

# KRISTIN MARA BRANSON

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## Education

- **University of California, San Diego** La Jolla, CA  
Ph.D., Computer Science, 2007  
Dissertation Title: *Tracking Multiple Mice through Severe Occlusions*  
Advisors: Serge Belongie and Sanjoy Dasgupta  
M.S., Computer Science (GPA 3.96), 2002
- **Harvard University** Cambridge, MA  
A.B. Cum Laude in Computer Science (GPA 3.31), 2000

## Work History

- **Group Leader** March, 2010 - Present  
HHMI Janelia Farm Research Campus Ashburn, VA
  - Project: Developing machine vision and learning-based systems for automatically tracking and analyzing the behaviors of model organisms.
- **Postdoctoral Researcher** January, 2007 - January, 2010  
California Institute of Technology Pasadena, CA
  - Project: Developing machine vision and learning-based systems for automatically tracking and analyzing the behaviors of *Drosophila*.
  - Advisors: Pietro Perona and Michael Dickinson.
- **Graduate Student Researcher** September, 2000 - December, 2006  
University of California, San Diego La Jolla, CA  
NASA Office of Space Science
  - Advisors: Serge Belongie and Sanjoy Dasgupta
  - Project: Developing a system for automatically tracking multiple lab mice from a side view.
  - NASA Graduate Student Researchers Program Fellowship
- **Teaching Assistant** January, 2002 - March 2004  
University of California, San Diego La Jolla, CA
  - CSE 150, Introduction to Artificial Intelligence, Charles Elkan, January-March, 2004
  - CSE 101, Design and Analysis of Algorithms, Sanjoy Dasgupta, January-April, 2003
  - CSE 140, Digital Logic, Alex Orailoglu, January-March, 2002
- **NASA Summer Student Researcher** June 1999 - August 2001  
NASA Ames Research Center, RIACS Mountain View, CA  
Dryden Flight Research Center Edwards Air Force Base, CA
  - June-August, 2001. Project: Modeling the environment of a constellation of Landsat-like satellites for the Remote Agent planner. Robert Morris, Jeremy Frank, Ari Jonsson, and David Smith.
  - June-August, 2000. Project: Comparing the Remote Agent Planner to more standard planning algorithms. Advisor: David Smith.

- June-August, 1999. Project: Developing a CAD program for aircraft design and simulation.  
Advisor: Kajal Gupta.

## Publications

- R. Egnor and K. Branson. Computational Analysis of Behavior. *Annual Reviews of Neuroscience*, 39, in press.
- J. Guo, A. R. Graves, W. W. Guo, J. Zheng, A. Lee, J. Rodríguez-González, N. Li, J. J. Macklin, J. W. Phillips, B. D. Mensh, K. Branson, A. W. Hantman. Cortex commands the performance of skilled movement. *eLife* 2015;10.7554/eLife.10774, 2015.
- N. Verma and K. Branson. Sample complexity of learning Mahalanobis distance metrics. *Advances in Neural Information Processing Systems*, 2015.
- K. Branson and J. Freeman. Cell Preview: Imaging the neural basis of locomotion. *Cell* 163(3), 541-542, 2015.
- W. C. Lemon, S. R. Pulver, B. Höckendorf, K. McDole, K. Branson, J. Freeman, and P. J. Keller. Whole-central nervous system functional imaging in larval *Drosophila*. *Nature Communications*, 6, p951-958, 2015.
- M. Kabra, A. A. Robie, K. Branson. Understanding classifier errors by examining influential neighbors. *Computer Vision and Pattern Recognition*, 2015.
- T. Ohyama, C. M. Schneider-Mizell, R. D. Fetter, J. V. Aleman, R. Franconville, M. Rivera-Alba, B. D. Mensh, K. Branson, J. H. Simpson, J. W. Truman, A. Cardona, M. Zlatić. A multilevel multimodal circuit enhances action selection in *Drosophila*. *Nature* 520, 633-639, 2014.
- Y. Aso, D. Sitaraman, T. Ichinose, K. R. Kaun, K. Vogt, G. Belliard-Guérin, P.-Y. Plaçaïs, A. A. Robie, N. Yamagata, C. Schnaitmann, W. J. Rowell, R. M. Johnston, T.-T. B. Ngo, N. Chen, W. Korff, M. N. Nitabach, U. Heberlein, T. Preat, K. Branson, H. Tanimoto, G. M. Rubin. Mushroom body output neurons encode valence and guide memory-based action selection in *Drosophila*. *eLife* 2014;3:e04580, 2014.
- D. Tervo, M. Proskurin, M. Manakov, M. Kabra, A. Vollmer, K. Branson and A. Karpova. Behavioral variability through stochastic choice and its gating by anterior cingulate cortex. *Cell* 159(1), p21-32, 2014.
- F. Amat, W. C. Lemon, D. Mossing, K. McDole, K. Branson, E. W. Myers, and P. J. Keller. Fast, accurate reconstruction of cell lineages from large-scale fluorescence microscopy data *Nature Methods*, 11, p951-958, 2014.
- K. Branson. Distinguishing seemingly indistinguishable animals with computer vision. *Nature Methods* 11, p721-722, 2014.
- A. I. Dell, J. A. Bender, K. Branson, I. D. Couzin, G. G. de Polavieja, L. P. Noldus, A. Pérez-Escudero, P. Perona, A. D. Straw, M. Wikelski, U. Brose. Automated image-based tracking and its application in ecology. *Trends in Ecology & Evolution*, 29(7), p417-428, 2014.
- M. Kabra, A. A. Robie, M. Rivera-Alba, S. Branson, and K. Branson. JAABA: An interactive machine-learning tool for automatic annotation of animal behavior. *Nature Methods*, 10, p64-67, 2013.
- E. Eyjolfssdottir, X. P. Burgos-Artizzu, S. Branson, K. Branson, D. Anderson, and P. Perona. Learning animal social behavior from trajectory features. Workshop on Visual Observation and Analysis of Animal and Insect Behavior, 2012.
- F. Zabala, P. Polidoro, A. A. Robie, K. Branson, P. Perona, M. H. Dickinson. A simple strategy for detecting moving objects during locomotion revealed by animal-robot interactions, *Current Biology* 22(14), p1344-50, 2012.

