Bernd Heisele

Curriculum Vitæ

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Education

1994 – 1997 **Ph.D. EE**, *University of Stuttgart and Daimler Research Center*, Stuttgart.
Detection of Moving Objects in Image Sequences

1987 – 1993 **Diploma EE (MEng)**, *University of Stuttgart*, Stuttgart.
Estimation of Atmospheric Ozone Concentrations using Neural Networks

Languages

German	Native
English	Full Proficiency
French	Minimum Professional Proficiency

Software Skills

Programming	C, C++, Python, Matlab, Unix Shell
Tools	TensorFlow, PyTorch, SciPy, PCL, OpenCV, Eigen, STL

Professional Interests

Research	Computer Vision, Machine Learning, Deep Learning
Applications	Autonomous Driving, Robotics, Object Detection and Recognition, Tracking

Experience

2019 – **Technical Lead Manager**, *Uber ATG*, Seattle.
Leading a team of engineers responsible for the automated generation and quality control of image and Lidar ground truth data.

- Automation of object-level annotations in Lidar and images using deep learning models,
- Scalable system for offline and online model inference on GPU clusters for ATG's annotation platform,
- Machine-assisted quality control of ground truth data using classical machine learning and deep learning techniques,
- Machine generated evaluation and ranking of human annotators,
- Collaboration with R&D and Perception teams on model development for annotation usage.

2017–2019 **Principal Computer Vision Engineer**, *Mighty AI*, Seattle.

Developing computer vision and machine learning technology for an image annotation platform.

- Leading the computer vision team and setting strategic direction of the company in computer vision and AI,
- Developed automated annotation and quality control system for object detection, segmentation, key-point detection, and pose estimation,
- Developed single and multi-object trackers to assist annotations of image sequences,
- Contributed to new point cloud annotation tool for Lidar.

2016–2017 **Principal Applied Scientist**, *Microsoft*, Bellevue.

Research and development for prototype and demo systems for workplace safety.

- Evaluation of VSLAM and VO algorithms with various sensors (mono, stereo, RGBD, IMU),
- Developed of a demo system within a retail scenario using RGBD sensors,
- Improved performance of deep learning face detection and recognition technology in a large scale surveillance system.

2010–2016 **Principal Scientist**, *Honda Research Institute*, Mountain View.

Research for advanced driver assist systems (ADAS) and autonomous driving (AD).
Head of perception team at Honda Research Institute in Mountain View.

- Vision research on occluded object detection and detection of objects at low image resolution,
- Research on detection of traffic participants for urban AD and ADAS,
- Research on scene understanding for urban ADAS and AD,
- Research on long-term path prediction for pedestrians,
- Research on occluded pedestrian detection,
- Developed self-localization using cameras, lasers, GPS, and IMU,
- Developed GPU-based real-time system for pedestrian, bicyclist, and car detection,
- Developed vision-based autonomous docking system for Honda's 4-wheeled Monpal.

2006 **Founder**, *Vislab Inc.*

Founder and CEO of technology consulting business.

2001–2010 **Senior Scientist**, *Honda Research Institute*, Boston.

Research for Honda's humanoid robot Asimo, lead group of machine learning and vision researchers.

- Developed real-time object detection and recognition system for grasping,
- Developed systems for face detection, face recognition, and facial expression recognition,
- Developed real-time multi-modal person detection and identification.

2001–2005 **Visiting Scientist**, *MIT Center for Biological and Computational Learning*, Cambridge.

Research in computer vision and machine learning and teaching.

- Taught 9.913 "Pattern Recognition for Vision" for graduate students,
- Taught IAP class for undergraduates "Learning: Theory, Engineering Applications, and Brains",
- Research on part-based pedestrian detection,
- Research on facial expression recognition.

1999
2001

Postdoctoral Fellow, *MIT Center for Biological and Computational Learning*, Cambridge.

Research in computer vision and machine learning.

- Research on hierarchical part-based object detection and recognition,
- Reaseach on morphable models for face detection and identification,
- Developed real-time face detection system using feature selection and hierarchical classification.

1994
1998

Researcher and PhD Student, *Daimler-Benz Research Center*, Ulm, Germany.

Research on object detection for driver assistance systems.

