David Held

davheld@cs.stanford.edu
http://stanford.edu/~davheld/

My research investigates how to teach robots to understand complex real-world environments. By modeling the how the world changes over time, robots can learn to be robust to occlusions, viewpoint changes, lighting variations, and other changes that objects often undergo. This work suggests a future in which robots learn about the world by recording observations, making predictions, and inferring how to act in their environment.

Education

Stanford University (Ph.D.)

Ph.D. in Computer Science.   Expected graduation: Feb 2016
Thesis: Deep Learning and Probabilistic Methods for Robotic Perception from Streaming Data
Advised by Sebastian Thrun and Silvio Savarese.

Stanford University (M.S.)
Masters of Science in Computer Science.   September, 2012
Advised by Sebastian Thrun and Vaughan Pratt.

Massachusetts Institute of Technology (M.S)
Masters of Science in Mechanical Engineering.   September 2007

Massachusetts Institute of Technology (B.S.)   June 2005
Bachelor of Science in Mechanical Engineering with a concentration in Controls Engineering.

Awards / Honors

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.

Publications

The top-tier venues in robotics are IJRR, T-RO, RSS, and ICRA.

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), 2015.*

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. *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 Experience	**Stanford Autonomous Driving Team**	*Palo Alto, CA*

Stanford Computational Vision and Geometry Lab
Sept 2010 – present. Ph.D. Designed various algorithms for object detection, segmentation, and tracking for autonomous driving (IV 2011, ICRA 2012, ICRA 2013, RSS 2014, IJRR 2015).

Weizmann Laboratory for Vision Research and Robotics   *Rehovot, Israel*
Sept 2009 – Aug 2010. Research Assistant. Designed a novel method to compute stiffness for a hyper-redundant simulated octopus arm (ICRA 2011).

MIT Bioinstrumentation Lab   *Cambridge, MA*
February 2006 – September 2007, Master's Thesis. Modeled the interaction of tactors with skin for a vibrotactile display worn on the user's back (Haptics Symposium 2010, JCISE 2008).

Harvard Social Psychology Lab   *Cambridge, MA*
July – December 2005. Research Assistant. Designed and implemented experiments to test the contrast effect with images.

MIT Aerospace Controls Lab   *Cambridge, MA*
Summer 2004. Research Assistant. Analyzed signals from a digital magnetometer for controlling a UAV.

Caltech Controls and Dynamical Systems   *Pasadena, CA*
Summer 2003. Research Assistant. Designed an outdoor testbed of 12 miniature hovercrafts (ACC 2004).

Work Experience	**Google**	*Mountain View, CA*

June 2013 – Sept 2013. Software Developer, Intern, Self-Driving Car Team. Worked on perception system for Google's self-driving car.

Evolven Software   *Rosh Ha'ayin, Israel*
February 2008 – Sept 2009. Software Developer, Server Team. Developed enterprise software for configuration management.

Patents

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

Teaching and Mentoring

Teaching Assistant: CS 229 Machine Learning - In addition to the traditional TA responsibilities, I gave two lectures: Probability Theory and Hidden Markov Models, and I assisted students with their class projects.

Teaching Assistant: CS 231A Computer Vision: From 3D Reconstruction to Recognition - In addition to the traditional TA responsibilities, I was a guest lecturer on Segmentation and Scene Understanding.

Mentoring: Devin Guillory, Helen Jiang, Derin Dutz, Naor Brown, Jacquelyn Kunkel, Elizabeth Kim, Katherine Ray

Service   Program Committee: Computer Vision in Vehicle Technology: Assisted Driving, Exploration Rovers, Aerial and Underwater Vehicles - CVPR 2015 Workshop

Organizer: Stanford AI Lab Distinguished Speaker Series 2014-2015, Bay Area Vision Meeting 2014

Reviewer: IROS 2013, ICRA 2014, ICRA 2016, ITS 2011-2014, T-RO 2015, CVPR 2015, CVPR Workshop 2015

Student Volunteer: ONR Workshop on Structured Learning for Scene Understanding 2014