the request is out of bounds or not valid. The option is none when the grid is empty and contains some entity when occupied at that location. I am using a crate to draw an infinite grid for debugging. There are helper classes for `GridCell` and `GridArea` to represent individual cells and areas of cells on the grid.

User Tools

Switch to view tool – [`]

Switch to building tool – [1]

Switch to road tool – [2]

Change road orientation – [Tab]

Switch to eraser tool – [3]

Adjust tool size – [F/R]

Tools are swapped between using a state machine in `toolbars.rs`. The building tool spawns scaled cubes to represent the buildings. The road tool allows you to drag after clicking to determine the size of the road. The road tool automatically creates intersections, extends roads, and bridges roads based on adjacent data in the grid. The eraser tool deletes buildings and roads. The view tool just disables all other functionalities.

Graph

Toggle Visualization – [H]

The graph connects buildings, roads, and intersections so that the city can be navigated. The graph observes spawning and deleting events to keep everything up to date. The graph is visualized with gizmos to show all the connections.

Vehicles

Spawn – [P]

In this version, vehicles are just an initial sketch of the functionality. When spawned, vehicles calculate a path from one random building to another if a path is possible. They query the graph to do a simple DFS for the path, which should be replaced with a better algorithm. Vehicles then move “on-rails” along the roads to follow the path. This should be replaced with a better driving system. If the path is edited after spawning the vehicle, it will just stop. Events should be added to recalculate the path if the relevant graph components are changed.

How to play the demo

Place some roads using the road tool. Intersections will be generated on adjacent roads (in most cases). Place some buildings adjacent to the roads using the building tool. Erase buildings and roads as needed. Observe the graph update by toggling the visualization with [H]. Spawn a vehicle with [P] and observe that it generates and follows a path from one building to another.