

Professor Vijay Kumar

UPS Foundation Professor, School of Eng. & Applied Science

Fellow of ASME and IEEE, and Member of the National Academy of Engineering

University of Pennsylvania

<http://kumar.grasp.upenn.edu>

A. Professional Preparation

- Indian Institute of Technology, Kanpur, India, Mechanical Engineering, B. Tech., 1983
- The Ohio State University, Columbus, Ohio, Mechanical Engineering, Ph.D., 1987

B. Recent Appointments

- 1998- Professor, Department of Mechanical Eng. & Applied Mechanics(secondary in Computer & Information Science, Electrical & Systems Eng.)
- 2012-13 Asst. Director, Robotics & Cyber Physical Systems, Office of Science & Technology Policy
- 2008-12 Deputy Dean for Education, School of Eng. and Applied Science, U. Pennsylvania
- 2005-08 Chairman, Department of Mechanical Eng. & Applied Mechanics, U. Pennsylvania
- 2000-04 Deputy Dean for Research, School of Eng. and Applied Science, U. Pennsylvania
- 1998-05 Director, GRASP Laboratory, U. Pennsylvania
- Fall 1999 Visiting Professor, Department of Mechanical Eng., Johns Hopkins University

C. Selected Publications (out of over 300 refereed publications)

- Das, R. Fierro, V. Kumar, J. Ostrowski, J. Spletzer, and C. J. Taylor. Vision Based Formation Control of Multiple Robots. *IEEE Transactions on Robotics*. 2002.
- Belta and V. Kumar. Abstraction and control policies for a swarm of robots. *IEEE Transactions on Robotics*, 20(5):865–875, 2004.
- S. Berman, A. Halasz, M. Ani Hsieh, and V. Kumar, Optimized Stochastic Policies for Task Allocation in Swarms of Robots, *IEEE Transactions on Robotics*, August 2009.
- N. Michael, D. Mellinger, Q. Lindsey, and V. Kumar. The GRASP multiple micro UAV testbed. *IEEE Robotics and Automation Magazine*. Vol. 17, No. 3. 2010.
- V. Kumar and N. Michael. Opportunities and Challenges with Micro Aerial Vehicles. *Int. Journal on Robotics Research*, Vol. 31, No. 11, 2012. 303.
- Shaojie Shen, Yash Mulgaonkar, Nathan Michael and Vijay Kumar, “Vision-Based State Estimation and Trajectory Control Towards Aggressive Flight with a Quadrotor,” *Robotics: Science and Systems (RSS)*, June 2013.
- Kartik Mohta, Kostas Daniilidis and Vijay Kumar, “Vision-based Control of a Quadrotor for Perching on Lines,” *Proceedings of IEEE Int. Conf. Robotics and Automation*, 2014
- Yash Mulgaonkar, Michael Whitzer, Brian Morgan, Christopher M. Kroninger, Aaron M. Harrington, Vijay Kumar, Power and weight considerations in small, agile quadrotors, in *Micro- and Nanotechnology Sensors, Systems, and Applications*, *Proceedings of SPIE* Vol. 9083, 2014.

D. Qualifications for leading Project FALCON

Vijay Kumar has been the technical and administrative lead on many successful DoD projects. He was the PI and Lead on ARO MURI Algorithmics of Motion (1995-1999), Tactical Mobile Robotics (DARPA, 1998-2000), Mobile Autonomous Robot Software (DARPA, 1999-2002), MARS 2020 (DARPA, 2002-2004), and ARO SWARMS MURI (2004-2009). He directs the Autonomy Center in the ARL MAST CTA. All these projects involved coordination with multiple universities, with integrated demonstrations and transition of technologies.

