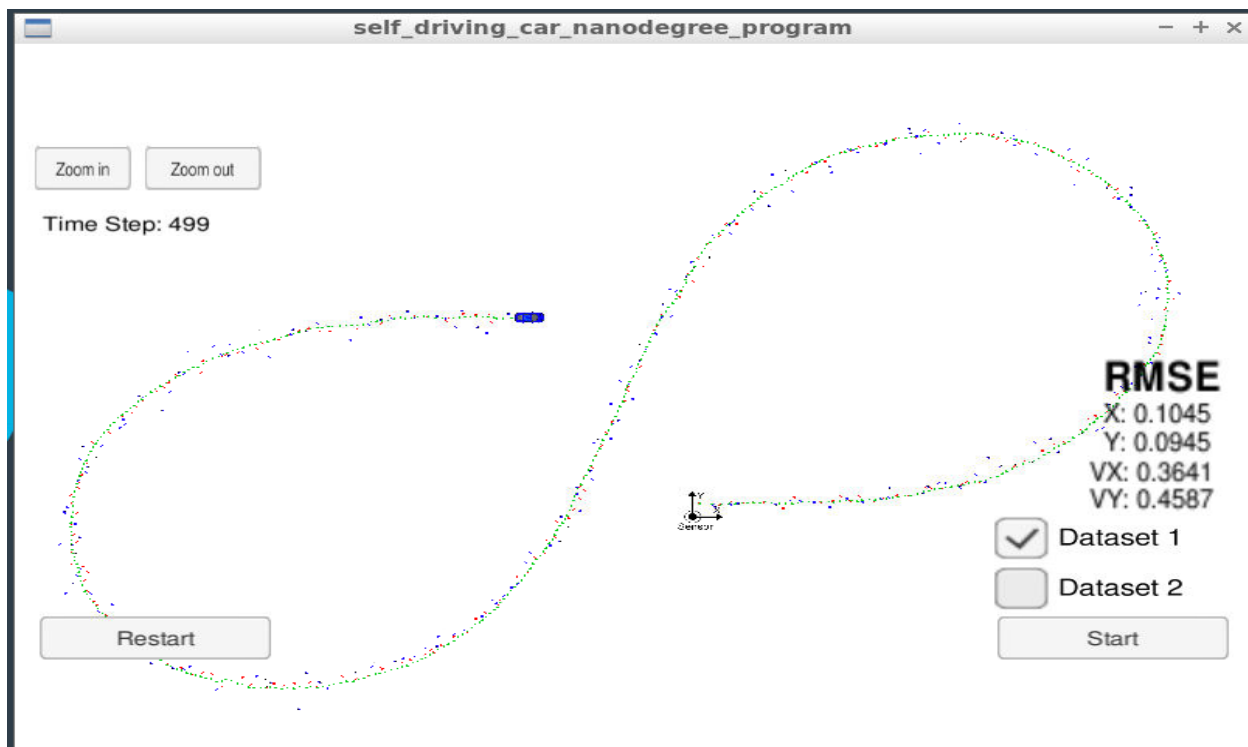


## Extended Kalman Filter

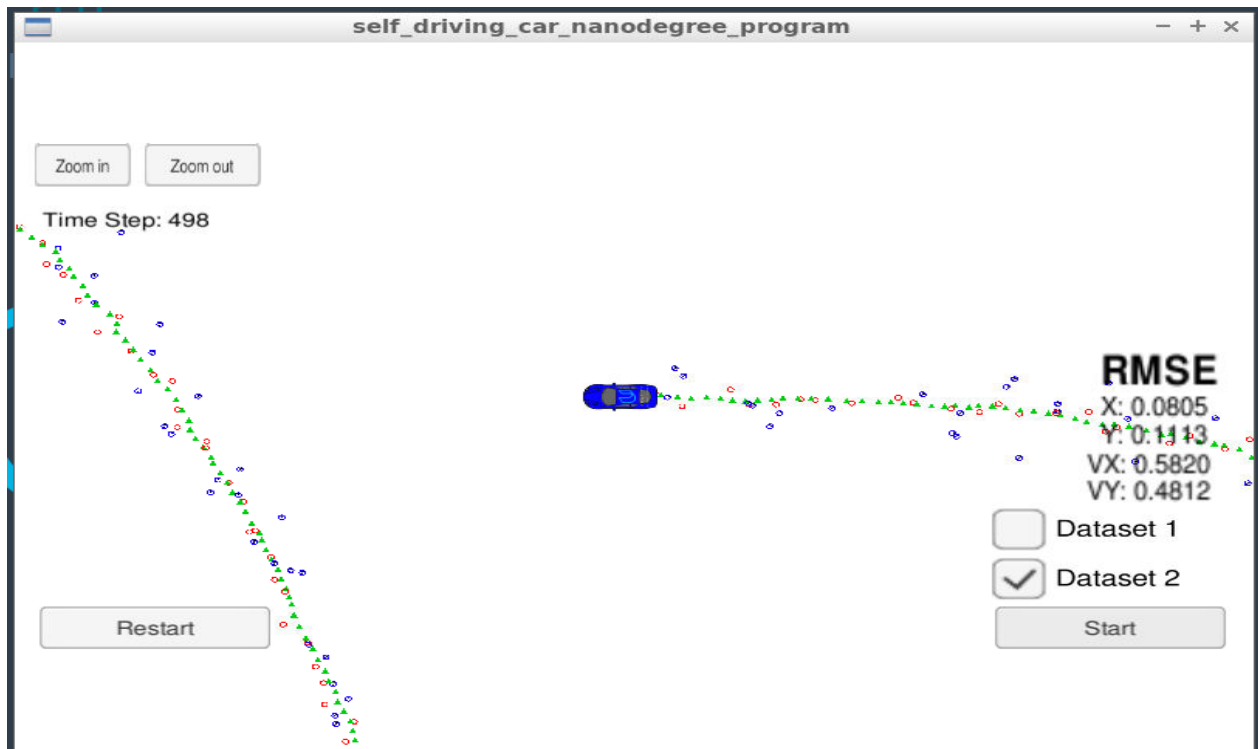
EKF is tested with Lidar and Radar data points. New estimate shows  $p_x$ ,  $p_y$ ,  $v_x$ , and  $v_y$  RMSE values as less than or equal to  $[.11, .11, 0.52, 0.52]$ .

Results of the EKF are presented as an image for different approaches.

