Term2: Project2 - Unscented Kalman Filters

1. Attached ukf.cpp and tools.cpp files.

The screenshot below shows the RMSE values when both Laser and Radar updates are used for predictions. The values are below the requirement of

[.09, .10, 0.40, 0.30].

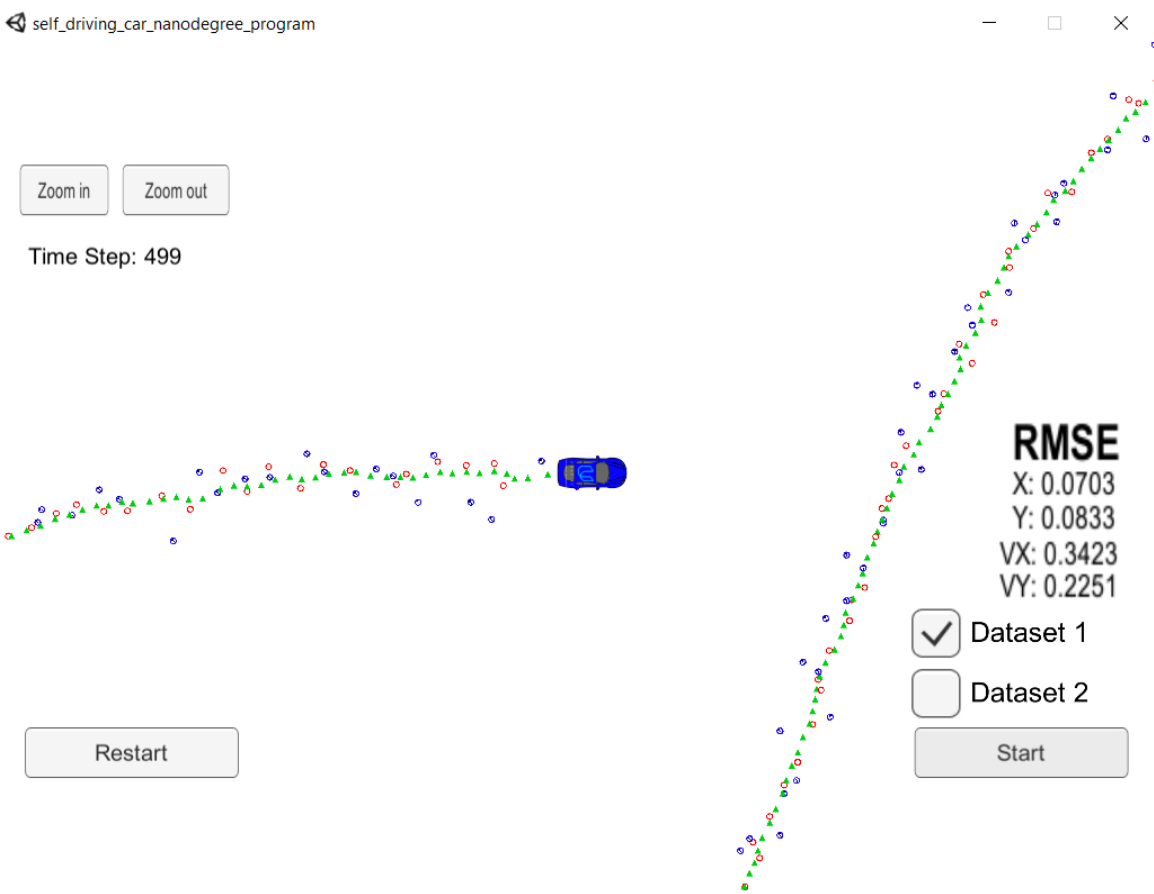

Fig.1 RMSE values with Radar updates - ON, Laser updates - ON

2. I then turned off Laser updates(in the ukf file) and used only Radar updates to see how it'd affect the RMSE values. See below screenshot.