Professor Daniel Lee, Dept. of Electrical and Systems Engineering,
Director, GRASP Laboratory, co-Director, University of Pennsylvania, Philadelphia

Education:

Harvard University	Physics	A.B. summa cum laude	1990
M.I.T.	Physics	Ph.D.	1995

Positions:

- 2012-present Professor, Dept. of Electrical and Systems Engineering,
Director, GRASP Laboratory, co-Director, University Transportation Center, University of Pennsylvania, Philadelphia, PA.
- 2005-2012 Associate Professor, Dept. of Electrical and Systems Engineering, University of Pennsylvania, Philadelphia, PA.
- 2001-2005 Assistant Professor, Dept. of Electrical and Systems Engineering, Dept. of Bioengineering, University of Pennsylvania, Philadelphia, PA.
- 1997-2001 Member of Technical Staff, Biological Computation Department, Bell Laboratories, Lucent Technologies, Murray Hill, NJ.
- 1995-1997 Postdoctoral Member of Technical Staff, Theoretical Physics Department, AT&T Bell Laboratories, Murray Hill, NJ.

Awards:

- Fellow, Institute of Electrical and Electronics Engineers (2013).
- National Academy of Engineering Frontiers of Engineering (2002, 2006, 2007).
- NSF CAREER Award (2004).

Representative Publications:

1. "Learning the parts of objects with nonnegative matrix factorization," D. D. Lee and H. S. Seung, *Nature* **401**, 788-791 (1999).
2. "The manifold ways of perception," H. S. Seung and D. D. Lee, *Science* **290**, 2268-2269 (2000).
3. "System and method for providing interactive dialogue and iterative search functions to find information," K. August, et. al., U. S. Patent 6647383 (2003).
4. "Short-term memory in orthogonal neural networks," O. L. White, D. D. Lee and H. Sompolinsky, *Phys. Rev. Lett.* **92**, 148102 (2004).
5. "Multiplicative updates for nonnegative quadratic programming," F. Sha, Y. Lin, D. D. Lee, L. K. Saul, *Neural Computation* **19**, 2004-2031 (2007).
6. "Optimal neural population codes for high-dimensional stimulus variables," Z. Wang, A. A. Stocker, and D. D. Lee, *Advances in Neural and Information Processing Systems*, 297-305 (2013).
7. "Learning and exploiting low-dimensional structure for efficient holonomic motion planning in high-dimensional spaces," P. Vernaza, D. D. Lee, *International Journal of Robotics Research* **31**, 1739-1760 (2012).

Previous DOD Funding:

1. Neural and psychophysical visual motion models for UGV perception and navigation, ONR, 2011-2015, \$400,000, PI: D. D. Lee, Co-PIs: A. Stocker
2. Robotic perception, intelligence, dexterous manipulation, and unique mobility, ARL CTA, 2010-2014, \$8,900,000, Penn PIs: K. Daniilidis, et. al.
3. Learning low dimensional controllers for high speed quadruped locomotion, DARPA IPTO, 2005-2008, \$1,600,000, PI: D. D. Lee
4. Learning long range robot perception and navigation, DARPA IPTO, 2004-2007, \$1,500,000, PI: D. D. Lee

Jianbo Shi

University of Pennsylvania Department of
Computer and Information Science School of
Engineering and Applied Science
3330 Walnut Street,
Philadelphia, PA 19104
jshi@seas.upenn.edu

Professional Preparation

Cornell University	Computer Science, Mathematics	B.A. , 1994
University of California at Berkeley	Computer Science	Ph.D. , 1998

Appointments

2014 -	Professor	Department of Computer and Information Science, University of Pennsylvania.
2012 - 2013	Guest Professor	Computer Science, ETH Zurich.
2009 - 2012	Graduate Group Chair	Department of Computer and Information Science, University of Pennsylvania.
2008 - 2013	Associate Professor	Department of Computer and Information Science, University of Pennsylvania.
2003 - 2008	Assistant Professor	Department of Computer and Information Science, University of Pennsylvania.
1999 - 2002	Research Scientist	The Robotics Institute, Carnegie Mellon University.

