# Final project : Sensor Fusion & Tracking

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Write a short recap of the four tracking steps and what you implemented there (EKF, track management, data association, camera-lidar sensor fusion). Which results did you achieve?

1) Extended Kalman filter :
   There was implementation of Extended Kalman update for a signal track.
   Following is the results of single object tracking with extended Kalman filter
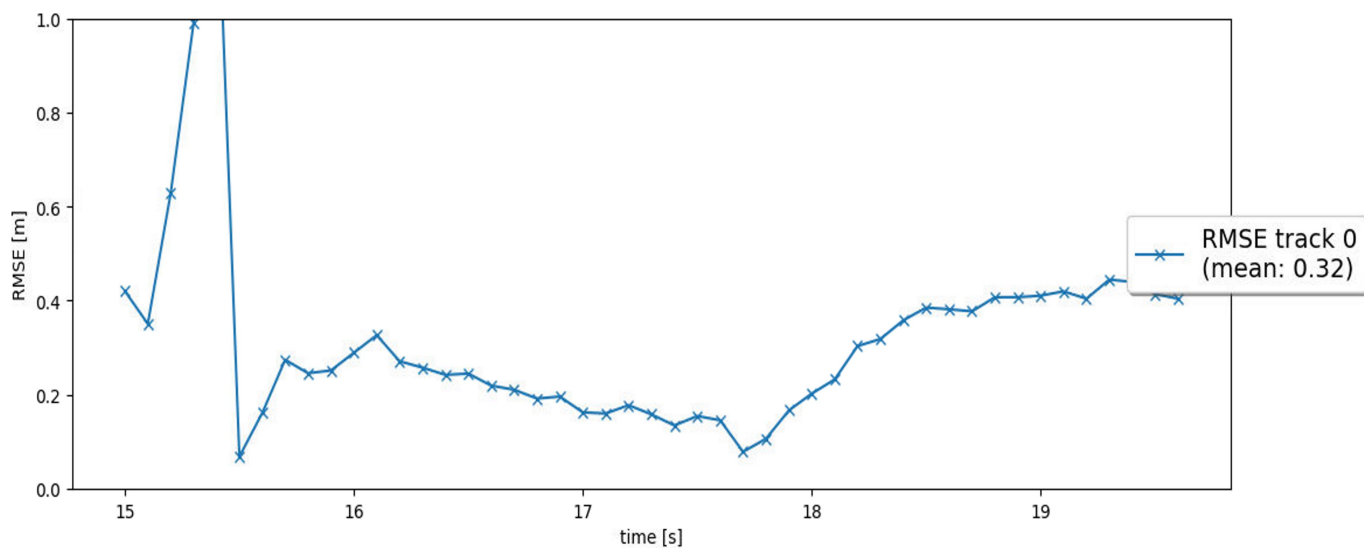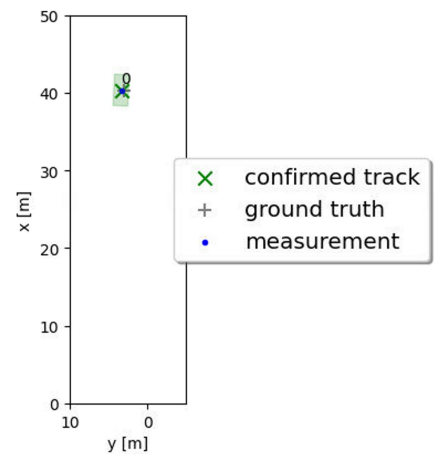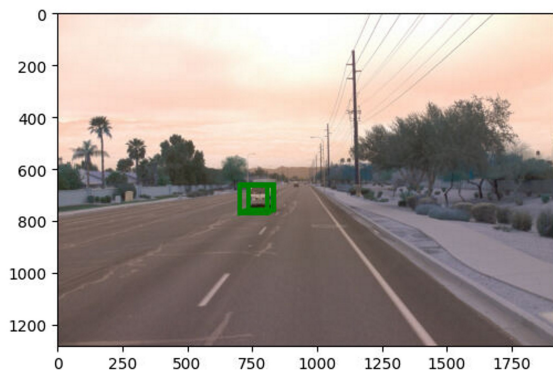
## 2) Track Management

