

Adrian Haarbach

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



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programming

advanced

python (NumPy, PyTorch)
C++14 (Eigen, Ceres Solver, OpenCV, OpenGL, ROS, CMake, Boost, Qt)
{Ecma,Type}Script (Angular, node, D3.js, ol.js)
Java (Android, Tomcat)
Matlab, Git

intermediate

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

basic

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

languages

proficient

German native
English 117/120 TOEFL

advanced

Italian C1 (8 sem)
French DELF B2 (6 years)
Chinese B1 (5 sem)
Russian A2 (4 sem)

basic

Hebrew 1 sem in Munich
Spanish 1 year in Texas
Vietnamese 1 month Hanoi
Indonesian, Japanese bits

work experience

- since 05/17 **Siemens, Munich** Research Scientist 3D Machine Vision - T 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.
- since 07/10 **Netwake GmbH, Überlingen** **freelance** Lead GIS Web Application Developer (1 day/week) Maintainer and main frontend developer for our *GPS tracking portals* <http://gpsvision.biz>. Implemented major features (e.g. adaptive POIs, VectorLayers to overlay Road surface information onto the map, ...) which allowed us to get into new B2B markets and gather a stable customer base. Continuous integration and refactoring keeps the code maintainable since 10+ years. Always trying to use latest ECMAScript standards and HTML features. Based on ES2019 with *OpenLayers* for GIS and *qooxdoo* for UI. Contributing back to the OS community via several ol- extensions and my *qooxdoo-extensions*.
- 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].
- 06/15-07/15 **Innoactive GmbH, Munich** **freelance** 3D 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.

education

technologies

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

Windows since 98 :-)

Linux since 2009

macOS since 2013

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 7x on trips to Rome, St. Tropez, Pula, Lago Di Garda & Lago Maggiore, Pyrenees, Bari.

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

since 09/19 **PhD student in Computer Science** Technische Universität München & Siemens AG {Deep, Reinforcement} 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 paper on interpolation methods [1]. Reviewer for *IEEE Transactions on Visualization and Computer Graphics*. Thesis supervision & organized *Tracking and Detection in Computer Vision* (lecture + practical). Supervisor Dr. Slobodan Ilic.

2019-2022 **Italian, Chinese & Statistics classes** Ludwig-Maximilians-Universität München Just inscribed to follow 8 Italian and 5 Chinese language classes and some useful lectures for my PhD, e.g.: descriptive and inductive statistics, measure theory and inference, linear models and generalized regression, machine learning and reinforcement learning, R programming.

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.

exchanges abroad

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.

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/mscthesi_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 Schläffer. *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/bscthesi_adrian.pdf.