Publications most closely related to the project:

- [1] Lubor Ladicky, Jianbo Shi and Mac Pollefeys. Pulling Things out of Perspective. In *IEEE Conf. Computer Vision & Pattern Recognition*, 2014
- [2] Jeffrey Byrne and Jianbo Shi. Nested Shape Descriptors. International Conference on Computer Vision (ICCV), 2013
- [3] Katerina Fragkiadaki, Geng Zhang, and Jianbo Shi. Pose from Flow and Flow from Pose. *IEEE Conf. Computer Vision & Pattern Recognition*, 2013
- [4] Katerina Fragkiadaki, Weiyu Zhang, Geng Zhang and Jianbo Shi. Two Granularity Tracking: Mediating Trajectory and Detection Graphs for Tracking under Occlusions. 12th European Conference on Computer Vision (ECCV), 2012
- [5] Haifeng Gong, Jiwoong Sim, Maxim Likhachev and Jianbo Shi. Multi-hypothesis Motion Planning for Visual Object Tracking. International Conference on Computer Vision (ICCV), 2011
- [6] Abhinav Gupta, Praveen Srinivasan, Jianbo Shi, and Larry Davis. Understanding Videos, Constructing Plots: Learning a Visually Grounded Storyline Model from Annotated Video. In *IEEE Conf. Computer Vision & Pattern Recognition*, 2009
- [7] Hua Zhong, Jianbo Shi, and Mirko Visontai. Detecting unusual events in video. In *IEEE Conference on Computer Vision and Pattern Recognition*, 2004.

Camillo Jose Taylor

GRASP Laboratory

Department of Computer and Information Science

University of Pennsylvania

Philadelphia, PA 19104

Education

Harvard College, Cambridge MA	Electrical, Computer and Systems Eng	A.B. 1988
Yale University, New Haven CT	Computer Engineering	M.S. 1990
Yale University, New Haven CT	Electrical Engineering	Ph.D. 1994

Professional Experience

2013- Professor, Department of Computer and Information Science, University of Pennsylvania

2003-2013 Associate Professor, Department of Computer and Information Science, University of Pennsylvania

1997-03 Assistant Professor, Department of Computer and Information Science, University of Pennsylvania

1994-97 Postdoctoral researcher/lecturer University of California, Berkeley

Five related publications

- A. Cowley, B. Cohen, W. Marshall, C. J. Taylor, and M. Likhachev, "Pereception and motion planning for pick-and-place dynamic objects," in IEEE/RSJ International Conference on Intelligent Robots and Systems, November 2013.
- C. J. Taylor, "Towards fast and accurate segmentation," in IEEE Conference on Computer Vision and Pattern Recognition, 2013.
- C. J. Taylor and A. Cowley, "Parsing indoor scenes using rgb-d imagery," in Robotics: Science and Systems, July 2012.
- B. Shirmohammadi and C. J. Taylor, "Self localizing smart camera networks," ACM Transactions on Sensor Networks, vol. 8, pp. 11:1–11:24, March 2012.
- C. J. Taylor, "Implementing high resolution structured light by exploiting projector blur," in *IEEE Workshop on Applications of Computer Vision*, pp. 9–16, January 2012.

Web Page

- <http://www.cis.upenn.edu/~cjtaylor/home.html>

Professor Shaojie Shen

Assistant Professor, Department of Electronic and Computer Engineering
Hong Kong University of Science and Technology
<http://www.ece.ust.hk/~eeshaojie>

A. Professional Preparation

- Hong Kong University of Science and Technology, Hong Kong, China, Electronic Engineering, B. Eng., 2009
- University of Pennsylvania, Philadelphia, Pennsylvania, Electrical and Systems Engineering, Ph.D., 2014

B. Recent Appointments

2014- Assistant Professor, Department of Electronic and Computer Engineering, Hong Kong University of Science and Technology

