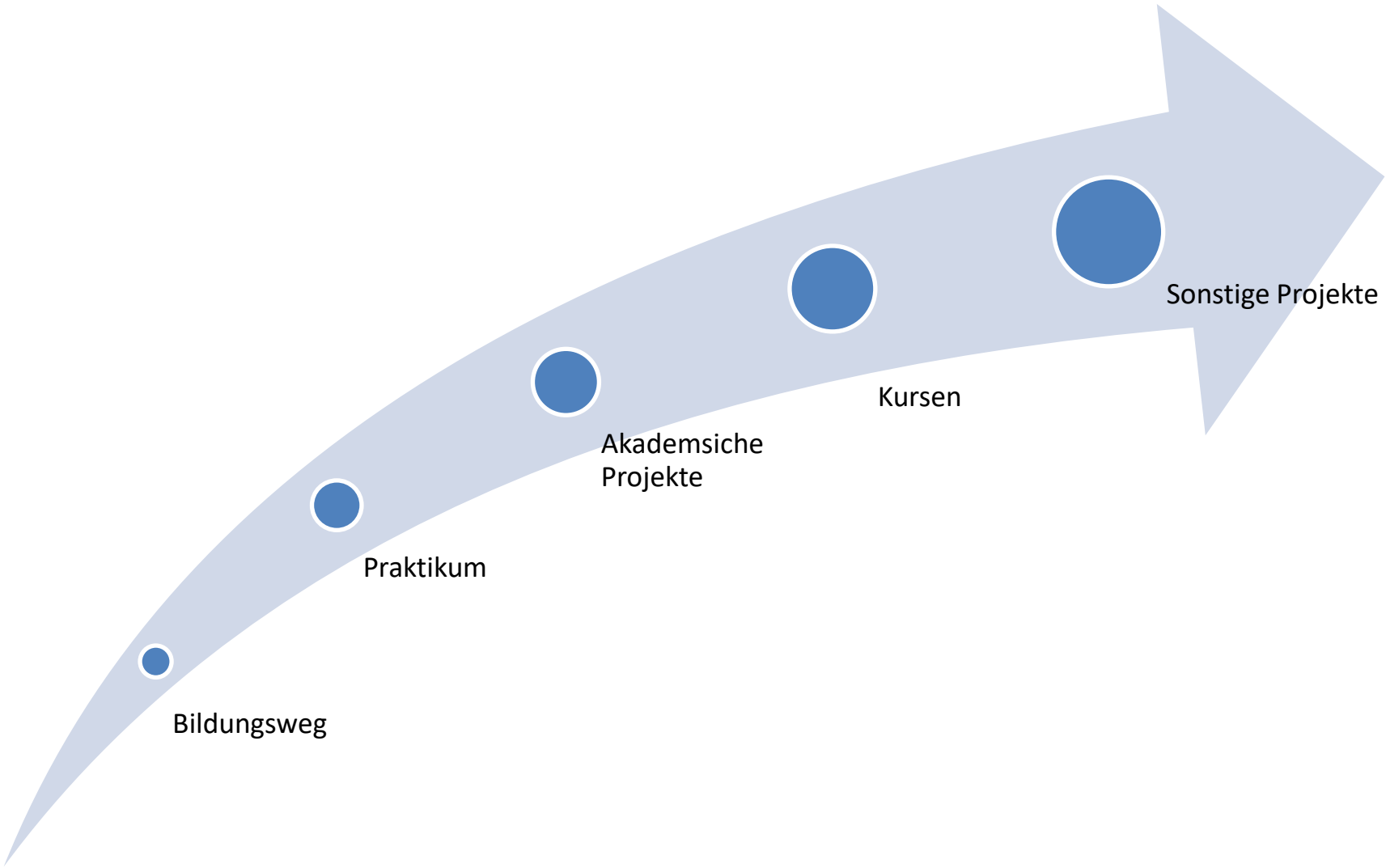
Portfolio

Roshan Sathyanarayana Shenoy

Agenda


Bildungsweg
Praktikum
Akademsiche Projekte
Kursen
Sonstige Projekte

Roshan Sathyanarayana Shenoy

Masters Student bei Technische Universität Kaiserslautern

Bildungsweg

Seit 10/19

Masters in Nutzfahrzeugtechnik, Vorläufige Noten: 2,1

Vertiefung:

Intelligente Systeme

Relevante Kursen:

2D Bildverarbeitung, Grundlagen des Software Engineering, Machine Learning I: Foundations, 3D Computer Vision

09/11 – 07/15

Bachelors in Maschinenbau, Deutsche Äquivalente Noten: 1,5

Relevante Kursen:

Engineering Mathematics, Computer Concepts and C Programming, Fahrzeugtechnik, Regelungstechnik

Bachelorarbeit:

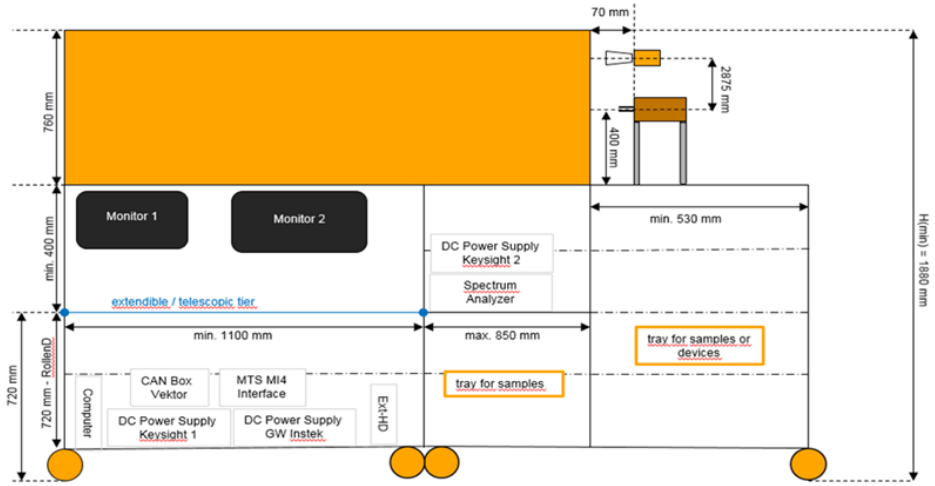
Effect of Boron Nitride on Mechanical, Friction and Wear Behaviour of Polyaryletherketone Composites.