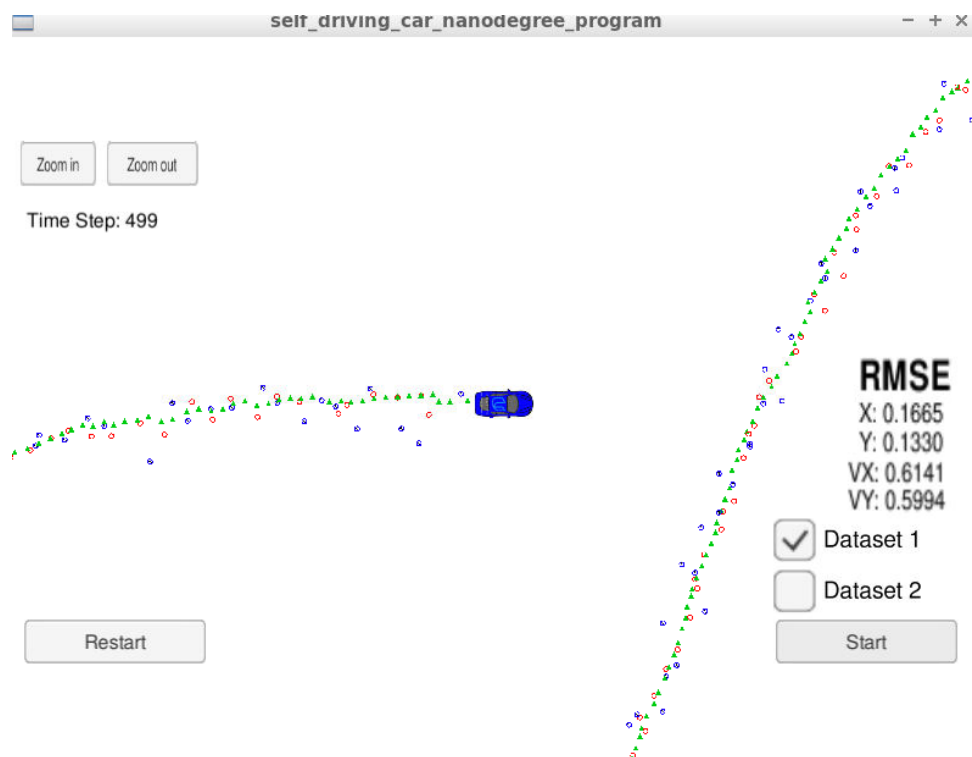
With Lidar and Radar DS1



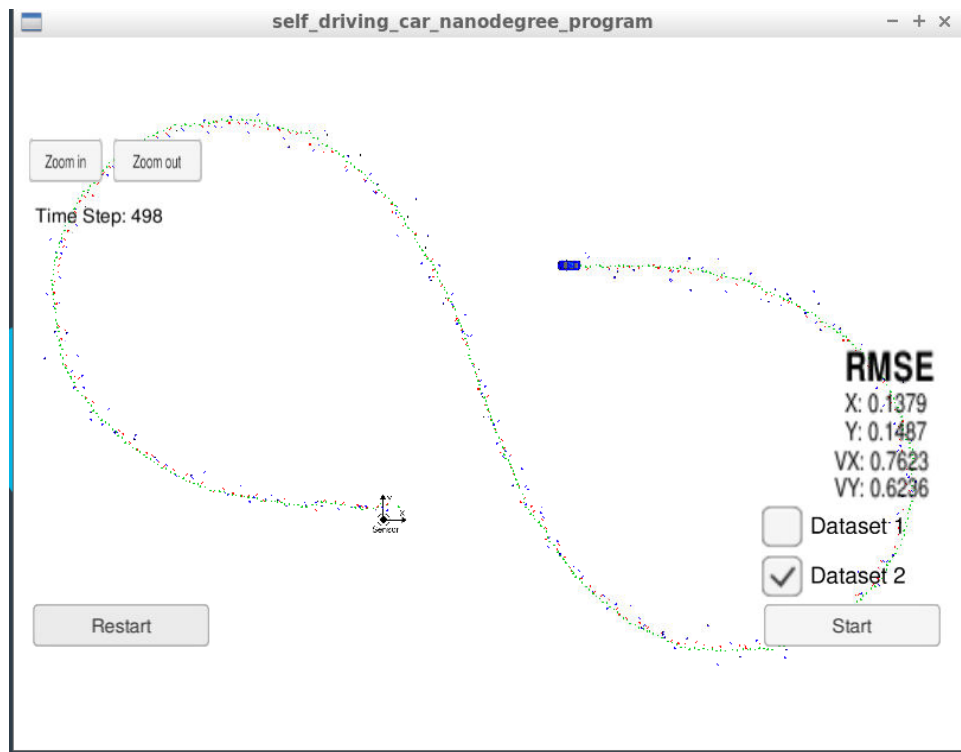
With Lidar and Radar DS2



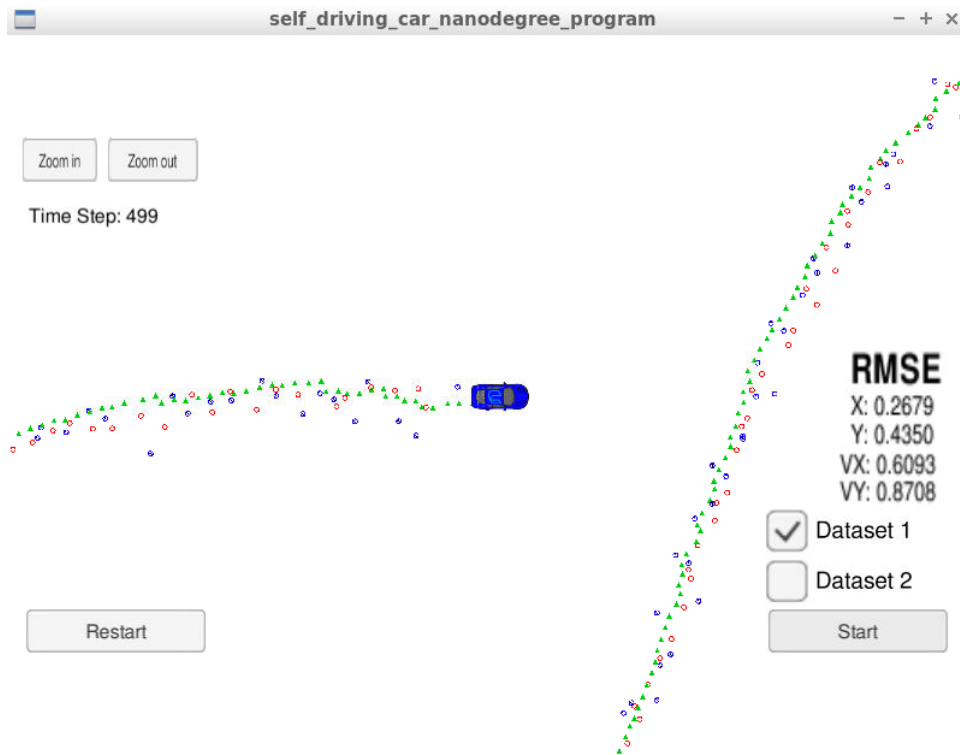
With Lidar only DS1



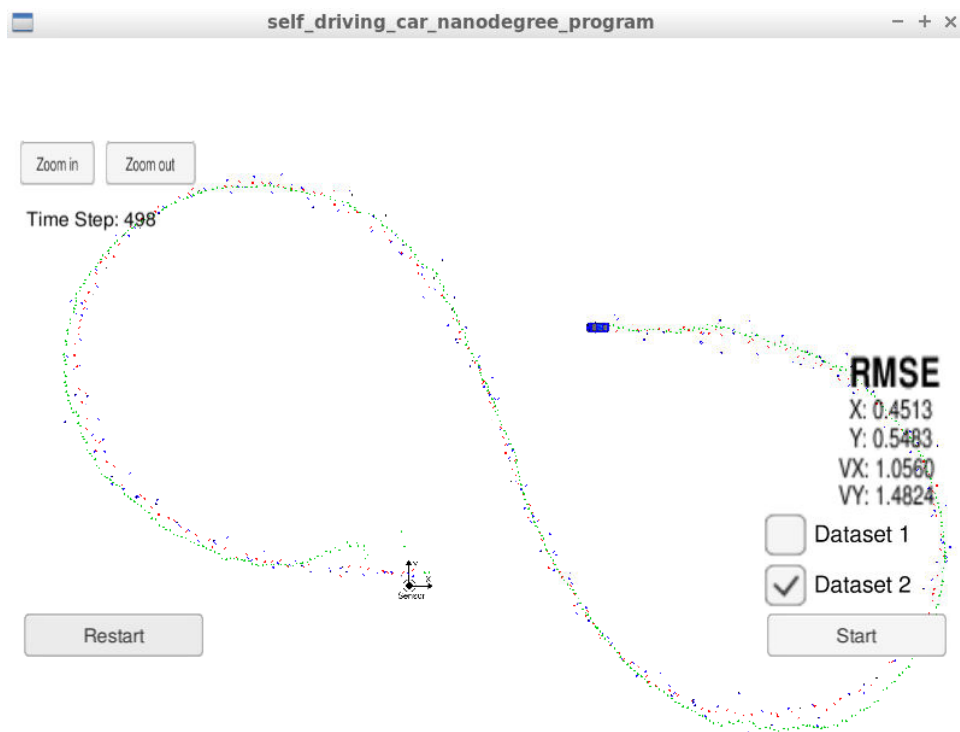
With Lidar Only DS2



With Radar only DS1



With Radar Only DS2



Performance Analysis with Only LIDAR and RADAR:

With the above different approaches to the EKF, we see fusion RMSE output values are close to zero than only with Lidar or RADAR. When LIDAR and RADAR performances are compared, we see LIDAR are very good in straight line where as during curves RADAR performances are better compared to LIDAR. Thus both are compensating for their inefficiencies when they are fused together in the EKF.

In the fusionEKF.cpp file I have initialized the lidar and radar input values with the simulator data. This was done in order to have output vx closer to 0. Otherwise it overshoots initially and then settles to expected values.