- Research on detecting moving objects in image sequences recorded on highways,
- Research on video-radar sensor fusion system for the detection and tracking of vehicles,
- Developed 3D segmentation and tracking in images recorded with a time-of-flight camera,
- Developed a stochastic relaxation algorithms for image segmentation in analog hardware.

Conference Publications

2017 Lu, Y., J. Huang, Y.-T. Chen, and B. Heisele. "Monocular Localization in Urban Environments using Road Markings". In: *IEEE Intelligent Vehicles Symposium (IV)*.

2016 Karasev, V., A. Ayvaci, B. Heisele, and S. Soatto. "Intent-Aware Long-Term Prediction of Pedestrian Motion". In: *International Conference on Robotics and Automation (ICRA)*.

2015 K. C. Chan, A. Ayvaci and B. Heisele. "Partially Occluded Object Detection by Finding the Visible Features and Parts". In: *International Conference on Image Processing (ICIP),* ***Best Paper Award***.

2014 Gepperth, A., E. Sattarov, B. Heisele, and S. Rodrigues Flores. "Robust visual pedestrian detection by tight coupling to tracking". In: *Intelligent Transportation Systems (ITSC)*.

2013 Ortiz, M. Garcia, A. Gepperth, and B. Heisele. "Real-time pedestrian detection and pose classification on a GPU". In: *Intelligent Transportation Systems (ITSC)*.

2009 Heisele, B., G. Kim, and A. J. Meyer. "Object Recognition with 3D Models". In: *British Machine Vision Conference (BMVC)*, pp. 29.1–29.11.

2008 Heisele, B. and C. Rocha. "Local Shape Features for Object Recognition". In: *International Conference on Pattern Recognition (ICPR)*.

2006 Skelley, J., R. Fischer, A. Sarma, and B. Heisele. "Recognizing Expressions in a New Database Containing Played and Natural Expressions". In: *International Conference on Pattern Recognition (ICPR)*.

2004 Heisele, B. and T. Koshizen. "Components for Face Recognitionv". In: *Conference on Automatic Face and Gesture Recognition (FG)*, pp. 153–158.

2004 Ivanov, Y., B. Heisele, and T. Serre. "Using Component Features for Face Recognition". In: *International Conference on Automatic Face and Gesture Recognition (FG)*, pp. 421–426.

2004 Weyrauch, B., J. Huang, B. Heisele, and V. Blanz. "Component-based Face Recognition with 3D Morphable Models". In: *IEEE Workshop on Face Processing in Video*.

2002 Bileschi, S. M. and B. Heisele. "Advances in Component-based Face Detection". In: *Pattern Recognition with Support Vector Machines, First International Workshop, SVM 2002*, pp. 135–143.

2002 Heisele, B., T. Serre, M. Pontil, T. Vetter, and T. Poggio. "Categorization by learning and combining object parts". In: *Neural Information Processing Systems (NIPS)*. Vancouver.

2002 Huang, J., V. Blanz, and B. Heisele. "Face Recognition Using Component-Based SVM Classification and Morphable Models". In: *Pattern Recognition with Support Vector Machines, First International Workshop, SVM 2002*, pp. 334–341.

2002 Weinstein, E., P. Ho, B. Heisele, T. Poggio, K. Steele, and A. Agarwal. "Handheld Face Identification Technology in a Pervasive Computing Environment". In: *First International Conference, Pervasive Computing*. Zurich, pp. 48–54.

2001 Heisele, B., P. Ho, and T. Poggio. "Face recognition with support vector machines: global versus component-based approach". In: *International Conference on Computer Vision (ICCV)*. Vol. 2. Vancouver, pp. 688–694.

2001 Heisele, B., T. Serre, S. Mukherjee, and T. Poggio. "Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Image". In: *Computer Vision and Pattern Recognition (CVPR)*. Vol. 2. Kauai, pp. 18–24.

2001 Heisele, B., T. Serre, S. Mukherjee, and T. Poggio. "Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images". In: *Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 18–24.

2001 Heisele, B., T. Serre, M. Pontil, and T. Poggio. "Component-based Face Detection". In: *Computer Vision and Pattern Recognition (CVPR)*. Vol. 1. Kauai, pp. 657–662.

2000 Campbell, C., T. Evgeniou, B. Heisele, and M. Pontil. "Machine Learning Strategies for Complex Tasks". In: *IEEE-RAS International Conference on Humanoid Robots*.