In the next step implementation of track management for a single track. With that measurement is associated with the track. It confirmed only when track is consistent otherwise track is discarded.
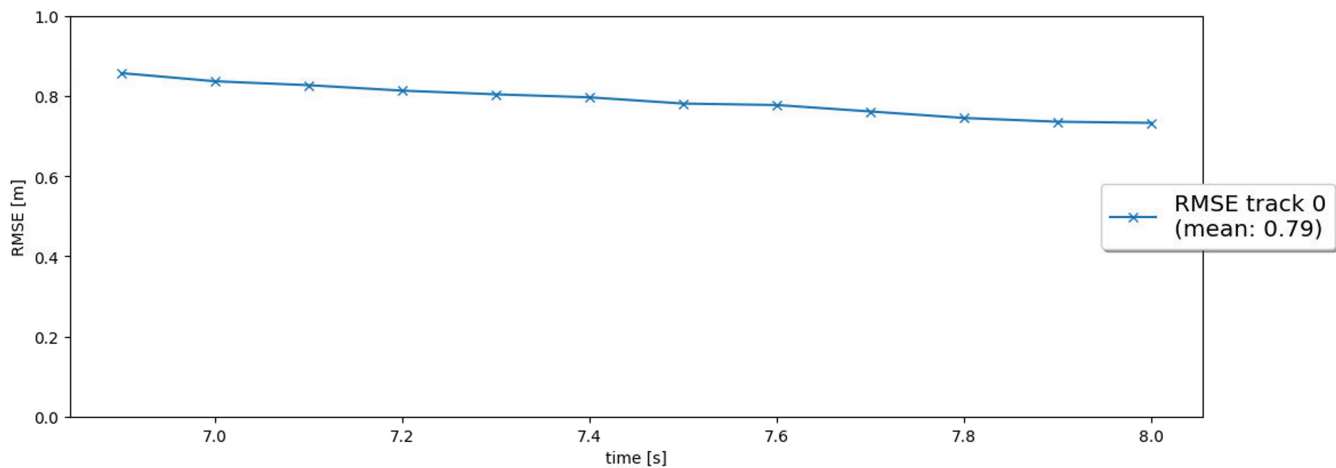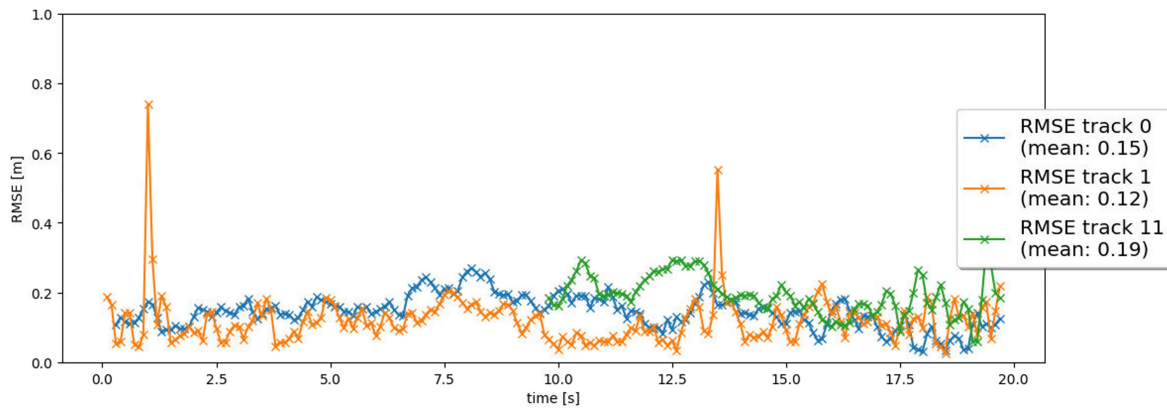


## 3) Data Association

Tracks are aligned with respective measurement according to least Mahalanobis distance between the tracks and the measurements. In addition to that gating is used to filter the measurement association to the track.
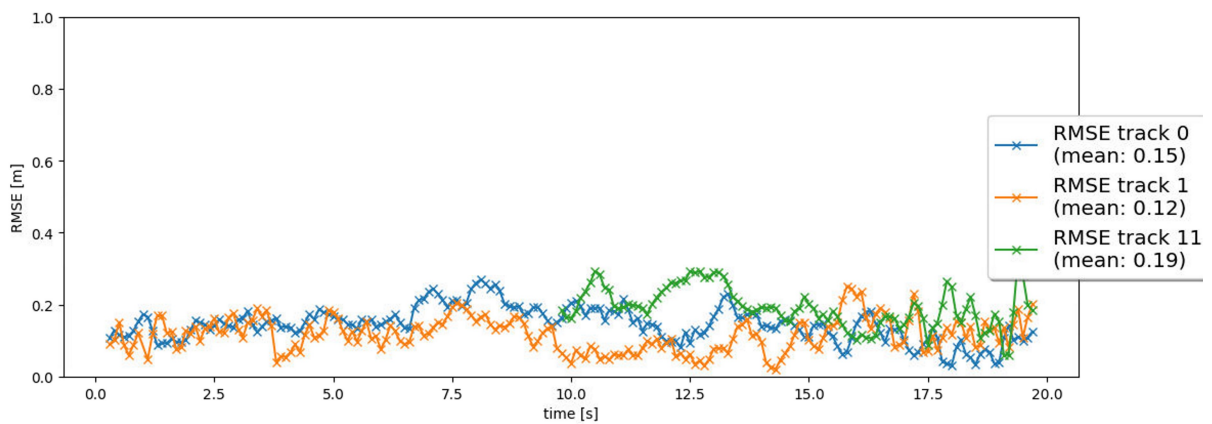


## 4) Measurement

Camera measurement is included to the measurement update step which helps to improve the tracking accuracy.

- ## Which part of the project was most difficult for you to complete, and why?
  - Overall project is well organised & structured. The EKF part was difficult to implement as it was not clear at initial stage after going back to videos & exercises that helped me.


- ## Do you see any benefits in camera-lidar fusion compared to lidar-only tracking (in theory and in your concrete results)?
  - Theoretically, In this project i can understand with association of camera & lidar sensor we got better results. Practically when we observe & compare the RMSE in fig 3 & 4, there is less fluctuation in the plots .

- ## Which challenges will a sensor fusion system face in real-life scenarios? Did you see any of these challenges in the project?
  - In real life scenario the main challenge is the environment.(rain , snow, water log on the road) in these condition measurements will have error & noise. In this project measurement was almost clear.

- ## Can you think of ways to improve your tracking results in the future?
  - We can improve the tracking results by adding below data in sensor fusion :
    a. Including the GPS measurement of ego vehicle & near by vehicles.
    b. Setting depth camera in measurement.
    c. Using Radar data