David Held

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My research is in developing methods for robotic perception and control that can enable robots to operate in cluttered, unknown environments. My approach is to design new deep learning and other machine learning algorithms that can enable a robot to learn how its environment changes over time. By teaching robots to understand and affect environmental changes, I hope to open the door to many new robotic applications for operating in messy, cluttered environments, such as robots for our homes, assisted living facilities, schools, hospitals, or disaster relief areas.

Current appointment

U.C. Berkeley 2016 - Present
Post-doctoral scholar in the Department of Electrical Engineering and Computer Sciences
Advised by Pieter Abbeel

Education

Stanford University 2012 - 2016
Ph.D. in Computer Science.
Thesis: Deep Learning and Probabilistic Methods for Robotic Perception from Streaming Data
Advised by Sebastian Thrun and Silvio Savarese.

Stanford University 2010 - 2012
Masters of Science in Computer Science.
Advised by Sebastian Thrun and Vaughan Pratt.

Massachusetts Institute of Technology 2006 - 2007
Masters of Science in Mechanical Engineering.

Massachusetts Institute of Technology 2001 - 2005
Bachelor of Science in Mechanical Engineering with a concentration in Controls Engineering.

Publications

The top-tier venues in robotics are RSS, ICRA, IROS, and IJRR

Held, D., McCarthy, Z., Zhang, M., Shentu, F., Abbeel, P., Probabilistically Safe Policy Transfer. *International Conference of Robotics and Automation (ICRA), 2017. (Under Review)*

Held, D., Thrun, S., Savarese, S., Learning to Track at 100 FPS with Deep Regression Networks. *European Conference on Computer Vision (ECCV), 2016.*

Held, D., Guillory, D., Rebsamen, B., Thrun, S., Savarese, S., A Probabilistic Framework for Real-time 3D Segmentation using Spatial, Temporal, and Semantic Cues. *Robotics: Science and Systems (RSS), 2016.*

Held, D., Thrun, S., Savarese, S. Robust Single-View Instance Recognition. *International Conference of Robotics and Automation (ICRA), 2016.*

Held, D., Levinson, J., Thrun, S., Savarese, S. Robust Real-Time Tracking Combining 3D Shape, Color, and Motion. *International Journal of Robotics Research (IJRR), 2016.*

Held, D., Levinson, J., Thrun, S., Savarese, S. Combining 3D Shape, Color, and Motion for Robust Anytime Tracking. *Robotics: Science and Systems (RSS), 2014.*

Held, D., Levinson, J., Thrun, S. Precision Tracking with Sparse 3D and Dense Color 2D Data *International Conference of Robotics and Automation (ICRA), 2013.* ***Best Vision Paper Finalist***

Held, D., Levinson, J., Thrun, S. A Probabilistic Framework for Car Detection in Images using Context and Scale. *International Conference of Robotics and Automation (ICRA), 2012.*

Held, D., Yekutieli, Y., Flash, T. Characterizing Stiffness of Multi-Segment Flexible Arm Movements. *International Conference of Robotics and Automation (ICRA), 2012.*

Levinson, J.; Askeland, J.; Becker, J.; Dolson, J.; **Held, D.**; Kammel, S.; Kolter, J.Z.; Langer, D.; Pink, O.; Pratt, V.; Sokolsky, M.; Stanek, G.; Stavens, D.; Teichman, A.; Werling, M.; Thrun, S. (2011) Towards Fully Autonomous Driving: Systems and Algorithms. Intelligent Vehicles Symposium (IV), IEEE, June 2011.

Jones, L.A., **Held, D.** & Hunter, I. Surface Waves and Spatial Localization in Vibrotactile Displays. Proceedings of the IEEE Haptics Symposium, 2010.

Jones, L.A. & **Held, D.** Characterization of Tactors Used in Vibrotactile Displays. Journal of Computing and Information Sciences in Engineering, 2008.

Jin, Z., Waydo, S., Wildanger, E.B., Lammers, M., Scholze, H., Foley, P., **Held, D.**, Murray, R.M. MVWT-II: The Second Generation Caltech Multi-Vehicle Wireless Testbed. 2004 American Control Conference (ACC), 2004.