Engagement und Erfolge

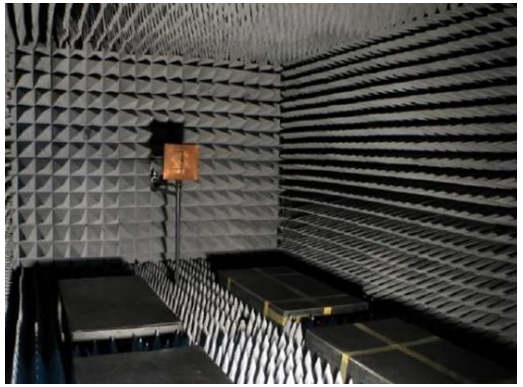
- Deutschland Stipendium 2019-20.
- ABCD (Above and Beyond the Call of Duty) Auszeichnung für vorbildlichen Beitrag zum Aufbau einer Belt-Routing-Kooperation.
- Patent zum Thema, Replacement of Femoral Metal Stem in Total Hip Arthroplasty with a Novel Composite Material beantragt (Patentanmeldungs-nummer: 5807/CHE/2015).
- Ein Forschungsbericht über "Optimization of wear behaviour of boron nitride filled polyaryletherketone composites by Taguchi approach" wurde am 31. Mai 2019 in Material Research Express veröffentlicht.

Praktikum (09/21 – 05/21) bei Continental ADC GmbH

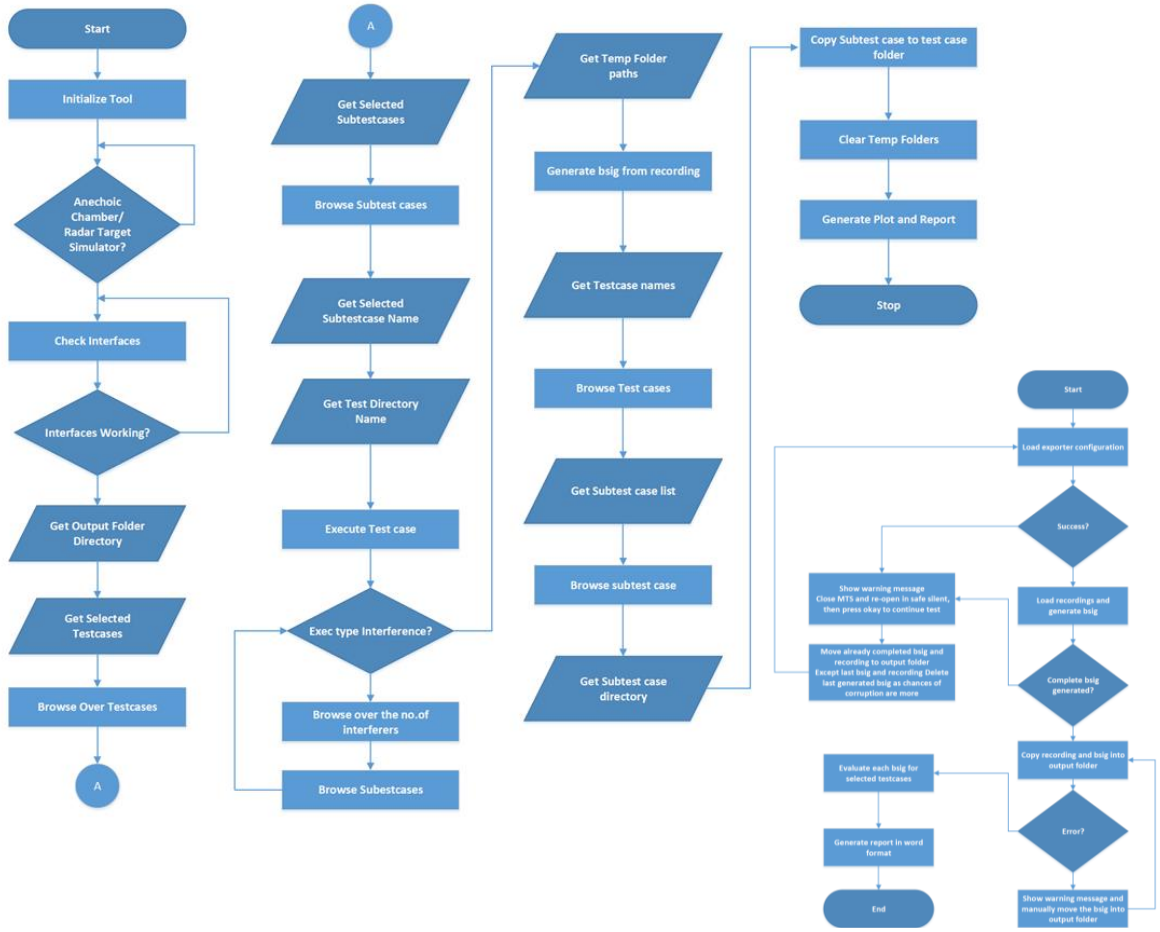
1. Test Automation Framework Entwicklung



