Khalil Fadhel
Udacity- Self Driving Car Course
Term 1

7 November 2017

Path Planning

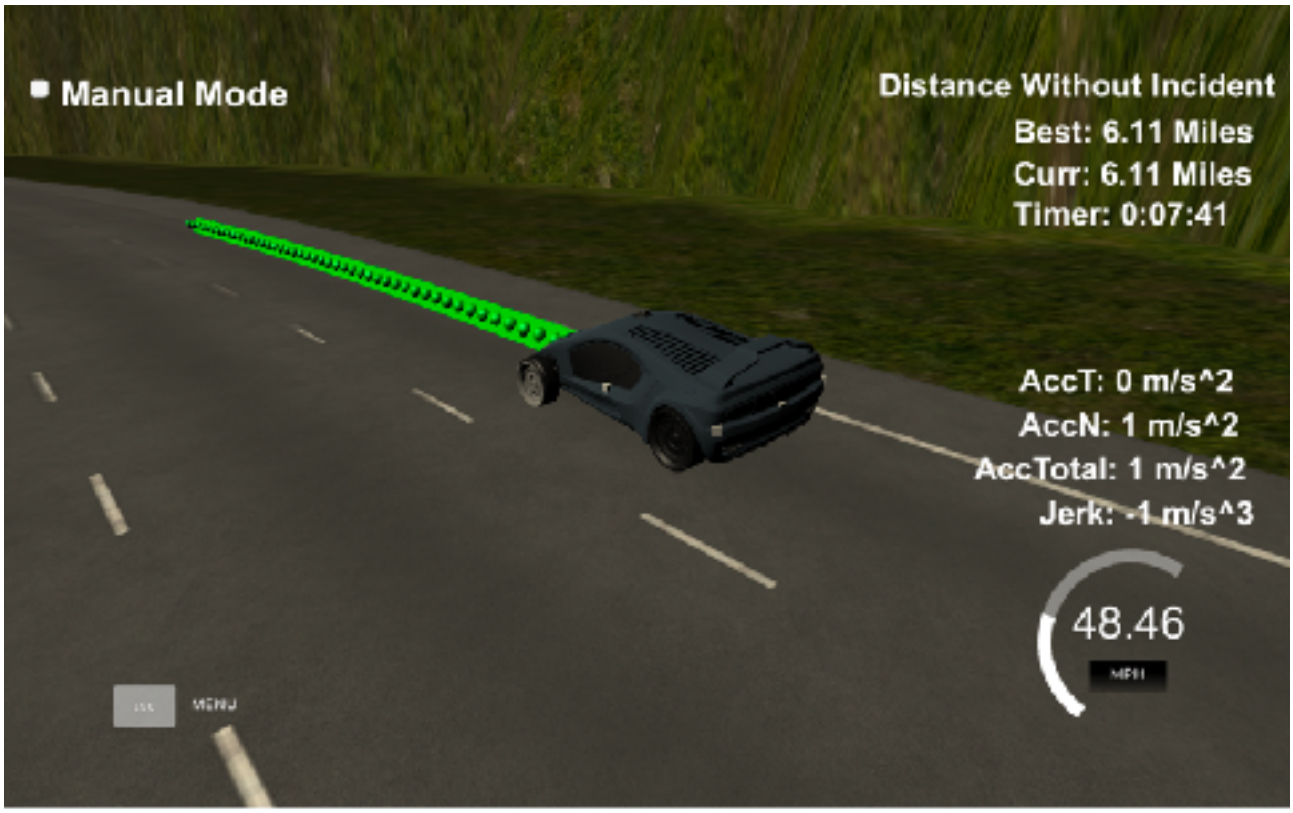

Figure 1 - Path Planning

In this project we plan the path of a car in a high way. We use audacity's simulator to simulate the car movement. The car should drive safe by avoiding collision and respecting the speed limit. The ride should also be pleasant by avoiding high jerk.

Pipeline

We start by following the walkthrough. We calculate the car's angle to change position informations to the car frame. We use frenet to calculate the car's position in sample points in the future and transform them back to Cartesian system after. We fit our sample points using spline then we fill our output vector by points from the resulting polynomial.