Research and Industry Experience

U.C. Berkeley Robot Learning Lab 2016 - present
Post-doctoral researcher. Developing deep reinforcement learning algorithms for object manipulation

Stanford Autonomous Driving Team 2010 - 2016
Ph.D. Student. Developed perception algorithms for self-driving car.

Google [x] Self-driving Car Team 2013
Intern. Developed perception algorithms for Google's self-driving car.

Weizmann Laboratory for Vision Research and Robotics 2009 - 2010
Research Assistant. Developed novel method to analyze stiffness of simulated octopus arm.

Evolven Software 2008-2009
Software developer. Developed enterprise software for configuration management.

MIT Bioinstrumentation Lab 2006 - 2007
Master's Thesis. Modeled the interaction of tactors with skin for a vibrotactile display.

Harvard Social Psychology Lab 2005
Research Assistant. Tested the contrast effect with images.

MIT Aerospace Controls Lab 2004
Research Assistant. Analyzed digital magnetometer signals for controlling a UAV.

Caltech Controls and Dynamical Systems 2003
Research Assistant. Designed an outdoor testbed of 12 miniature hovercrafts.

Patents

Robust Anytime Tracking Combining 3D Shape, Color, and Motion with Annealed Dynamic Histograms (Provisional Patent: 14/733,902)

Awards

Best Vision Paper Finalist, ICRA 2013

Best Master's Thesis of 2012 in Stanford's Computer Science Department
M.S. Thesis: "Autonomous Driving: Car Detection, Tracking, and Street Sign Detection," co-advised by Sebastian Thrun and Vaughan Pratt

Invited Talks

Spotlight Talk at NIPS Workshop on Reliable Machine Learning in the Wild	2016
Future Star Talks Series at RSS Workshop on Deep Learning for Autonomous Robots	2016
Northeastern College of Computer and Information Science Seminar	2016
Harvard School of Engineering and Applied Sciences Special Seminar	2016
Johns Hopkins Laboratory for Computational Sensing and Robotics Seminar	2016
University of Maryland Computer Vision Laboratory Seminar	2016
TTI Chicago Young Researcher Seminar Series	2016

MIT Robotics Seminar	2015
UC Berkeley	2015
Carnegie Mellon University VASC Seminar Talk	2015
University of Toronto AI Seminar	2015
University of Michigan AI Seminar	2015
The Future of Driverless Car Technology, UCLA VC Fund	2015
Google [x] Self-driving Car Team	2015
Stanford-Seoul National University Workshop on Automated Driving	2015

Teaching

Teaching Assistant: CS 229 Machine Learning - I gave two lectures: Probability Theory and Hidden Markov Models. I also helped to design midterm questions and mentored students on their course projects.

Teaching Assistant: CS 231A Computer Vision: From 3D Reconstruction to Recognition - I was a guest lecturer on Segmentation and Scene Understanding. I also helped to design homework questions and mentored students on their course projects.

Mentoring

I served as a mentor for: Joshua Achiam, Sandy Huang, Ignasi Clavera, Michael Zhang, Fred Shentu, Xinyang Geng, Devin Guillory, Helen Jiang, Derin Dutz, Naor Brown, Jacquelyn Kunkel, Elizabeth Kim, Katherine Ray

Service

Associate Editor:	International Conference on Robotics and Automation (ICRA), 2017
Organizer:	Deep Learning for Action and Interaction, NIPS Workshop 2016 Stanford AI Lab Distinguished Speaker Series 2014-2015 Bay Area Vision Meeting 2014 ONR Workshop on Structured Learning for Scene Understanding 2014
Program Committee:	Computer Vision in Vehicle Technology, CVPR 2015 Workshop Deep Learning for Robotic Perception, CVPR 2017 Workshop
Reviewer:	RSS 2016, IROS 2013-2016, ICRA 2014-2016, IETE Journal of Research 2016, T-RO 2015, CVPR 2015, CVPR Workshop 2015, ITS 2011-2014

References

Sebastian Thrun
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Silvio Savarese
Assistant Professor
Department of Computer Science, Stanford University
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ssilvio@cs.stanford.edu

Pieter Abbeel
Associate Professor
Department of Electrical Engineering and Computer Sciences, UC Berkeley
https://people.eecs.berkeley.edu/~pabbeel/
pabbeel@cs.berkeley.edu

Tamar Flash
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Department of Computer Science and Applied Mathematics, Weizmann Institute of Science
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John Leonard
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