RTS Blockschaltbild



Anechoic Chamber

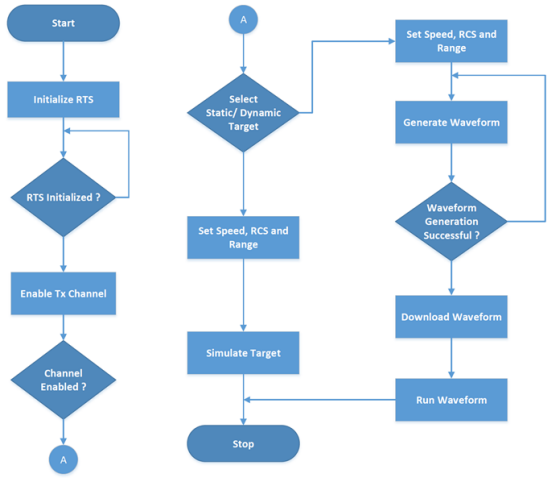


Test Exekution und Evaluation Flow Diagramm

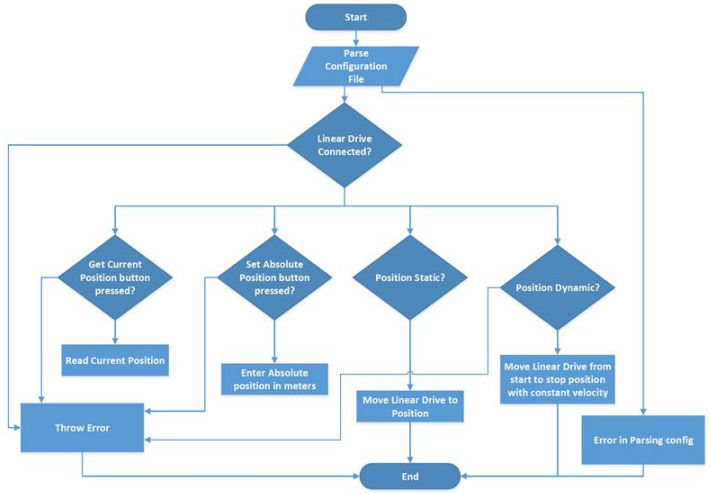
Praktikum (09/21 – 05/21) bei Continental ADC GmbH

2. Kontrollierung von Verschiedene Steuergeräte

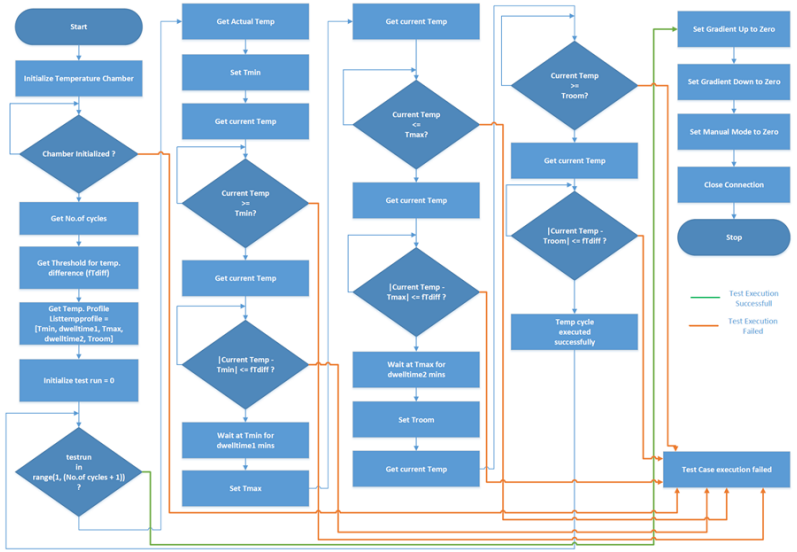
Radar Target Simulator



Lineare Antriebe



Temparatur Chamber

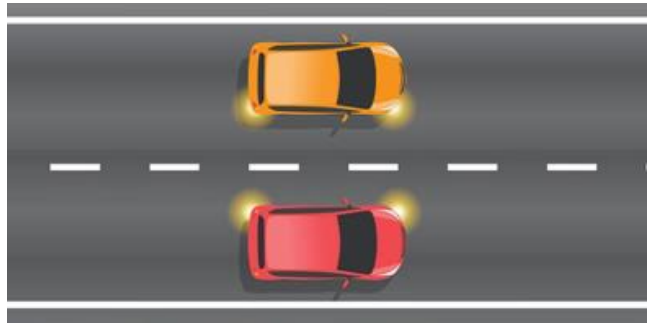


Drehmotoren

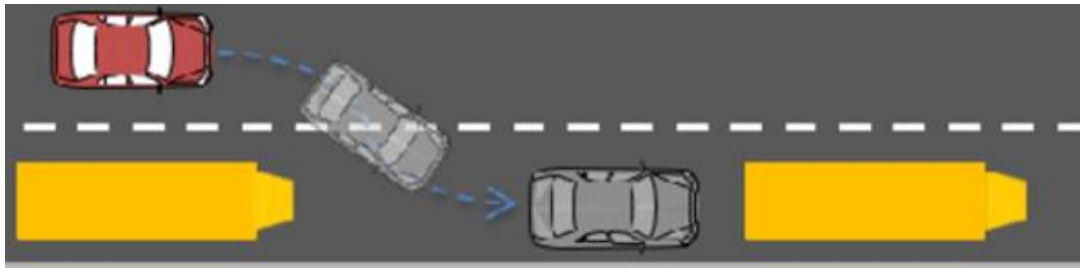
Datenerfassungssysteme

Praktikum (09/21 – 05/21) bei Continental ADC GmbH

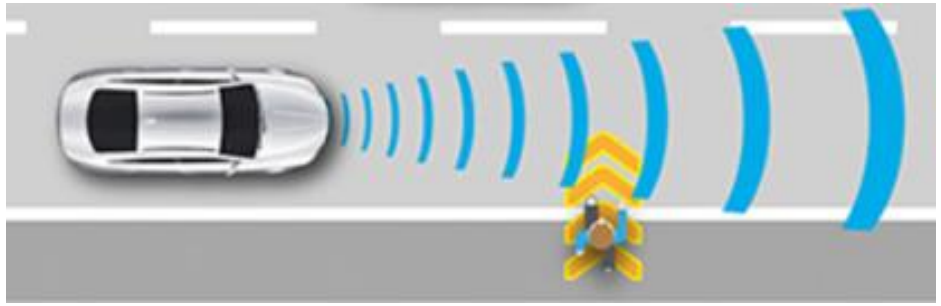
3. Integrierung von EURO NCAP Test Szenarian