C. Selected Publications

- S. Shen, N. Michael, and V. Kumar, “Obtaining liftoff indoors: autonomous navigation in confined indoor environments”, IEEE Robotics and Automation Magazine, vol. 20, no. 4, pp. 40-48, 2013.
- S. Shen, N. Michael, and V. Kumar, “A stochastic differential equation-based exploration algorithm for autonomous indoor 3d exploration with a micro-aerial vehicle”, International Journal of Robotics Research, vol. 31, no. 12, pp. 1431-1444, 2012.
- N. Michael, S. Shen, K. Mohta, Y. Mulgaonkar, V. Kumar, K. Nagatani, Y. Okada, S. Kiribayashi, K. Otake, K. Yoshida, K. Ohno, E. Takeuchi, and S. Tadokoro, “Collaborative mapping of an earthquake-damaged building via ground and aerial robots”, Journal Field Robotics, vol. 29, no. 5, pp. 832–841, 2012.
- S. Shen, Y. Mulgaonkar, N. Michael, and V. Kumar, “Vision-based state estimation and trajectory control towards high-speed flight with a quadrotor”, in Proc. of Robotics: Science and Systems (RSS), Berlin, Germany, June 2013.
- S. Shen, Y. Mulgaonkar, N. Michael, and V. Kumar, “Multi-sensor fusion for robust autonomous flight in indoor and outdoor environments with a rotorcraft MAV”, in Proc. of the IEEE International Conference on Robotics and Automation (ICRA), Hong Kong, China, May 2014.
- S. Shen, Y. Mulgaonkar, N. Michael, and V. Kumar, “Vision-based state estimation for autonomous rotorcraft MAVs in complex environments”, in Proc. of the IEEE International Conference on Robotics and Automation (ICRA), Karlsruhe, Germany, May 2013.
- S. Shen, N. Michael, and V. Kumar, “Autonomous indoor 3D exploration with a micro-aerial vehicle”, in Proc. of the IEEE International Conference on Robotics and Automation (ICRA), Saint Paul, MN, May 2012, pp. 9–15.
- S. Shen, N. Michael, and V. Kumar, “Autonomous multi-floor indoor navigation with a computationally constrained MAV”, in Proc. of the IEEE International Conference on Robotics and Automation (ICRA), Shanghai, China, May 2011, pp. 20–25.

D. Qualifications for Participating in Project FALCON

Shaojie Shen has been in close collaboration with project PI’s group when he was working towards his Ph.D degree at the University of Pennsylvania. He was the key researcher in autonomous flight in GPS-denied environments with vision and visual-inertial fusion (Figures 1 & 2 in the Project FALCON proposal).

Brian P. Gerkey, PhD

Professional preparation

	Institution	Major/Area	Degree, Year
Undergraduate	Tulane University	Computer Engineering, Mathematics; minor in Robotics & Automation	B.S.E., 1998
Graduate	University of Southern California	Computer Science	M.S., 2000
	University of Southern California	Computer Science	PhD, 2003
Postdoctoral	University of Southern California	Computer Science / Robotics	2003
	Stanford University	Computer Science / Robotics	2003–2005

Appointments

- July 2012–: *President & CEO*, Open Source Robotics Foundation.
- Apr 2009–May 2012: *Director of Open Source Development*, Willow Garage.
- Feb 2008–Apr 2009: *Research Scientist*, Willow Garage.
- Jul 2005–Feb 2008: *Computer Scientist*, SRI Artificial Intelligence Center.
- Aug 2003–Jun 2005: *Postdoctoral Scholar*, Stanford University Artificial Intelligence Laboratory. Advisor: Prof. Sebastian Thrun.
- Jun 2003–Jul 2003: *Postdoctoral Research Fellow*, University of Southern California Robotics Research Laboratory. Advisor: Prof. Maja J Matarić.
- Aug 1998–May 2003: *Research Assistant*, University of Southern California Robotics Research Laboratory. Advisor: Prof. Maja J Matarić.
- May 1999–Aug 1999: *Member of Technical Staff*, Artificial Intelligence Group, Jet Propulsion Laboratory, Pasadena, California. Supervisor: Dr. Tara Estlin.