- A. Straw, K. Branson, T. Neumann, M. Dickinson. Multi-camera realtime 3D tracking of multiple flying animals, *Journal of the Royal Society Interface* 8(56), p395 - 409, 2011.
- K. Branson, A. Robie, J. Bender, P. Perona, and M. Dickinson. High-throughput ethomics in large groups of *Drosophila*, *Nature Methods* 6, p451 - 457, 2009.
- S. Agarwal, K. Branson, and S. Belongie. Higher order learning with graphs, *International Conference on Machine Learning*, 2006.
- K. Branson and S. Belongie Tracking multiple mouse contours (without too many samples), *Computer Vision and Pattern Recognition*, 2005.
- S. Belongie, K. Branson, P. Dollar, and V. Rabaud. Monitoring animal behavior in the Smart Vivarium, *Measuring Behavior*, 2005.
- K. Branson and S. Belongie. Three brown mice: See how they run, *VS-PETS Workshop at the International Conference on Computer Vision*, 2003.
- G. Cottrell, K. Branson, and A. Calder. Do expression and identity need separate representations? *Cognitive Science Conference*, 2002.

## Invited talks

- MIT Neurotech Symposium, November, 2015.
- Janelia Conference on Emerging Tools for Acquisition and Interpretation of Whole-Brain Functional Data, November, 2015.
- EMBO Workshop on Neural circuits and behaviour of *Drosophila*, June, 2015.
- BioImage Computing Workshop, CVPR, June, 2015.
- Biophysical Society Annual Meeting, February, 2015.
- Neuroscience Graduate Program Seminar, Brown, October 2014.
- Janelia Conference on Life in the Aggregate: Mechanisms and Features of Social Dynamics, October, 2014.
- Measuring Behavior, August, 2014.
- Mathematical Biosciences Institute Workshop on Analysis of Large Collections of Imaging Data, April, 2014.
- AAAS Neuroscience and Data Sharing Symposium, 2014.
- Advisory Committee to the NIH Director BRAIN Working Group, July, 2013.
- FliACT Training Workshop, April, 2013.
- International Symposium on Neuroethology, August, 2012.
- Janelia Machine Learning Conference, May, 2012.
- Cold Spring Harbor Conference on High-Throughput Automated Phenotyping, April, 2012.
- Society for Integrative and Comparative Biology Annual Meeting, January, 2012.
- Janelia Conference: What Can Computer Vision Do for Neuroscience, and Vice-Versa?, November, 2010.
- Annual *Drosophila* Research Conference, April, 2010.