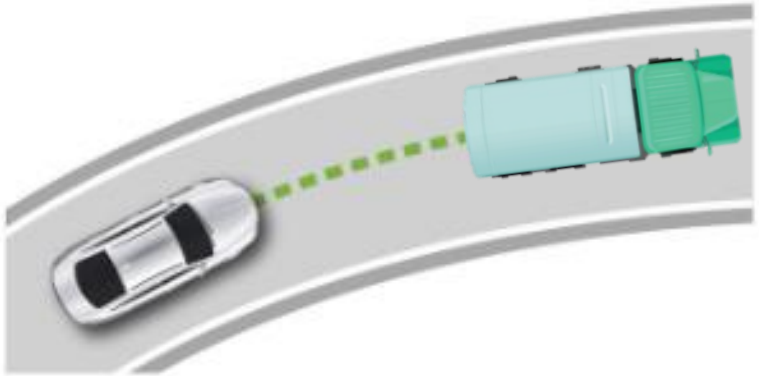
Parallel Fahren



Cut-in Fahren



Cross Moving Fahren



Kurve Fahren

- Python Bibliotheken: PyQt, Pyserial, ctypes, pandas, numpy und matplotlib
- MATLAB
- CANoe, Esys

Akademische Projekte

Projekt

10/20 – 04/21

Environment perception, mapping and motion planning for Autonomous mobile robots

- Recherchierte der Verwendung von Dense-Objektdeskriptoren zur Erkennung von 1-D-Objekten für die Roboternavigation.
- Bewegungsplannung durch A star und sample based (Rapidly-exploring Random Tree) algorithmen.
- Simultaneous Lokalizierung und Mapping (SLAM) für die Schätzung von Roboterposition und Umgebung.

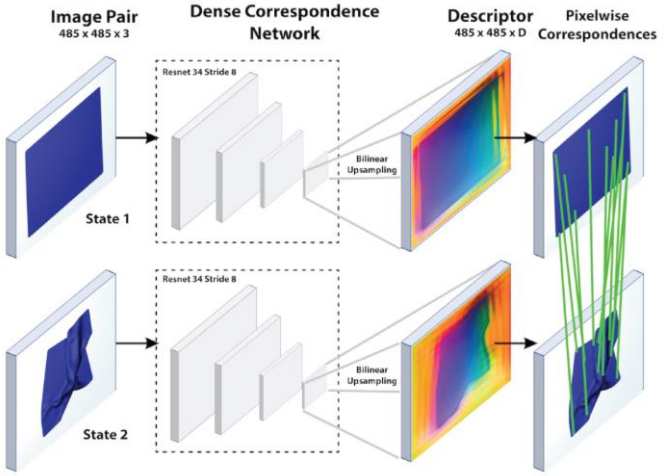
Aufgaben

- Detektion von 1D objekte wie kabeln zur roboter navigation über ein unbekanntes Terrain.
- Detektion von Kannten, Ecke und Topgraphie von objekt

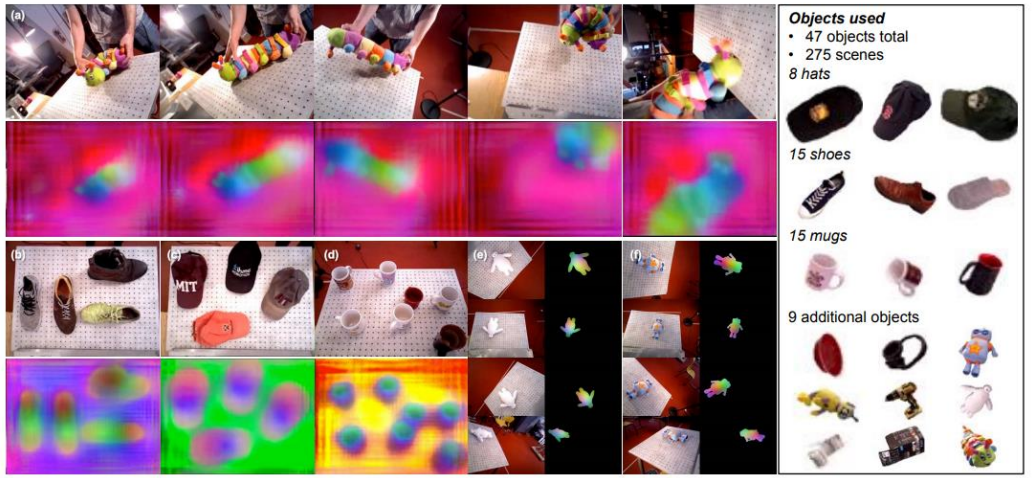
Tools Used

- Python Bibliotheken: pytorch, pandas, numpy and matplotlib

Images



Dense Descriptor generation pipeline



Gelernte Deskriptor Korrespondenz

Github link

https://github.com/rshn1994/pytorch-dense-correspondence.git

Projekt

Hearausforderungen

Toolkette

Images

Github link

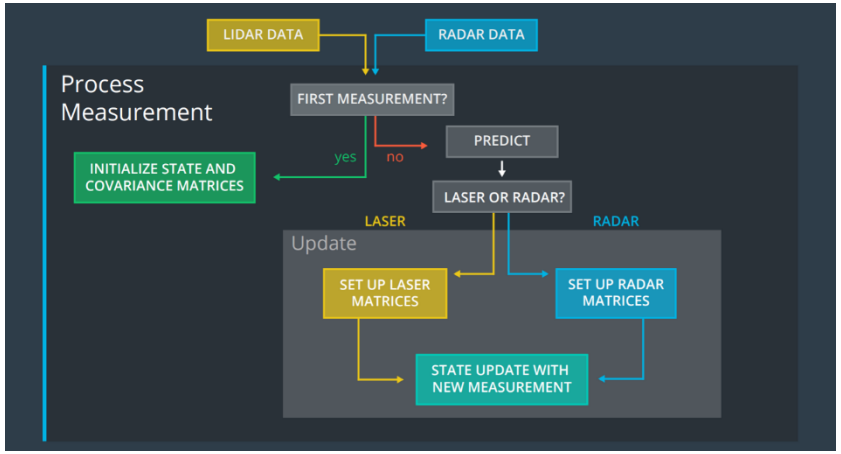
10/19 – 09/20

A Comparative Study: Sensor Fusion of LIDAR and RADAR using Kalman Filter and Extended Kalman Filter