Publications related to the proposed project

- Carlos E. Agüero, Nate Koenig, Ian Chen, Hugo Boyer, **Steven Peters**, John Hsu, Brian Gerkey, Steffi Paepcke, Jose L. Rivero, Justin Manzo, Eric Krotkov and Gill Pratt. Inside the Virtual Robotics Challenge: Simulating real-time robotic disaster response. *IEEE Transactions on Automation Science and Engineering*, 12(2), Accepted for publication.
- Geoffrey Biggs, Radu Bogdan Rusu, Toby H.J. Collett, **Brian P. Gerkey**, and Richard T. Vaughan. And all the robots merely Players. *IEEE Robotics & Automation Magazine*, in press, Oct 2011.
- Radu Bogdan Rusu, **Brian P. Gerkey**, and Michael Beetz. Robots in the kitchen: Exploiting ubiquitous sensing and actuation. *Robotics and Autonomous Systems* 56(10):844–856, Oct 2008.
- **Brian P. Gerkey**, Richard T. Vaughan, Kasper Støy, Andrew Howard, Gaurav S Sukhatme, and Maja J Matarić. Most Valuable Player: A Robot Device Server for Distributed Control. In *Proc. of the IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS)*, pages 1226–1231, Wailea, Hawaii, Oct 2001.
- Radu Bogdan Rusu, Ioan Alexandru Sutan, **Brian P. Gerkey**, Sachin Chitta, Michael Beetz, and Lydia E. Kavraki. Real-time Perception-Guided Motion Planning for a Personal Robot. In *Proc. of the IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS)*, pages 4245–4252, St. Louis, Missouri, Oct 2009.
- Kurt Konolige, Motilal Agrawal, Morten Rufus Blas, Robert C. Bolles, **Brian P. Gerkey**, Joan Solá, and Aravind Sundaresan. Mapping, Navigation, and Learning for Off-Road Traversal. *Journal of Field Robotics* 26(1):88–113, Jan 2009.
- **Brian P. Gerkey**, Sebastian Thrun, and Geoff Gordon. Visibility-based pursuit-evasion with limited field of view. *Intl. Journal of Robotics Research* 25(4):299–316, Apr 2006.

Morgan Quigley, Chief Architect, Founder
morgan@osrfoundation.org

EDUCATION Ph.D. Computer Science, Stanford University (2012)

- Advisor: Dr. Andrew Ng, Artificial Intelligence Laboratory
- Dissertation title: Hardware and Software Systems for Personal Robots

B.S. Computer Science and B.A. Music, Brigham Young University (2005)

WORK Open Source Robotics Foundation (2012-present)
Artificial Intelligence Laboratory, Stanford University (2005-2012)
Machine Intelligence Laboratory, Brigham Young University (2002-2005)
Consulting (2002-2012)

PUBLICATIONS

- M. Quigley, C. Salisbury, A. Y. Ng, J. K. Salisbury, "Mechatronic Design of an Integrated Robotic Hand," in the International Journal of Robotics Research (IJRR), Volume 33, 5 April 2014, pp. 706-720
- L. S. Lincoln, M. Quigley, B. Rohrer, C. Salisbury, and J. Wheeler, "An Optical 3D Force Sensor for Biomedical Devices," in IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics, Rome, Italy. June 24-27, 2012.
- M. Quigley, "Hardware and Software Systems for Personal Robotics", Dissertation, Stanford University Computer Science Department, 2012.
- M. Quigley, A. Asbeck, and A. Y. Ng, "A Low-cost Compliant 7-DOF Robotic Manipulator," in Proc. Proceedings of International Conference on Robotics and Automation (ICRA), 2011.
- M. Quigley, D. Stavens, A. Coates, and S. Thrun, "Sub-meter Indoor Localization in Unmodified Environments with Inexpensive Sensors," in Proc. Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2010.
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2010.
- S. Gleason, M. Quigley, and P. Abbeel, "An Open Source AGPS/DGPS Capable C-coded Software Receiver," in Proc. Proceedings of the Institute of Navigation, Savannah, GA, 2009.
- M. Quigley, B. Gerkey, K. Conley, J. Faust, T. Foote, J. Leibs, E. Berger, R. Wheeler, and A. Y. Ng, "ROS: an open-source Robot Operating System," in Proc. Open-Source Software workshop of the International Conference on Robotics and Automation (ICRA), 2009.
- M. Quigley, S. Batra, S. Gould, E. Klingbeil, Q. Le, A. Wellman, and A. Y. Ng, "High-Accuracy 3D Sensing for Mobile Manipulation: Improving Object Detection and Door Opening," in Proc. International Conference on Robotics and Automation (ICRA), 2009.
- S. Gould, P. Baumstarck, M. Quigley, A. Y. Ng, and D. Koller, "Integrating visual and range data for robotic object detection," in Proc. European Conference on Computer Vision (ECCV) workshop on Multi-camera and Multi-modal Sensor Fusion Algorithms and Applications (M2SFA2), 2008.
- P. Abbeel, A. Coates, M. Quigley, and A. Y. Ng, "An application of reinforcement learning to aerobatic helicopter flight," in Proc. Neural Information Processing Systems Conference (NIPS), 2006.
- P. Abbeel, M. Quigley, and A. Y. Ng, "Using inaccurate models in reinforcement learning," in Proc. Internal Conference on Machine Learning (ICML), 2006.
- M. A. Goodrich, B. S. Morse, D. Gerhardt, J. L. Cooper, M. Quigley, J. A. Adams, and C. Humphrey, "Supporting Wilderness Search and Rescue using a Camera-Equipped Mini UAV," Journal of Field Robotics, vol. 25, pp. 89-110, 2008.
- M. Quigley, B. Barber, and M. A. Goodrich, "Towards Real-World Searching with Fixed-Wing Mini-UAVs," in Proc. IEEE International Conference on Intelligent Robots and Systems (IROS), 2005.