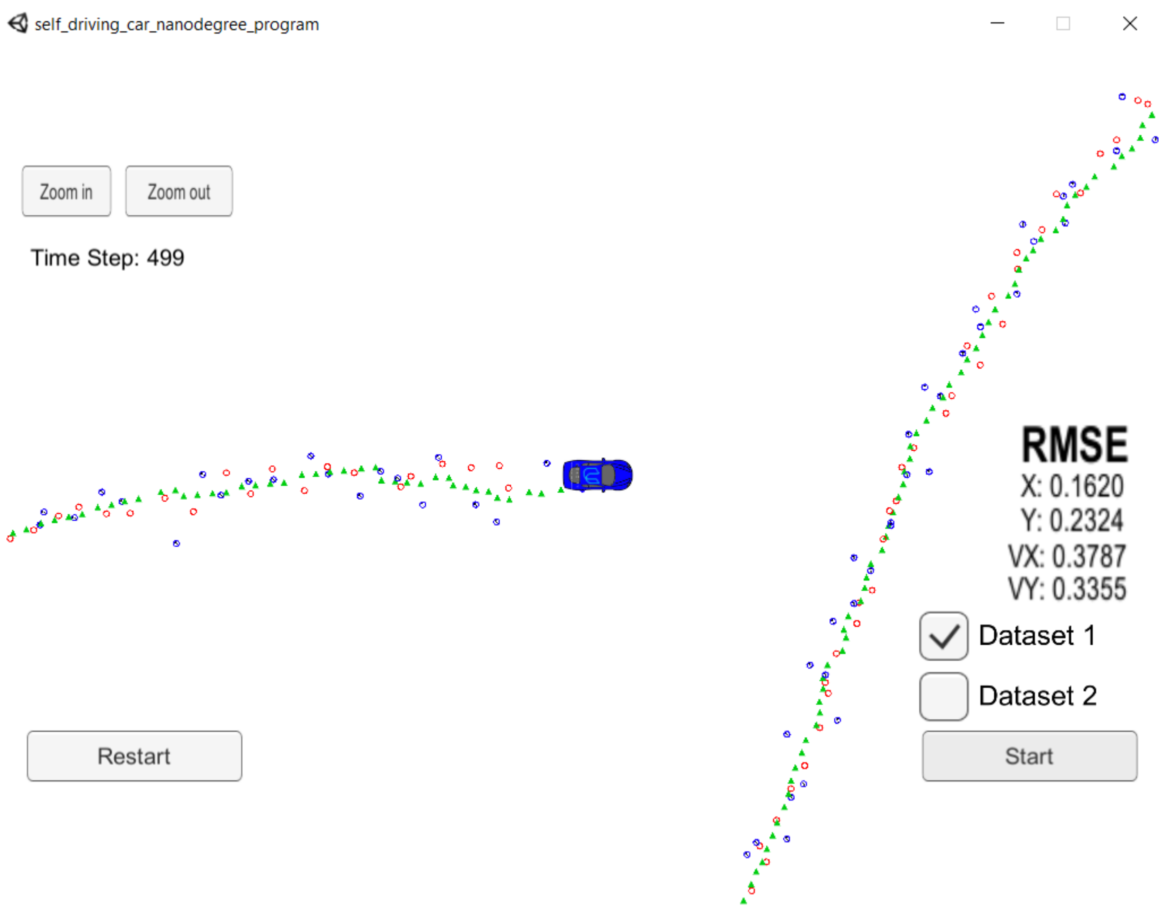

Fig.2 Radar updates - ON, Laser updates - OFF

3. Later turned off Radar updates(in the ukf file) and used only Laser updates to see how it'd affect the RMSE values. See below screenshot.

