

Coen-120 Final Exam Spring 2001

You have just been given the assignment to relieve some of the traffic congestion on the 3.8 mile stretch of Brokaw Road extending East from the San Jose Airport to Hwy 680. There are 21 traffic signals on this stretch of road. At the present time, each signal operates independently without regard to the other signals, and responds to sensors, located immediately at the signal intersection, that detect the crossing of a vehicle..

Recently, 21 additional new sensors have been added (in addition to the existing sensors) and placed in the road midway between the existing signals to assist in the task of relieving the congestion. Each of these new sensors is capable of detecting a vehicle crossing over it.

Your assignment is to create a master monitor that determines the **running average** flow of traffic passing by each of the 42 sensors and informs the next two signal controllers in sequence of the approaching flow of autos. (The signals will be responsible for using this information in determining when to change the signal. You do NOT need to concern yourself with the action of the signals.) The monitor should continuously display all pertinent information about the traffic flow information being received by each of the signals.

Some things that may assist you in creating this monitor are:

A list of the signal controllers and mileages is as follows:

Signal	Mileage from Airport going East	Signal	Mileage from Airport going East	Signal	Mileage from Airport going East
1	0.0	8	1.0	15	2.4
2	0.1	9	1.25	16	2.7
3	0.3	10	1.5	17	2.9
4	0.45	11	1.6	18	3.2
5	0.6	12	1.8	19	3.45
6	0.7	13	2.05	20	3.65
7	0.8	14	2.3	21	3.8

Don't forget, there are two sides to the road, an eastbound and a westbound, and signals are receiving data from both directions.

You should use the PIC serial device to simulate the vehicle detection of the sensors. Also, you may want to use the same button as the input to several sensors to facilitate testing.

You will want to compute a running average of the number of vehicles crossing any given sensor per unit time. (You may choose whatever time interval you think is appropriate) In order to accomplish this, you may need to extend the sensor class to include a time stamp of when the vehicle crosses the sensor. A vehicle is only considered to have passed a sensor if the sensor makes a "off-on-off" transition. A sensor with a steady "on" status is considered to have an auto stopped over it (i.e. flow is stopped, with traffic present).

For the exam, create a Use Case for the monitor, an Object Model Diagram, and an appropriate state chart for each object requiring one. You may wish to include sequence diagrams to assist you in verifying your design, however they are not necessary.

You will have 3 hours to complete your design and testing. You should attempt to demonstrate your final product to me running under VxWorks. You must create a report of your exam and place it in the "StudentDropBox" directory on the server. Please copy your ENTIRE project folder to your Student account.

You should name your exam/project and report with your FirstInitial-LastName (e.g. nquinn).

"That's it, there ain't no more!"