Adrian Haarbach

passionate about computer vision research, web and mobile technologies, and all kinds of languages

Munich, Germany
Nov. 1990 in Überlingen, Germany
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education

since 09/19 **PhD student in Computer Science** Technische Universität München & Siemens AG
Supervised by PD Dr. Slobodan Ilic and Prof. Dr. Matthias Nießner.
Research interests: Deep Learning & Optimization methods for 2D/3D Computer Vision, Computer-Aided Design (CAD) & Reverse Engineering, 3D Reconstruction & Geometric Object Modeling, Simultaneous Localization and Mapping (SLAM), Multiple-View Geometry & Camera Calibration.
3DV conference paper on interpolation methods [1].

2015-2016 **M.Sc. in Computer Science, 1.4** Technische Universität München
Thesis, 1.0: "Continuous time trajectory estimation for 3D SLAM from an actuated 2D laser scanner" [3]. Interdisciplinary project *Visualization of advanced graph algorithms* [2]. Computer Vision & parallel programming electives.

2010-2015 **B.Sc. in Computer Science, 1.8** Technische Universität München
Thesis, 1.0: "3D Object Reconstruction using Point Pair Features" [6]. GPU Programming in Computer Vision project [5]. Area of application: Math.

2001-2010 **Abitur, 1.0** Gymnasium Überlingen
Top of class, awards from German Physical and Chemical Society.

international education

10/15-02/16 **Tel Aviv University, Israel** Semester abroad
Exchange student, international MBA classes at Recanati Business School.

01/13-05/13 **National University of Singapore** Semester abroad
Computer science (Computer Graphics, Networks and Protocols, Parallel Programming) and language (Chinese, Indonesian) classes.

2007-2008 **Public High School in Pleasanton, Texas, USA** Exchange student
Spent one year in Texas, lived in a host family and had Spanish class every day. I was part of the band as well as of the football team.

09/05-11/05 **College de Vendenheim, France** Exchange student
Individual exchange program organized by the Franco-German Youth Office.

work experience

05/17-08/19 **Siemens, Munich** Research Scientist 3D Machine Vision - CT RDA IoT Digital Perception
Projects on industrial 3D reconstruction and refinement based on [6, 4]. Camera Calibration, Photogrammetry & Bundle Adjustment projects. Cloud development (frontend & backend) for vision algorithms as Software as a Service.

04/16-05/17 **NavVis, Munich** Master thesis student & Software Engineer - Mapping and Perception
Master's thesis [3] research and development of a LiDAR-inertial continuous-time trajectory estimation algorithm for accurate indoor mapping on a handheld device. Software engineer for multi-sensor time-synchronization, 3D SLAM algorithms, laser scanner evaluation and the UI for the new M6 trolley.

10/15-02/16 **EyeClick, Tel Aviv, Israel** 3D Computer Vision R&D - *New Kibbutz Internship Program*
People detection, tracking and re-identification with a top-view RGB-D camera for player counting and analytics in the BEAM interactive gaming solution.

09/15 **Magazino, Munich** R&D intern 2D Computer Vision
Discriminative image classification on highly similar drug labels with sparse (SIFT) and dense (KLT) image alignment, template matching (SAD,SSD,NCC) and basic machine learning (SVM) to find the most distinctive image regions.

05/15-08/15 **Siemens & TUM, Munich** Working student & Research assistant - CT RTC SET & *CAMP*
Developed *Multi-view Levenberg-Marquardt ICP* [4], a pose graph optimization framework for highly accurate 3D workpiece reconstruction using nonlinear least-squares solvers (g2o, Ceres Solver) to extend my BSc' thesis [6].

programming

advanced
python (NumPy, PyTorch)
C++14 (Eigen, Ceres Solver, OpenCV, OpenGL, ROS, CMake, Boost, Qt)
TypeScript+ES6 (Angular, node, D3.js, OpenLayers)
Java (Android, Tomcat)
Matlab, **Git**

intermediate
SQL (PostgreSQL, MySQL)
R (R Studio, ggplot2)
HTML5 & CSS3, Bootstrap
CUDA, **Haskell**

basic
Objective-C (iOS)
OCaml, SML, PHP, bash

languages

proficient
German native
English 117/120 TOEFL

advanced
French B2 (DELF)
Russian A2 (4 sem)

basic
Italian A1 in Munich
Hebrew A1.1 in Munich
Chinese A1 in Singapore
Spanish A1 in Texas
Vietnamese A1 in Hanoi
Indonesian, **Japanese** bits

technologies

Docker and **Kubernetes** for cloud processing projects.

Linux since 2009, **Mac OS** since 2013, **Windows** 7/10

Developed **Android apps** *vocabulary training* and *voice dictionary* to assist language learning in class and on travels.