Daide Scaramuzza, Assistant Professor, Director of the Robotics and Perception Group, Department of Informatics, University of Zurich

Education

2008 PhD in Robotics and Computer Vision, ETH Zurich, Switzerland
2004 M.S. in Electronics and Information Engineering, University of Perugia, Italy.

Professional experience

02/2012 – Present Assistant Professor in Robotics, University of Zurich
01/2009 – 02/2012 Coordinator of the European project SFLY
01/2011 – 01/2012 Postdoctoral researcher at GRASP Lab, University of Pennsylvania, with V. Kumar & K. Daniilidis
02/2008 – 12/2010 Postdoctoral researcher, research team leader, lecturer - ETH Zurich, with Roland Siegwart

Awards

2014 IEEE Robotics and Automation Early Career Award
2014 Google Faculty Research Award
2014 KUKA Innovation Award
2012 European Young Researcher Award - Sponsored by EU and Euroscience
2010 Finalist of the George Giralt EURON PhD award (best European PhD thesis)

JOURNALS – Selected list from last 5 years

[1] M. Faessler, F. Fontana, C. Forster, D. Scaramuzza, Autonomous, Vision-based Flight and Live Dense 3D Mapping with a Quadrotor MAV, Journal of Field Robotics, in Press, 2015.
[2] A. Majdik, Y. Albers-Schoenberg, D. Verda, D. Scaramuzza, Air-ground Matching: Appearance-based GPS-denied Urban Localization of Micro Aerial Vehicles, Journal of Field Robotics, in Press, 2015.
[3] C. Forster, M. Pizzoli, D. Scaramuzza, Appearance-based Active, Monocular, Dense Reconstruction for Micro Aerial Vehicles, Robotics: Science and Systems, Berkely, 2014.
[4] Scaramuzza, D., et al., Vision-Controlled Micro Flying Robots: from System Design to Autonomous Navigation and Mapping in GPS- denied Environments, IEEE Robotics and Automation Magazine, 2014.
[5] A. Censi, D. Scaramuzza, Calibration by Correlation using Metric Embedding from Non-metric Similarities, IEEE Transaction on Pattern Analysis and Machine Intelligence, January 25, 2013.
[7] Scaramuzza, D., 1-Point-RANSAC Structure from Motion for Vehicle-Mounted Cameras by Exploiting Non-holonomic Constraints, International Journal of Computer Vision, Volume 95, issue 1, 2011.

TOBIAS DELBRUCK - ETH Honorary Professor of Physics and Electrical Engineering; Group Leader Sensors Group at the Institute of Neuroinformatics; University of Zürich and ETH Zürich,

EXPERTISE: Neuromorphic and bio-inspired electronic engineering: electronic vision systems, robotics.

DEGREES

Doctor of Philosophy Degree in Department of Computation and Neural Systems, California Institute of Technology, 1993. Thesis advisor: Carver Mead.

B.A. University of California, San Diego, in Physics and Applied Mathematics. 1983.