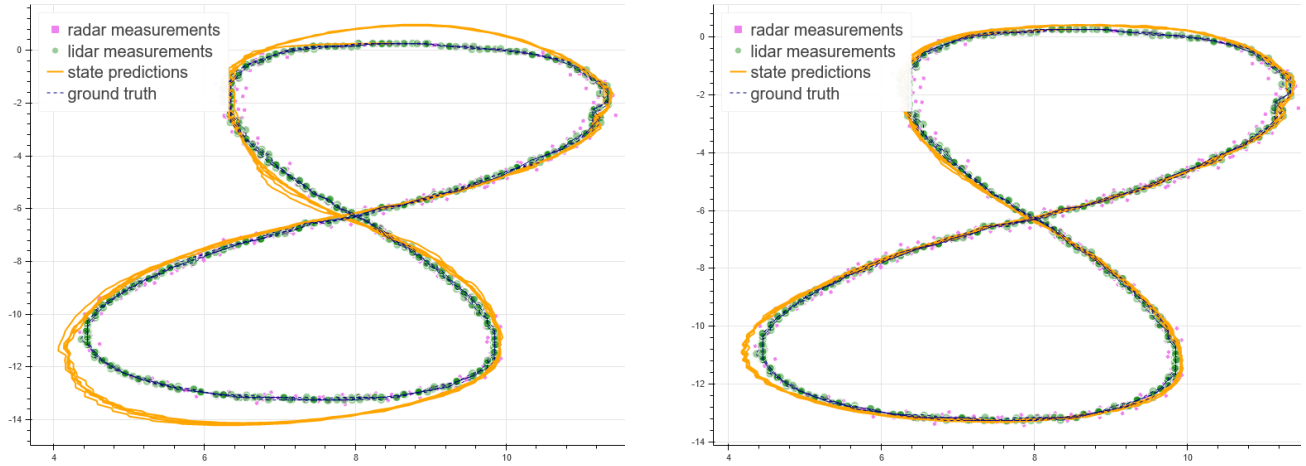
- untersuchte die Parameter, die die Auswahl von LIDARs und RADARs beeinflussen.
- Modelierung von Kalman Filter und Erweiterte Filter für abstand and geschwindigkeit schätzung.
- Vorhersage vergleich von Kalman Filter and Erweiterte Kalman Filter mit dem aktuelle ground truth werten.

- Problem bei der Umstellung von polaren in kartesische Koordinaten für RADAR.

- Python Bibliotheken: pandas, numpy und matplotlib



Kalman Filter Working Flowchart



Application of Kalman Filter on (left) and Extended Kalman Filter (Right) on RADAR and LiDAR

https://github.com/rshn1994/A-Comparative-Study-Sensor-Fusion-of-Lidar-and-Radar-using-Kalman-Filter-and-Extended-Kalman-Filter.git

Kursen

Machine Learning 1: Foundations

Projekt

04/21 – 09/21

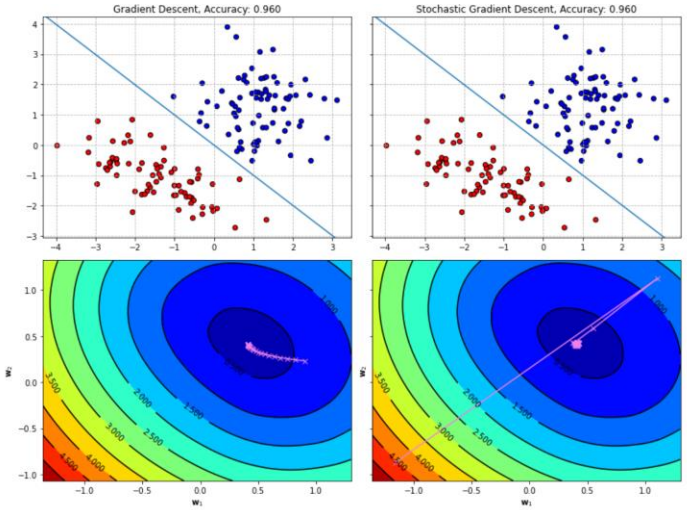
Programmierung Übungen

- Übung 1: Linear Support Vector Machine Reference implementation und Nearest Centroid Classifier.
- Übung 2: Gradient Descent und Linear Support Vector Machine Implementation.
- Übung 3: Multi Class und Kernel SVM Implementation.
- Übung 4: Artificial Neural Networks (LeNet-5 Architecture und ANN).
- Übung 5: K-Means und Dbscan clustering implementation.

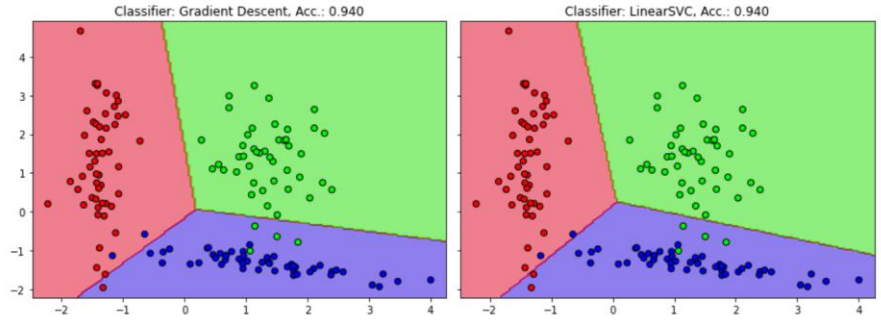
Toolkette

- Python Bibliotheken: scikit learn, pytorch, pandas, numpy, os, sys und matplotlib

