# MICHAEL HOFMANN

Amsterdam, The Netherlands. +31 6 1485 6132. kmhofmann@gmail.com.
https://linkedin.com/in/kmhofmann. https://github.com/kmhofmann. https://mhofmann.dev.

## PROFILE

**R&D & Software Engineering Manager / R&D Engineer**

- R&D engineer with >8 years of industry experience.
- Experience in leading, managing and building up research & engineering teams.
- In-depth expertise in machine learning (deep learning) and computer vision.
- PhD in computer science from the University of Amsterdam.
- Excellent software engineering skills, with emphasis on modern C++ and Python.

## WORK EXPERIENCE

**TomTom** Jul 2016 — present
*Manager Software Engineering* *Amsterdam, NL*

· Leading multiple teams of R&D and software engineers on HD mapping for automated vehicles. Hiring manager for these teams, resulting in >30 direct and indirect (hired) reports as of Q3 2019. Reporting to the VP Product Unit Autonomous Driving.

- Development of internal products for large-scale extraction of detailed semantics & geometry for HD mapping purposes at global scale, from LiDAR and camera data.
- R&D on using and advancing the latest deep learning & computer vision techniques for above purposes. Co-author of several scientific papers (see *Publications*). Co-supervisor of interns writing their master's thesis with TomTom.
- Responsible for engineering roadmap of the teams, its delivery, and aligning with business cases & company strategy. Interacting with engineers, product owners, engineering management, product management & process owners on regular basis. Further interactions with talent acquisition, marketing, legal teams, and upper management.
- Main technologies used include Python, TensorFlow, C++, AWS. Agile issue & project management using JIRA, Confluence.

**Blippar** Jul 2014 — Jun 2016
*Head of Computer Vision R&D* *Amsterdam, NL*

· Hired and led a team of 8 (7 Computer Vision R&D Engineers, 1 CPU/GPU Performance Engineer), based in Amsterdam and London. Responsible for creating the computer vision roadmap and its delivery.

· Supervision of computer vision R&D, and development of various key parts of the mobile application (Android, iOS) and back-end, including:

- Real-time planar and non-planar object detection and tracking (∼12 ms/frame on mobile);
- Real-time landmark-based face detection and alignment (∼5 ms/frame on mobile);
- Large-scale image instance retrieval on server-side;
- NEON and SSE based SIMD optimizations.

· Development of libraries used by R&D and application teams, for image representation, processing, and I/O, feature detection and matching, task-based thread pool, logging, etc.

**Layar** Nov 2010 — Jun 2014
*Computer Vision R&D Engineer* *Amsterdam, NL*

- Enabling vision-based augmented reality for Layar, a mobile AR platform. Layar was acquired by Blippar in June 2014.
- Lead engineer and developer of the visual recognition and tracking technology used in the mobile Layar client application (iOS, Android). Implementation of robust large-scale image retrieval technology in the back-end. Work on internal rendering engine as part of core technology team.
- (Co-)Inventor of several patents in the AR domain.

**Siemens Corporate Research** Mar 2003 — Sep 2003
*Internship* *Princeton, NJ, USA*

Internship in the Interventional Imaging Group.

## EDUCATION

**University of Amsterdam** Jul 2005 — Oct 2010
*PhD* *Amsterdam, NL*

- Graduate student at the Intelligent Autonomous Systems (IAS) Group, Informatics Institute, University of Amsterdam, NL.
  *PhD Thesis*: Multi-view 3D Human Pose Recovery in Complex Environment. (see *Publications*)
  *Topic*: Visual recognition of humans and their movements in real-world environments; in particular, 3D human pose tracking and 3D shape model estimation.
  *Advisor*: Prof. Dr. Dariu M. Gavrila.