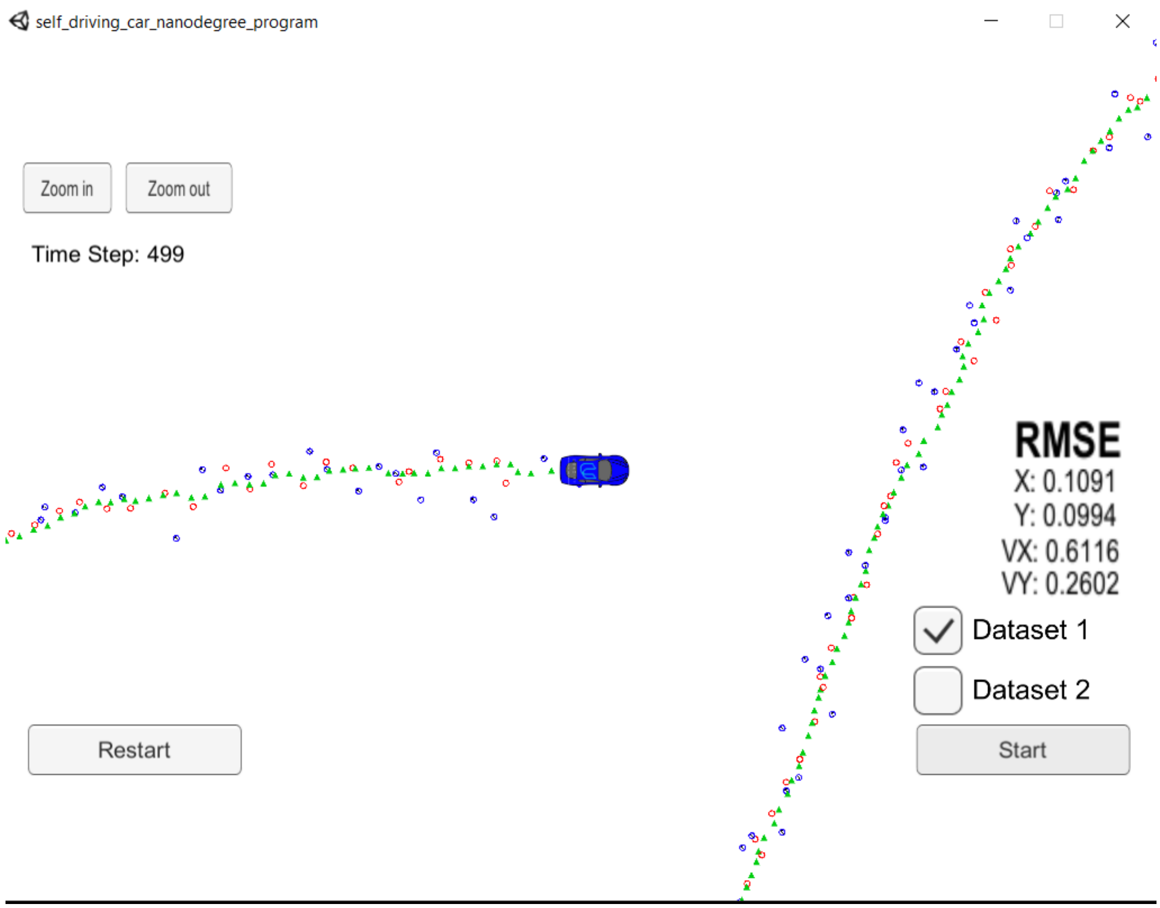

Fig.3 Radar updates - OFF, Laser updates - ON

Conclusion: From the RMSE values it can be seen that Laser sensor provides more accurate updates for position in this case. There's higher error in poistion in Radar compared to Laser which can be attributed to the higher resolution of Laser sensors.

But only after combining Laser and Radar updates, the RMSE values for both position and velocity got down below the acceptable levels.

Also, the RMSE values with the CTRV model using Unscented Kalman filters (0.0703, 0.0833, 0.3423, 0.2251)are better, especially for velocity, than those of Extended Kalman filter in Project1 (0.0973, 0.0855, 0.4513, 0.4399).

This is because the CTRV model is more precise than the constant velocity model used in the EKF project. And UKF is also known for handling non-linear equations better than EKF.