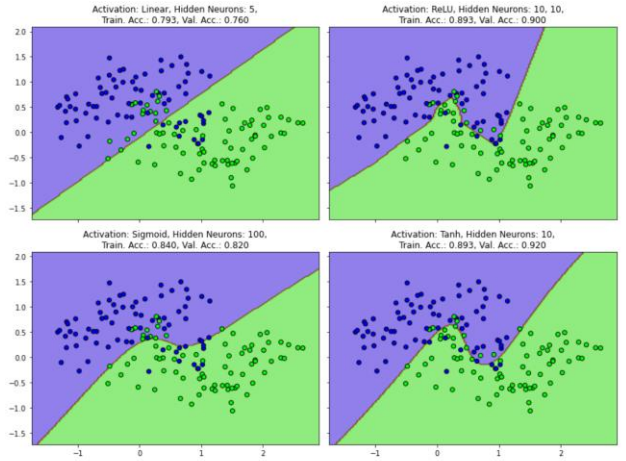
Ergebnisse



Gradient Descent



Multi Class SVM



Neural Network Classifier

Projekt

Toolkette

Ergebnissen

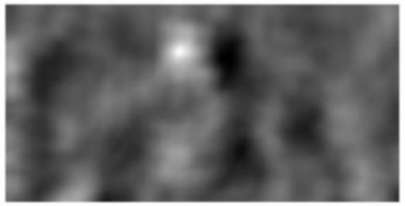
2D Bildverarbeitung

04/21 – 09/21

Programmierung Übungen

- Übung 1: Template Matching, Image smoothening, Image Noises, Fourier Transform, Integral Histogram.
- Übung 2: Canny Edge, Laplacian und Harris Point detector.
- Übung 3: Lucas Kanade Optical Flow.

- Python Bibliotheken: OpenCV, numpy, os und matplotlib



Template Matching

Image Noise

Kante und Ecke Detektoren

Projekt

Toolkette

Ergebnissen

3D Computer Vision

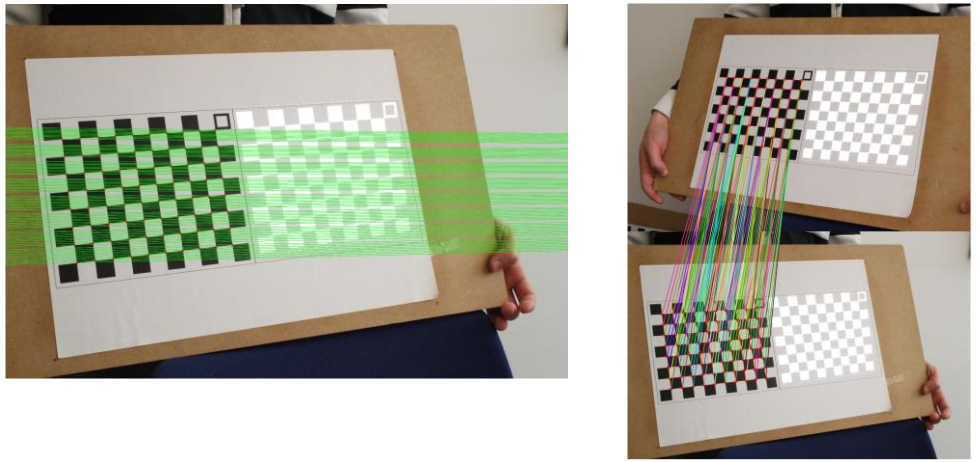
10/20 – 03/21

Programmierung Übungen

- Übung 1: Kamera Kalibrierung.
- Übung 2: Relativ Drehung und Pose Einschätzung vom Homography.
- Übung 3: Feature Matching und Struktur Rekonstruktion.

- Python Bibliotheken: OpenCV, scipy, numpy, os und matplotlib

Kamera Kalibrierung



Epilines und Feature Matches

Sonstige Projekte

Project Name

Radar Target Generation and Detection

Duration

May 2020 - May 2020

Objective

The aim of the project was to track multiple cars on a highway using Lidar and Radar

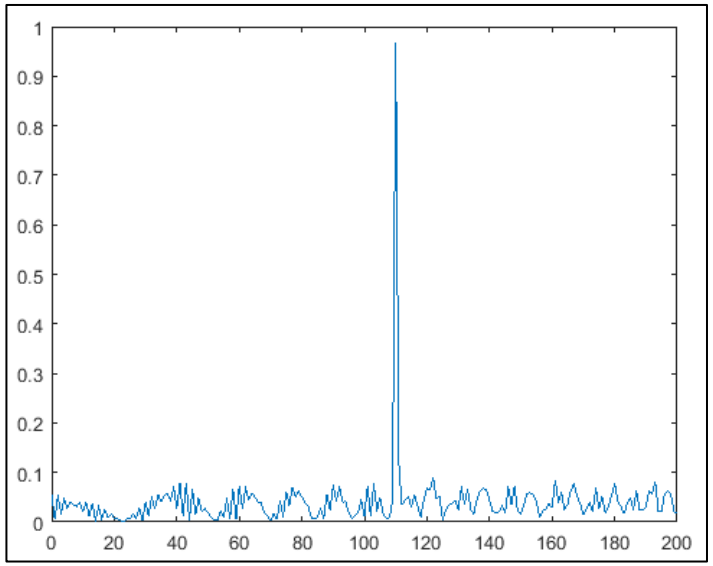
Highlights

- ❑ Developed a radar target generation and detection system by configuring the Frequency Modulated Continuous Wave (FMCW) radar waveform.
- ❑ Implemented Range/Doppler Fast Fourier Transform (FFT) and 2D Constant False Alarm Rate (CFAR) techniques for detecting position and velocity using MATLAB.

