

Bachelor Thesis / Master Thesis (Deep Learning)

Interested in **deep learning**, **computer vision** and **autonomous driving**? Looking for a bachelor/master thesis to conduct research on cutting-edge technologies? Find out more in the proposal below or contact me directly to discuss further topics!

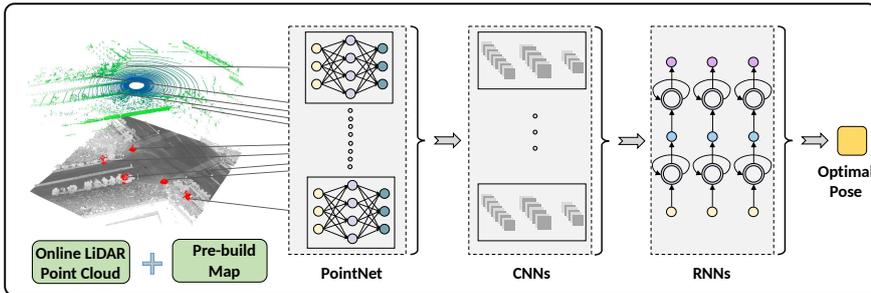


Figure: Example deep learning architecture for LiDAR localization proposed in [1]

6D-Pose Estimation with Deep Learning Methods

In the last years, convolutional neural networks (CNNs) have been proven to excel on multiple computer vision tasks including image classification, object detection and semantic segmentation. They are a powerful tool to teach autonomous cars the capability to understand their complex and dynamic surroundings. There are many different applications for deep learning in autonomous driving and adjusting the network architectures to the task at hand is an exciting field of research.

In this thesis, the 6D pose of a movable agent is to be estimated using machine learning techniques. Recent publications propose great CNN architectures which estimate the global ego pose (see [1] or [2]). This thesis aims to develop an architecture which fuses information from LiDAR and camera measurements with a high definition map to reach this goal.

It consists of the following parts:

- Literature research about deep learning
- Literature research about learning-based SLAM and pose estimation
- Design and implementation of novel deep learning architectures
- Evaluation of the developed algorithms on state-of-the-art benchmarks

I am happy to answer any questions you might have. Feel free to ask for an appointment or just drop by at my office!

[1] Lu et al: "L3-Net: Towards Learning based LiDAR Localization for Autonomous Driving, IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), 2019"

[2] L. von Stumberg et al: "GN-Net: The Gauss-Newton Loss for Deep Direct SLAM, In preprint, 2019"

Institute of Measurement and Control Systems (MRT)
Prof. Dr.-Ing. Christoph Stiller

Advisor:

Frank Bieder, M.Sc.

Programming language(s)¹:

Python proficient
C++ advanced

System, Framework(s):

Linux

Required skills:

- Prior knowledge of deep learning & computer vision
- Excellent coding skills
- Work on your own

Language(s):

German or English

For more information please contact:

Frank Bieder

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Or directly send in your application including your current grades as well as our questionnaire!

