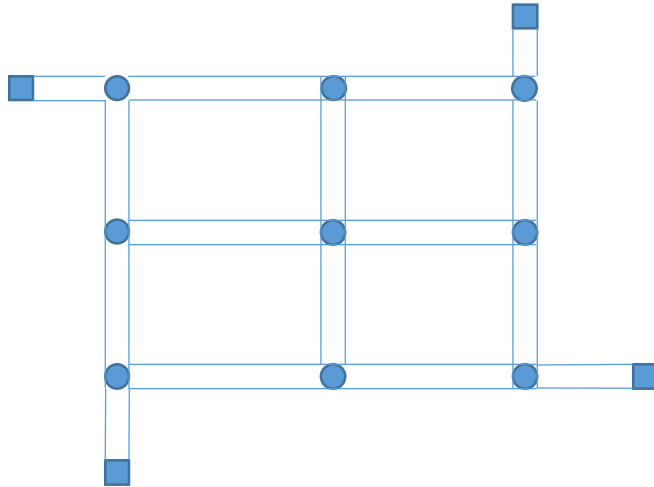


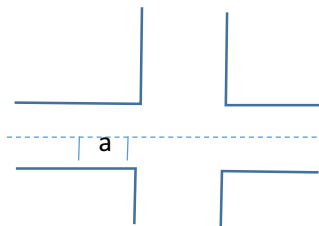
ECEN 689-605/700 Dependable Learning Systems Fall 2018 Project

This project is to design a simplified intelligent traffic system. The road system is like below, which has



three horizontal roads and three vertical roads. Each circle is a road intersection. Each small square is a departure or a destination point. The distance between two neighboring circles is 0.5 mile and the distance from a square to its adjacent circle is $1/30$ mile. A car can either run with speed of 30 miles per hour or stop.

Each road segment between two intersections is divided into 30 uniform-sized slots. Each control step (or time step) is 2 seconds. At each control step, a car must be within a slot. In the next step, it can either stay there or move the next slot. Along each direction, there is a single lane. For example, in the figure below, there is one intersection among four edges. Car 'a' is at the rightmost slot of the left segment. In the next step, it can go to either of the following: (1) go straight to leftmost slot of the right segment, (2) turn right to the topmost slot of the bottom segment, (3) turn left to the bottom slot of the top segment. Between two consecutive time steps, there is at most 1 car crossing an intersection. If at any moment, there are more than one car in the same slot, that is counted as a collision. A car must stop at "red" light as well, and cannot make right turn. The problem formulation is to maximize the total number of cars reaching each of the 4 square node destinations per hour, without any collision, without any red-light signal violation. Each i-group must verify and report the number of collisions and red-light signal violations. There are green and red lights, but no yellow lights.



There are 24 students in the class. They are divided into 3 teams: A, B and C. Each team has two infrastructure groups (i-group), and two vehicle groups (v-group). Each group has exactly two students. You are required to sign up a google doc to form groups by October 5, Friday. If you do not sign up, I will assign arbitrarily.

An i-group will develop a software simulating road infrastructure. It can receive vehicle signals from v-group to know vehicle location, speed and moving directions. **But i-group does not know if a car would make turn or go straight at an intersection.** It will decide the green/red light on/off at each road intersection. Each v-group will develop a software simulating a number of vehicles in the road system. A vehicle starts from one square and moves towards its diagonally opposite square through the road system. It can receive traffic congestion map from **itself**, and then decide the best route to reach its destination in the shortest time. The results for both i-group and v-group are evaluated by overall throughput of the road system, **the number of collisions, and the number of red-light violations.**

Important deadlines:

1. Sign up groups by Oct 5, Friday.
2. Project plan (10 points) due on Oct 17, Wednesday.
3. Progress report (10 points), due on Nov 7, Wednesday.
4. Project demo (15 points), last week of the semester
5. Final report (15 points), due on Dec 5, Wednesday.