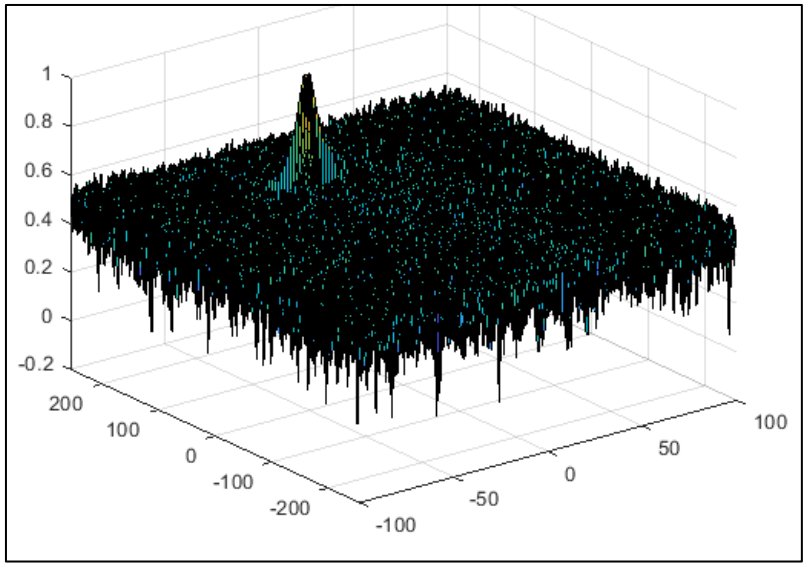
Software used

- ❑ MATLAB

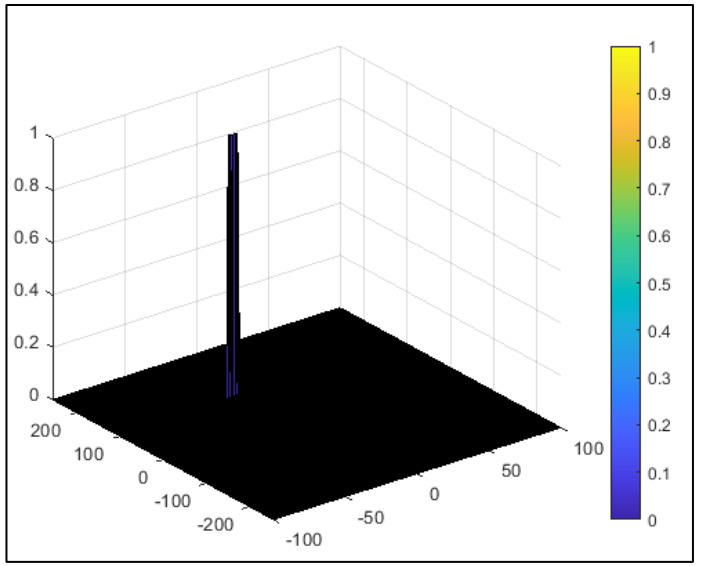
Images



The 1st FFT output for the target located at 110 m



2D FFT output - Range Doppler Map



The output of the 2D CFAR process

Project Name

Lidar Obstacle Detection

Duration

May 2020 - May 2020

Objective

The aim of the project was to detect cars and trucks on a narrow street using Lidar

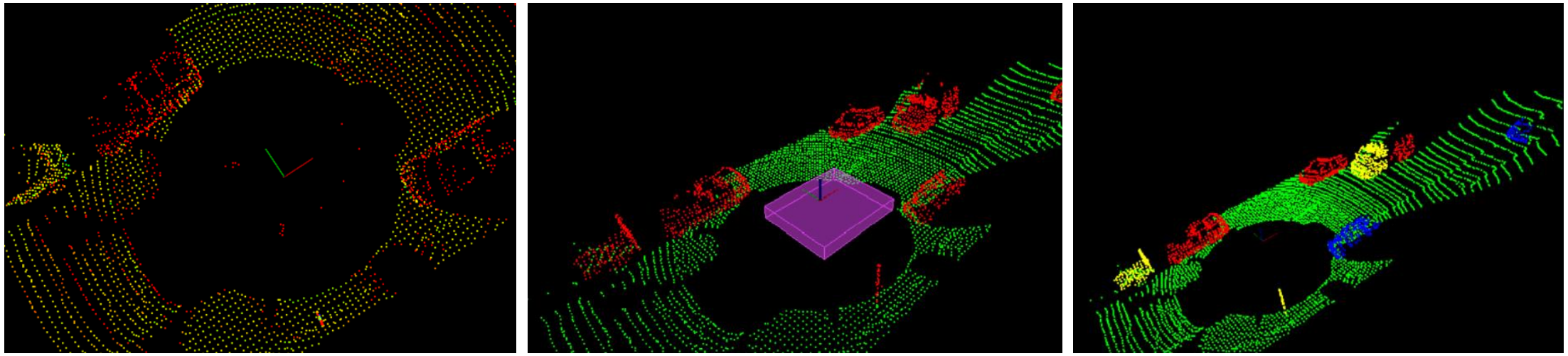
Highlights

- ❑ Applied voxel grid filtering technique to filter out the point clouds
- ❑ Used RANSAC algorithm to segment the point clouds
- ❑ Applied Euclidian clustering to group the point clouds into roads and obstacles
- ❑ Generated bounding boxes for the road and the obstacles
- ❑ Streaming of the point cloud data