**DaimlerChrysler Research** Nov 2004 — Apr 2005
*Master thesis* *Ulm, Germany*

- *Thesis*: Shape Representations for Pedestrian Detection.
  *Grade*: 1.0 (best possible: 1.0, range: 1.0 — 5.0)

**University of Mannheim** Oct 1999 — Apr 2005
*Bachelor & Master studies* *Mannheim, Germany*

- Master degree in computer science (German: Dipl.-Inf. Technische Informatik). Passed with distinction; overall grade: 1.3 (best possible: 1.0, range: 1.0 — 5.0). Various teaching assistant activities.

## SKILLS

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|---|---|
| **Programming Languages** | C++17, Python, Bash; some LaTeX, HTML, CSS. |
| **Software, Libraries** | vim, tmux, git, TensorFlow, Eigen, Boost, etc. |
| **Operating systems** | GNU/Linux, macOS, Microsoft Windows. |
| **Languages** | English (fluent), German (native), some Dutch. |

## ACTIVITIES

Developer & maintainer of *Selene*, a C++17 image representation, processing and I/O library. https://selene.dev

Author & maintainer of C++ style guide. https://github.com/kmhofmann/cpp-coding-guidelines

Keynote "HD Maps: How AI gives eyes to self-driving cars", TomTom Data & AI Summit (internal), 8 May 2019.

Keynote at ICT.OPEN2019 (Artificial Intelligence track): "AI for Map Making: Embedding Loss Generative Adversarial Networks for Lane Detection", 19 March 2019.

Guest lecture "AI for Map Making", University of Amsterdam, Applied Machine Learning course, 5 Dec 2018.

Invited talk "Deep Learning for HD Mapping", TomTom Data & AI Summit (internal), 10 Apr 2018.

Invited talk "Deep learning based semantic HD mapping for autonomous vehicles", Bits&Chips Smart Systems conference, 2 Nov 2017.

(Co-)Supervision of Master's students at both University of Amsterdam (2007—2008) and TomTom (2017—present).

Reviewer for NeurIPS ('16, '17, '18 (top 30%), '19 (top 50%)), ICLR ('18, '19, '20), ICML ('18), BMVC ('18, '19).

## PUBLICATIONS

L. Samson, N. van Noord, O. Booij, **M. Hofmann**, E. Gavves, M. Ghafoorian. *I Bet You Are Wrong: Gambling Adversarial Networks for Structured Semantic Segmentation.* CVRSUAD 2019 workshop, ICCV 2019. (https://arxiv.org/abs/1908.02711)

S. Shkodrani, **M. Hofmann**, E. Gavves. *Dynamic Adaptation on Non-Stationary Visual Domains.* TASKCV-2018 workshop, ECCV 2018. **Best paper award.** (https://arxiv.org/abs/1808.00736)

M. Ghafoorian, C. Nugteren, N. Baka, O. Booij, **M. Hofmann**. *EL-GAN: Embedding Loss Driven Generative Adversarial Networks for Lane Detection.* CVRSUAD 2018 workshop, ECCV 2018. (https://arxiv.org/abs/1806.05525)

**M. Hofmann**. *Multi-view 3D Human Pose Recovery in Complex Environment.* PhD thesis, 11/2011. (http://dare.uva.nl/record/396515)

**M. Hofmann**, D.M. Gavrila. *Multi-view 3D Human Pose Estimation in Complex Environment.* International Journal of Computer Vision, 01/2012. (http://dx.doi.org/10.1007/s11263-011-0451-1)

**M. Hofmann**, D.M. Gavrila. *3D Human Model Adaptation by Frame Selection and Shape-Texture Optimization.* Computer Vision and Image Understanding, 11/2011. (http://dx.doi.org/10.1016/j.cviu.2011.08.002)

**M. Hofmann**, D.M. Gavrila. *Single-frame 3D Human Pose Recovery from Multiple Views.* DAGM, 2009. (http://dx.doi.org/10.1007/978-3-642-03798-6_8)

**M. Hofmann**, D.M. Gavrila. *Multi-view 3D human pose estimation combining single-frame recovery, temporal integration and model adaptation.* IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2009. (http://dx.doi.org/10.1109/CVPRW.2009.5206508)