James Huang

ITP 115

MW 10-11:20am

**Modeling Traffic and Street Redesigns with Python**

**REVISED: 05/06**

**Background**

As an Urban Studies and Planning major, I am interested in modeling traffic in an urban environment, and calculating the true effects of new sustainable street designs. I hope that my project can provide me with personal data on the changes that street designs can make on our cities.

**Libraries**

I will likely use the Pandas library to visualize data, including visualizing “travel time” improvements, and changes in travel mode distribution when the user changes attributes of the road.

**Classes**

*Road🡪* This describes our main road. It will have width, length, density, intersection occurrences(stored in a dictionary~~), and bus route~~, it will also have a list of **nodes** within the intersection occurrence dictionary, it will also have a list of lanes and their widths. It will also contain the navigation and pathfinding algorithm for various modes of transportation.

*Node🡪* A node represents an destination, located on the road. It will have destination type(office, residential etc.), popularity, and also list of nearby nodes. This will aid in the navigation of vehicles.

*Intersection🡪*An intersection has an *intersecting street width*(not editable), 4 nodes (up, down, right, left)

*Lane🡪*A lane will have the attributes of permitted vehicles, width

*Vehicle🡪* A vehicle will have the attributes of name. Vehicles will travel on the road, and can also be pedestrians

**Relationships between Classes**

* A *Road* has *Lanes* and *Intersections* and *Nodes* and *Vehicles*
* An *Intersection* has *Nodes*

**Program Flow**

User will either open program, and be greeted with terminal text message, or GUI text message:

*Step 1: user chooses initialization variables...*

STREET WIDTH: from 10-200feet

NEIGHBORHOOD TYPE: High Density Residential, Mixed Use High Density, Office,

SIMULATION STREET LENGTH: 1-10 blocks

*Step 2: user places traffic lanes(cross-section design)*

LANE WIDTH: from 1-17feet

LANE TYPE: Bicycle Lane ,Traffic Lane,Buffer,Sidewalk,

Data is stored in a list of lanes. Program accesses lane info through get methofs.

*Step 3: initialization plan*

Each intersecting street has four Nodes, our main street has two Nodes at the start and end of the street. Nodes will represent destinations; they will have random pull-and-push factors, but will be influenced by nearby nodes and whether or not the intersection has been designated as a high traffic one. Vehicles will continually be spawned, and based on travel distance and perceived safety, will travel on appropriate form of transportation.

*Step 4: LOS calculations*

* Calculating travel mode choice.
* Calculating travel time by travel mode

*Step 4a: Export statistics*

Exports statistics to a csv file.

*Repeat the steps to Create a new road with design changes!*

*Step 6: Recalculating after road change*

* Calculating mode choice.
* Calculating travel time by travel mode

*Step 7:*

User exits program