## The Model :

I applied the kinematic model taught as part of udacity training program. The model combines state and actuations from previous timestamp to calculate the state for current timestamp . The state model is represented by the vehicles position, orientation angle (in radians) and velocity. A cross track error (distance of vehicle from trajectory) and an orientation error (difference of vehicle orientation and trajectory orientation) were also included in the state model.Two actuators were used, delta — to represent the steering angle (normalised to [-1,1]) and a — for acceleration corresponding to a throttle, with negative values for braking.

## Timestep Length and Elapsed Duration (N & dt):

The values chosen for N and dt are 10 and 0.1, respectively. Other values gave errors. The values tried are 50 and 0.5, 15 and 1.5 , 10 and 0.05 and lot more.

## Polynomial Fitting and MPC Preprocessing:

The waypoints are preprocessed by transforming them to the vehicle's perspective. This simplifies the process to fit a polynomial to the waypoints because the vehicle's x and y coordinates are now at the origin (0, 0) and the orientation angle is also zero.

## Model Predictive Control with Latency:

he original kinematic equations depend upon the actuations from the previous timestep, but with a delay of 100ms (which happens to be the timestep interval) the actuations are applied another timestep later. The new state after applying the kinematic model is being used as the current state for cost evaluation and actuation. Please refer to line number 182-195 from MPC.cpp.