2000 Heisele, B. "Motion-based Object Detection and Tracking in Color Image Sequences". In: *Asian Conference on Computer Vision (ACCV)*, pp. 1028–1033.

1998 Heisele, B. and C. Wöhler. "Motion-based recognition of pedestrians". In: *International Conference of Pattern Recognition and Image Processing (ICPR)*, pp. 1325–1330.

1997 Heisele, B., U. Kressel, and W. Ritter. "Tracking non-rigid, moving objects based on color cluster flow". In: *Computer Vision and Pattern Recognition (CVPR)*. San Juan, pp. 253–257.

1996 Heisele, B., H. Neef, W. Ritter, R. Schneider, and G. Wanielik. "Object detection in traffic scenes by a colour video and radar data fusion approach". In: *Australian Data Fusion Symposium (ADFS)*. Adelaide, pp. 48–52.

1995 Heisele, B. and W. Ritter. "Obstacle detection based on color blob flow". In: *Intelligent Vehicles Symposium (IV)*. Detroit, pp. 282–286.

Journal Publications

2016 Gepperth, A, M Garcia Oritz, E Sattarov, and B Heisele. "Dynamic attention priors: a new and efficient concept for improving object detection". In: *Neurocomputing*.

2003 Heisele, B. "Visual Object Recognition with Supervised Learning". In: *IEEE Intelligent Systems*, pp. 38–42.

2003 Heisele, B., P. Ho, J. Wu, and T. Poggio. "Face recognition: component-based versus global approaches". In: *Computer Vision and Image Understanding (CVIU)* 91.1-2, pp. 6–21. ISSN: 1077-3142.

2003 Heisele, B., T. Serre, S. Mukherjee, and T. Poggio. "Hierarchical classification and feature reduction for fast face detection with support vector machines". In: *Pattern Recognition (PR)* 36.9, pp. 2007–2017.

2002 Heisele, B., A. Verri, and T. Poggio. "Learning and Vision Machines". In: *Proceedings of the IEEE* 90.7, pp. 1164–1177.

Book Chapters

2006 Heisele, B. and V. Blanz. "Morphable models for training a component-based face recognition system". In: *Face Processing, Advanced Modeling and Methods*. Elsevier. Chap. 14, pp. 439–462.

2006 Heisele, B., I. Riskov, and C. Morgenstern. "Components for Object Detection and Identification". In: *Toward Category-Level Object Recognition*. Ed. by J. Ponce, M. Hebert, C. Schmid, and A. Zisserman. Springer, pp. 225–237.

2005 Heisele, B., T. Serre, S. Prentice, and T. Poggio. "Hierarchical Classification and Feature Reduction for Fast Face Detection". In: *Handbook of Pattern Recognition and Computer Vision, 3rd edition*, pp. 481–495.

Thesis

1998 Heisele, B. *Objektdetektion in Strassenverkehrsszenen durch Auswertung von Farbbildfolgen*. VDI Verlag. ISBN: 3-18-356710-5.

Patents

2017 Ayvaci et al. "System and method for partially occluded object detection". 9971934.

2017 Lu et al. "Monocular localization in urban environments using road markings". 10282860.

2016 Ayvaci et al. "Partially occluded object detection using context and depth ordering". 9805274.

2015 Ayvaci et al. "Pedestrian path predictions". 9786177.

2015 Ayvaci et al. "System and method for partially occluded object detection". 9785828.

2015 Heisele et al. "System and method for image based vehicle localization". 9727793.

2015 Heisele et al. "System and method for providing laser camera fusion for identifying and tracking a traffic participant". 10121082.

2013 Heisele. "3D human models applied to pedestrian pose classification". 9418467.

2013 Heisele. “Real-time bicyclist detection with synthetic training data”. 9213892.

2012 Sakagami et al. “Vehicle periphery monitoring device”. 9135798.

2010 Heisele et al. “Object recognition with 3D models”. 8422797.

2010 Heisele et al. “Using a model tree of group tokens to identify an object in an image”. 8676733.

2006 Heisele et al. “Creating a model tree using group tokens for identifying objects in an image”. 7680748.

2005 Koshizen et al. “System and method for face recognition”. 7783082.

2004 Heisele. “Systems and methods for training component-based object identification systems”. 7734071.