After implementing the skeleton, we can work on changing the lane and speed using frenet coordinates. On every round, we check the sensor fusion data and the distance to the nearest car on the same lane. Once we get too close we check whether or not is better to change lane or reduce speed. To do so, we

check the distance and speed of the nearest car in every lane then calculate a cost. In our cost, we emphasise empty lanes and high speed over multiple lane change at once. For every lane update, we update our goal velocity to correspond to either the max speed or to the nearest car on the lane.
To avoid max jerk, we don't change the reference velocity at once to the goal velocity. Instead we increment the velocity literally to reach the goal velocity.

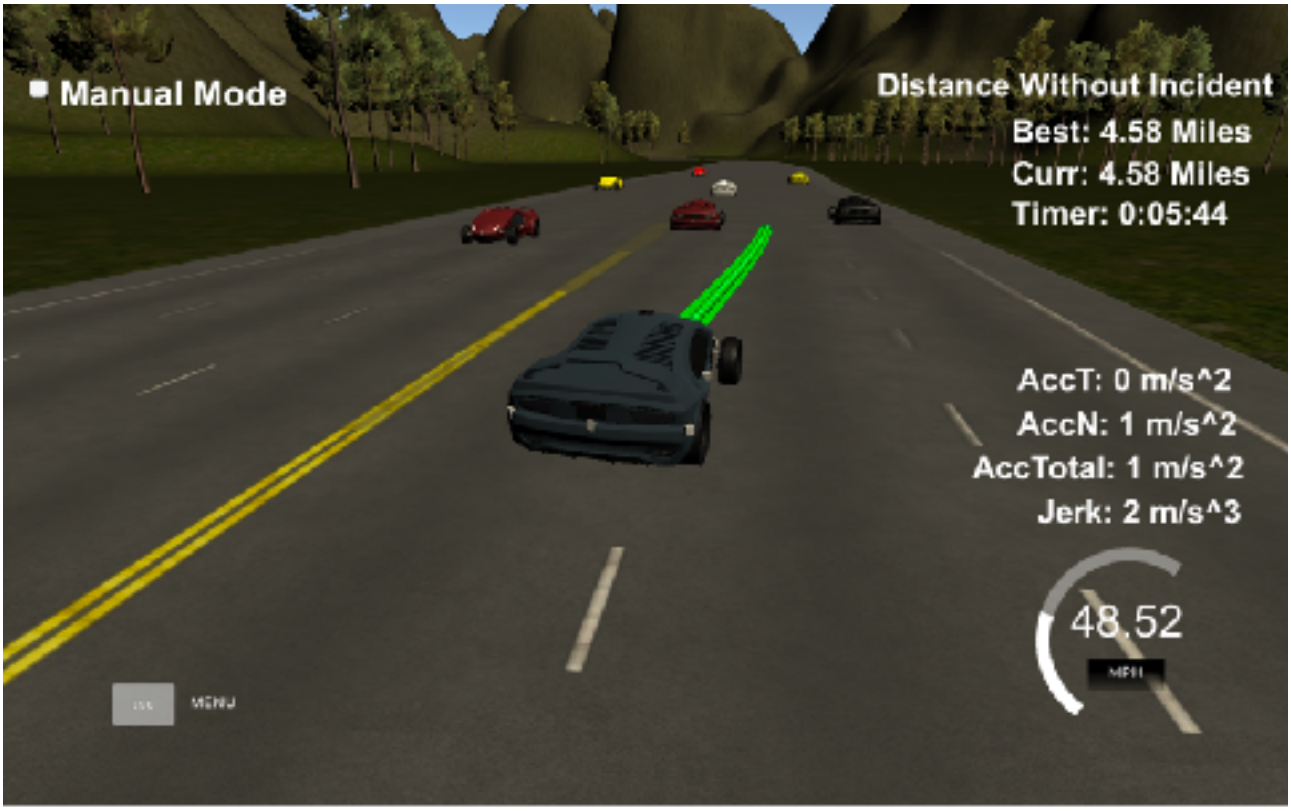

Figure 2 - Lane Change

Conclusion

In this project we've been able to implement a path planner. We learnt to use frenet coordinate to facilitate the math in path planning and spline to fit pos data.