PROFESSIONAL EXPERIENCE

2013 IEEE Fellow, appointed ETH Honorary Professor of Electrical Engineering

2009 Appointed ETH Honorary Professor of Physics.

1998-2000: Research Scientist, Institute for Neuroinformatics.

1998-2003: Visiting associate faculty, Caltech.

1994-1998: Synaptics, Foveon, National Semiconductor, and Arithmos in Silicon Valley.

AWARDS

8 IEEE best paper awards, including 2006 Solid State Circuits Society Jan van Vessel Outstanding European paper award.

2013: IEEE Fellow

2007-2008: IEEE Distinguished Lecturer.

REPRESENTATIVE PUBLICATIONS

A 128×128 120dB 15us Latency Asynchronous Temporal Contrast Vision Sensor, Lichtsteiner, P., C. Posch and T. Delbruck. IEEE J. Solid State Circuits. (2008)

Neuromorphic Sensory Systems, , Current Opinions in Neurobiology. (2010)

A 240x180 130dB 3us latency global shutter spatiotemporal vision sensor, C. Braendli, R. Berner, M-H Yang, S-C. Liu, T. Delbruck IEEE J. Solid-State Circuits., (2014)

Real-time classification and sensor fusion with a spiking deep belief network, P. O'Connor, et al., Front. Neuroscience. (2013)

The Language of the Brain, Terry Sejnowski, Tobi Delbruck, Scientific American, Oct. 2012.

Confession Session: Learning from Others Mistakes, P. Abshire, T. Delbruck et al., ISCAS 2011, Rio de Janeiro: 2014 Oct 15

Professional Preparation

2005 - 2008 PhD, Neuroinformatics, University of Edinburgh.
2004 - 2005 MSc by Research, Neuroinformatics, Edinburgh University.

Employment (post-doctoral)

2013 - Present Inilabs GmbH, Zurich; Senior Engineer and Member of the Board of Directors.
2011 - 2013 Research Associate, Complex Systems Modelling group, Istituto Superiore di Sanità, Rome; working on EU-funded CORONET project.
2009 - 2011 Research Associate, Seconded to Istituto Superiore di Sanità, Rome, from Laboratory for Synthetic Perceptive, Emotive and Cognitive Systems, Pompeu Fabra University, Barcelona; working on EU-funded ReNaChip project.
2009 Research Associate, University of Edinburgh.

Publications

2015 “A neuro-inspired model-based closed-loop neuroprosthesis for the substitution of a cerebellar learning function in anesthetized rats” Hogri R, Bamford SA, Taub AH, Magal A, Del Giudice P, Mintz M. Scientific Reports 5 : 8451 | DOI: 10.1038/srep08451
2014 "A cerebellar neuroprosthetic system: computational architecture and in vivo experiments", Herreros Alonso I, Giovannucci A, Taub AH, Hogri R, Magal A, Bamford SA, Prueckl R, Verschure PF. Frontiers Bioengineering and Biotechnology, 2014, vol. 2, no. 14, doi: 10.3389/fbioe.2014.00014.
2012 "A VLSI field-programmable mixed-signal array to perform neural signal processing and neural modelling in a prosthetic system", Bamford SA, Hogri R, Giovannucci A, Taub AH, Herreros I, Verschure PFMJ, Mintz M, Del Giudice P. IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 20, no. 4, pp. 455-467.
2012 "Silicon synapses self-correct for both mismatch and design inhomogeneities", Bamford SA, Murray AF, Willshaw DJ. Electronics Letters, vol. 48, no. 7, pp. 360-361.
2012 "Spike-timing-dependent plasticity with weight dependence evoked from physical constraints", Bamford SA, Murray AF, Willshaw DJ. IEEE Transactions on Biomedical Circuits and Systems, vol. 6, no. 4, pp. 385-398.
2010 “Synaptic rewiring for topographic map formation and receptive field development”, Bamford SA, Murray AF, Willshaw DJ. Neural Networks, vol. 23, pp. 517-527.
2010 “Large developing receptive fields using a distributed and locally reprogrammable address-event receiver”, Bamford SA, Murray AF, Willshaw DJ. IEEE Transactions on Neural Networks, vol. 21, no. 2, pp. 286-304.