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Project type: laboratory project

Topic: Vehicle Parking Parameter Optimalization

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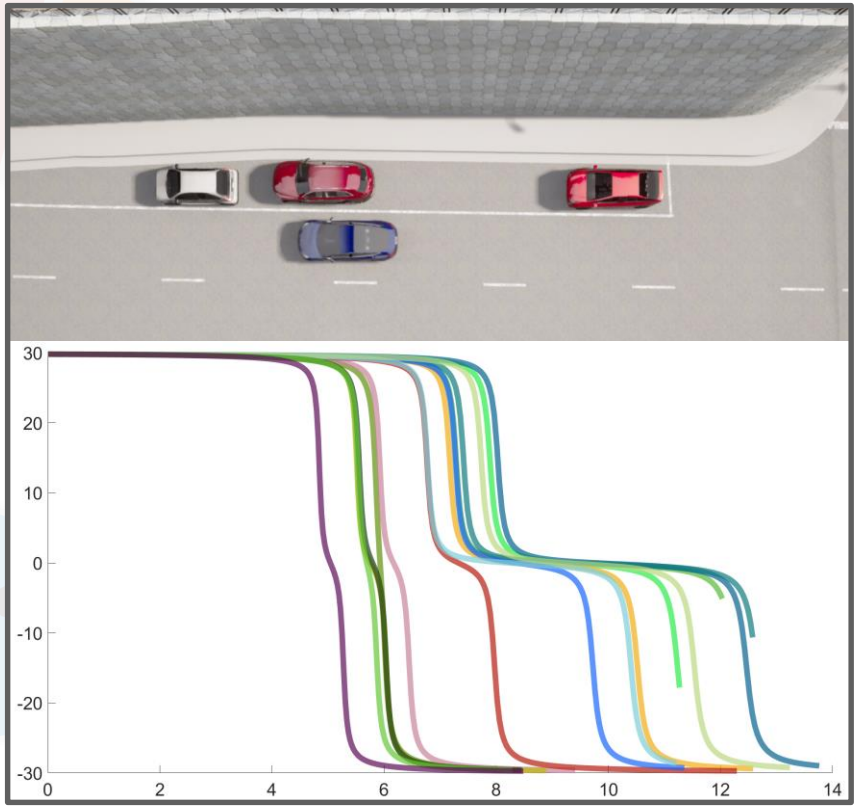
In search of optimal steering for reverse paralell parking

- What is an ”optimal” parking?
  - No collision, no going over the curve
  - As little space used as possible
  - Minimal distance from the desired position
- Use optimization methods to construct a steering function
  - $steering\ angle = \frac{1}{6} * (atan(a * t + b) + atan(c * t + d))$
- Verify neural net predictions for steering function paramters



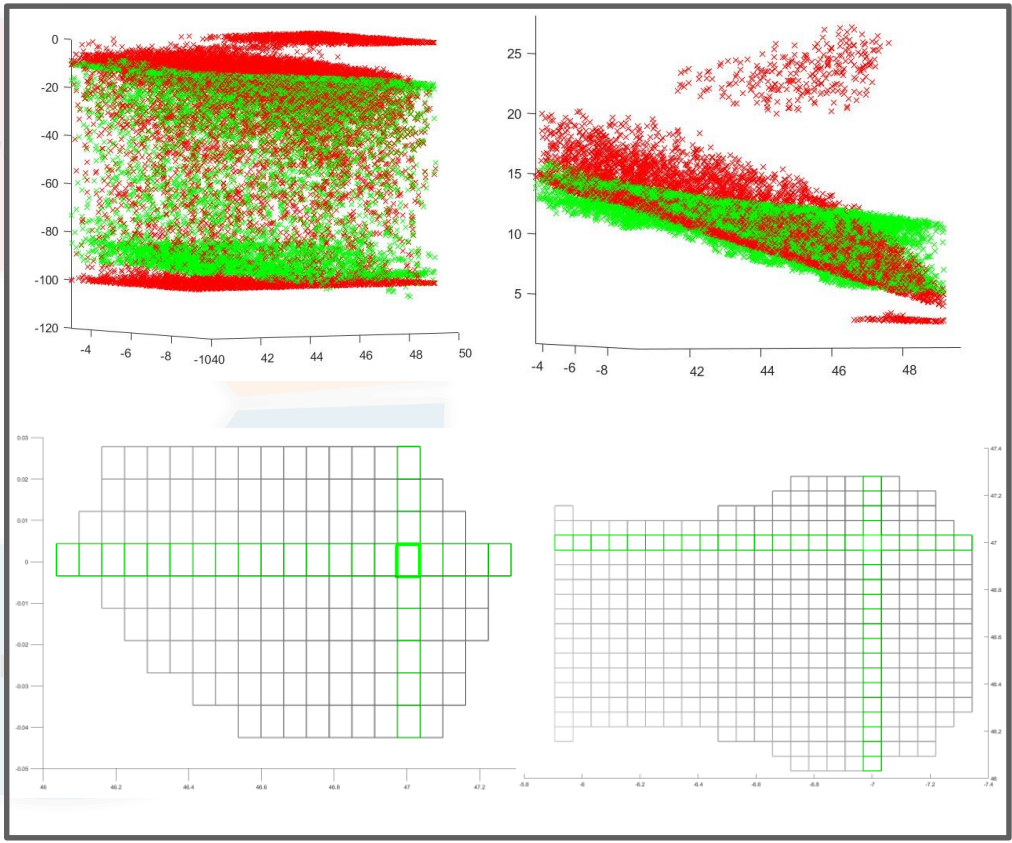
Experiments

Results of optimization (red) and neural network prediction (green) of parameters

- For practical use, numerical verification of neural networks is necessary
    - Input data could contain errors (sensor sensitivity)
    - Limited size of memory in on-board computers

Verify the area where a certain steering function still results in quasi-optimal parking

- In what proximity is the answer still acceptable?
    - simulate limited precision of LiDAR and RADAR by introducing input uncertainty
- Use **interval arithmetics** to check for collisions and distance



Results & future work

Results:

- Neural network predicts optimal trajectory
- The network's answer is verified for numerical errors and sensor precision

Future work:

- Further analysis of numerical errors in small-scale neural networks
- Test learning capibility for other autonomous driving situtations (obstacle avoidance, different parking situations)