Published the **iOS game** *Space Jumpy Monkey* to the App Store.

Took a **Big data** seminar and learned about NoSQL systems.

Learnt about **Data science** and statistics with R and ggplot2.

Applied **interactive visualization** methods in my interdisciplinary project [2] using JavaScript and D3.

Ported scientific code to **CUDA**, achieved a 100x performance gain [5] and a mention in the publication *Variational Depth from Focus Reconstruction*.

interests

Saxophone
15 years of private lessons, orchestra and bigband member.

Handball
in a team in Munich

Windsurfing
mostly on Lake Constance

Cycling
crossed the alps 6x on trips to Rome, St. Tropez, Pula, Lago Di Garda & Lago Maggiore.

Hiking
hiked along Portugals coast and on the E4 through Crete, Greece. Jakob's trail is next.

Backpacked
all **ASEAN** countries except for Brunei and Myanmar.

Learning languages
not just for programming

06/15-07/15 **Innoactive GmbH, Munich** **freelance** Web Developer
Prototyped an immersive virtual reality image gallery with 3D CoverFlow behaviour using THREE.js, WebVR, Google Cardboard.

09/14-12/14 **BMW Car IT, Munich** Working student
Implement a ROS RVIZ plugin showing a car's actuator states and the perceived environment to visually test autonomous driving algorithm's decisions.

06/13-09/13 **Google, Dublin, Ireland** Business Associate Intern for Finance Business Intelligence
Worked in a global team which uses data to inform business and product decisions across the company. Developed interactive reports [2] using web technologies such as D3 and Angular that change how users connect, explore, and interact with finance information.

2011-2013 **TUM, Garching** Tutor - Department of Informatics at Technische Universität München
Taught multiple subjects to classes of 15-30 students:
- Practical Course: Basics for Programming (spring and fall 2011)
- Fundamentals of Algorithms and Data Structures (spring 2012)
- Functional Programming and Verification (fall 2013)

04/12-10/12 **post-it-out.com, Munich** **freelance** Mobile developer (Android)
Implemented a chat feature similar to WhatsApp, designed an efficient content caching strategy and shaped the REST interface.

08/11-09/11 **Brainlab AG, Munich** Software Engineering Intern in QA
Test automation for radiotherapy treatment planning software. Wrote TestComplete scripts to allow for automated GUI testing and verification of PDF outputs.

since 07/10 **NetwakeVision GmbH, Überlingen** **freelance** Lead Web Application Developer
Implemented major features (e.g. POI) of our *GPS tracking portal* which allowed us to get into new B2B markets. Continuous integration and refactoring keeps the code maintainable. Using HTML5, JavaScript with OpenLayers and qooxdoo, open-source contributions via our *qooxdoo-extensions*.

extracurricular

2010-2015 **OlyNet e.V., olympic village dorm, Munich** voluntary Network administrator

2010-2012 **SICK Robot Day and Field Robot Events** first place in 'Freestyle'
Built a firefighter robot which navigates to burning candles to blow them out.

2010 **Jugend forscht regional competition South Württemberg** participant
3rd place with the topic *'How can a robot navigate through corn rows?'*

publications

[1] Adrian Haarbach, Tolga Birdal, and Slobodan Ilic. "Survey of Higher Order Rigid Body Motion Interpolation Methods for Keyframe Animation and Continuous-Time Trajectory Estimation". In: *3D Vision (3DV), 2018 Sixth International Conference on*. IEEE. 2018, pp. 381–389. DOI: 10.1109/3DV.2018.00051. URL: http://www.adrian-haarbach.de/interpolation-methods.

[2] Adrian Haarbach. *Visualization of advanced graph algorithms*. Interdisciplinary Project. Dec. 2016. URL: http://www.adrian-haarbach.de/idp-graph-algorithms.

[3] Adrian Haarbach. "Continuous time trajectory estimation for 3D SLAM from an actuated 2D laser scanner". Master's thesis. Technische Universität München, Dec. 2016. URL: http://static.adrian-haarbach.de/mscthesis_adrian.pdf.

[4] Adrian Haarbach. *Multiview ICP*. Technical report. Aug. 2015. URL: http://www.adrian-haarbach.de/mv-lm-icp/docs/mv-lm-icp.pdf.

[5] Adrian Haarbach, Dennis Mack, and Markus Schlaffer. *variational-depth-from-focus*. GPU Programming in Comp. Vision course. Apr. 2015. DOI: 10.5281/zenodo.438189.

[6] Adrian Haarbach. "3D Object Reconstruction using Point Pair Features". Bachelor's thesis. Technische Universität München, Mar. 2015. URL: http://static.adrian-haarbach.de/bscthesis_adrian.pdf.