Software used

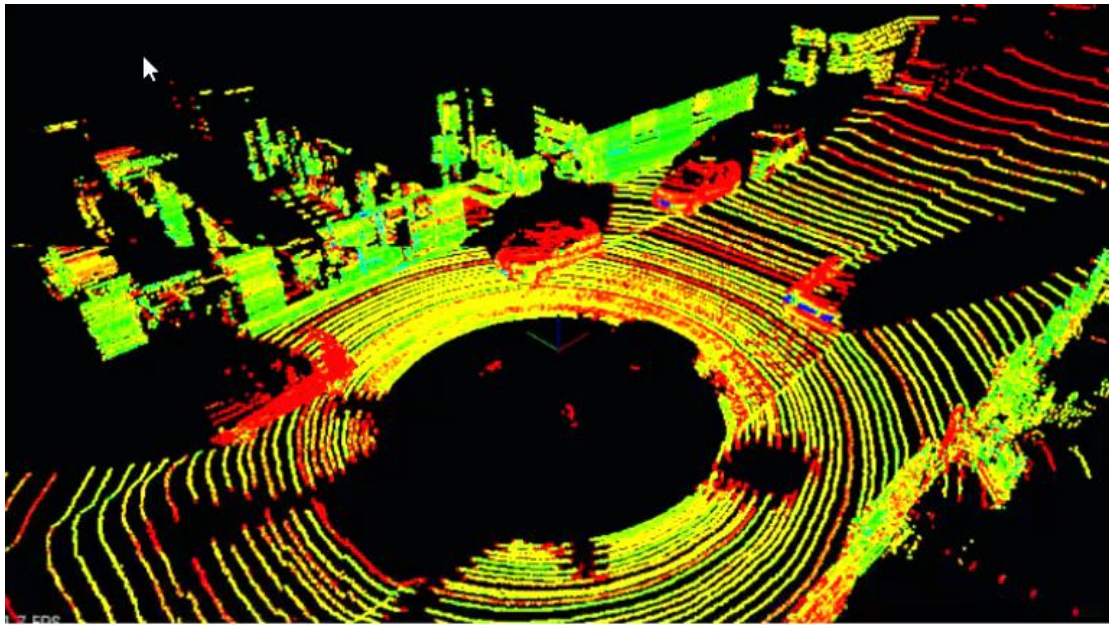
- ❑ C++

Images

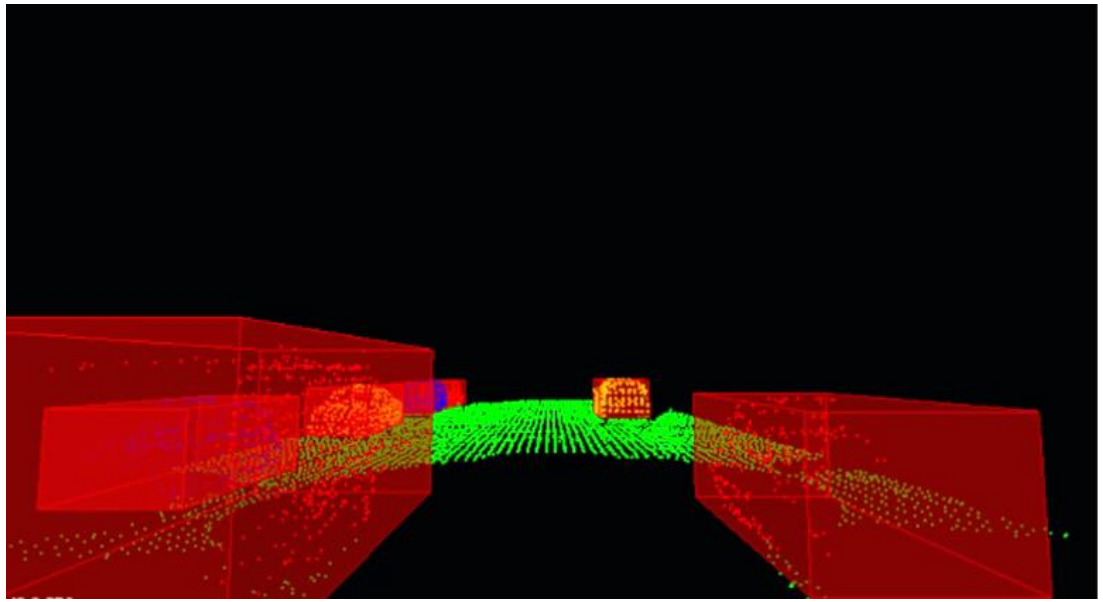


Filtered, segmented and clustered point cloud data

Videos



Sample stream of unprocessed point cloud data



Streaming von processed punktwolken daten

Project Name

Unscented Kalman Filter Project

Duration

May 2020 - May 2020

Objective

The aim of the project was to track multiple cars on a highway using Lidar and Radar

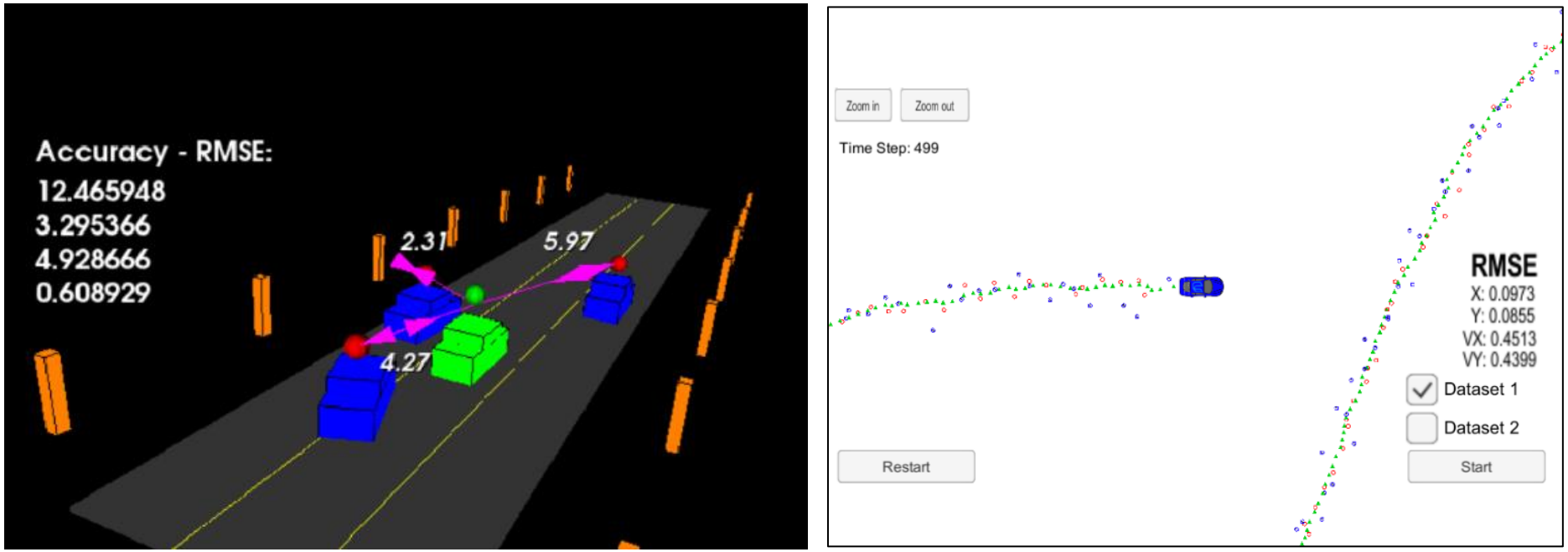
Highlights

- ❑ Each vehicle was tracked using a Constant Turn Rate Velocity motion model
- ❑ Used unscented transformation based on sigma points to approximate the mean and covariance for the real predicted distribution
- ❑ Predicted the position and velocity for the vehicles using Lidar and Radar measurements
- ❑ Checked if the RMS values for the position and velocity were below the threshold

Software used

- ❑ C++

Images



Tracking using Unscented Kalman Filter