Path Planning Project

The goal of the project is to program a car to be able drive on a highway with desired speed, safe and comfortable.

I started with code from lessons and project Q&A.

On that point I had modules that could lead car on the same lane, and even change it. But it could only change lane once to the left. I've added other states to change lane to the right. That way I use all available lanes. I also added check for safety of the lane change manoeuvre.

In lines 254 – 309 I check the environment if left and right lanes are available for lane change and if our lane is occupied by slower vehicle. I check it base on the s position of other vehicles. For side lanes from -5m to 40m and for my lane 30m forward. In that case I know that I can perform safe lane change. I change lanes in Frenet coordinates in lines 311 – 325. The car prefers to change lane to the left if it is possible.

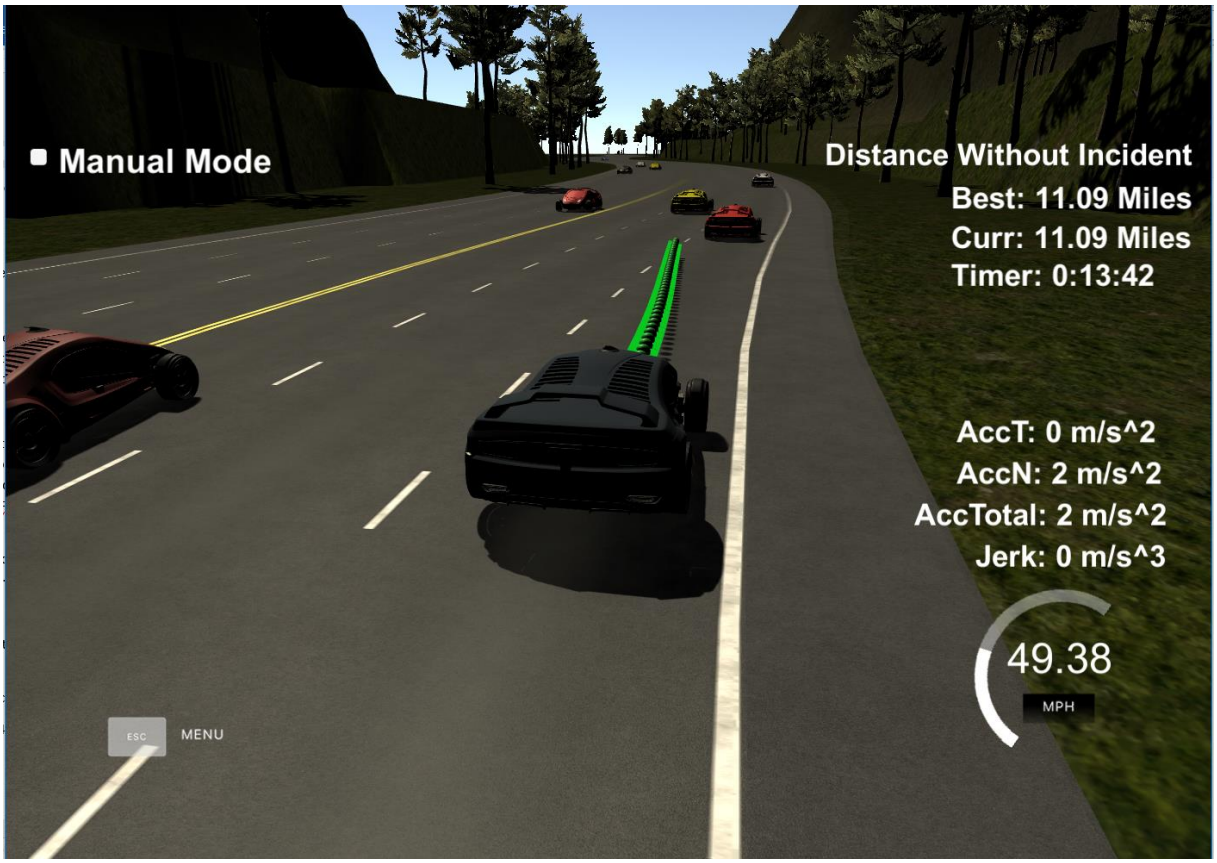
I also check the following car velocity, and for distance 30 to 20 m ahead I try to follow with that car velocity. If host car will be closer than 20m I start to decelerate (lines 327 to 335)

Next I'm creating a path. It needs to be tangent to the car or be continuation of previous path (lines 349 – 373)

Next I change global to local coordinates: 387-394 and create spline (lines397, 400)

In the end in lines 421 - 446 I calculate path itself with desired velocity (ref_vel) as variable for length of the step.

With this algorithm I vas able to drive more than 10 miles without accident.



What can be improved is to add fully monitored highway to add double lane changes. Also the distance for lane change could depend on car velocity.