

CONTACT INFORMATION	Jorgensen 260 Mail code 256-80 Computer Science California Institute of Technology 1200 E California Blvd. Pasadena, CA 91125 USA	<i>Voice:</i> +1 (412) 983-5985 <i>Fax:</i> +1 (412) 983-5985 <i>Web:</i> www.cs.caltech.edu/~krausea <i>E-mail:</i> krausea@caltech.edu
RESEARCH INTERESTS	Observation Selection, Sensor Networks, Value of Information, Probabilistic Reasoning under Uncertainty, Graphical Models, Gaussian Processes, Algorithmic and Statistical Machine Learning, Optimization, Approximation Algorithms, Privacy.	
CURRENT POSITION	California Institute of Technology , Pasadena, California USA <i>Assistant Professor of Computer Science</i>	January 2009 - present
EDUCATION	Carnegie Mellon University , Pittsburgh, Pennsylvania USA M.Sc., Computer Science, August '08 Ph.D., Computer Science, December '08 Optimizing Sensing – Theory and Applications. Advisor: Prof. Carlos Guestrin	
	Technische Universität München , Munich, Germany Dipl.-Math. Univ. (M.Sc. equiv., predicate: exceptional), Mathematics, September '04 Dipl.-Inf. Univ. (M.Sc. equiv., predicate: exceptional), Computer Science, April '04	
HONORS AND AWARDS	<ul style="list-style-type: none"> • Microsoft Research Graduate Fellowship 2007-2008 • Top score at Battle of the Water Sensor Networks (BWSN) sensor placement challenge '07 • Best Student Paper Award for the paper “Cost-effective Outbreak Detection in Networks” at KDD 2007 • Best Paper Award for the paper “Near-optimal Sensor Placements: Maximizing Information while Minimizing Communication Cost” at IPSN 2006 • Best Paper Runner Up Award for the paper “Near-optimal Sensor Placements in Gaussian Processes” at ICML 2005 • Best Paper Runner Up Award for the paper “Near-optimal Nonmyopic Value of Information in Graphical Models” at UAI 2005 • NRW Undergraduate Science Award for publishing an outstanding journal paper during undergraduate studies – April 2005 • Scholarship of the Konrad-Adenauer-Stiftung, October 2001 - April 2004 • Award for excellence in Physics and Mathematics, Parler Gymnasium, 1998 • First Prize at the Bundeswettbewerb Jugend Musiziert (Highly competitive German national music competition), Classical Guitar Duo, 1998 	
RESEARCH EXPERIENCE	Carnegie Mellon University , Pittsburgh, Pennsylvania USA <i>Graduate Student with Prof. Carlos Guestrin</i> August, 2004 - present <i>Visiting Scholar with Prof. Daniel Siewiorek and Prof. Asim Smailagic</i> April - Oct. 2003	

Microsoft Research, Redmond, WA, USA

Research Intern with Dr. Eric Horvitz and Dr. Feng Zhao

May - July 2007

Siemens Corporate Technology, Munich, Germany

Research Intern with Dr. Volker Tresp

June - August 2006

GSF, National Research Center for Environment and Health, Munich, Germany

Research Intern with Prof. Rupert Lasser

May 2005 - July 2005

Research Intern with Prof. Volkmar Liebscher

March - August 2004

Research Intern with Dr. Volker Hoesel

February 2003 - April 2003

Technische Universität München, Munich, Germany

Graduate Student with Dr. Harald Meier

May 2002 - Jan 2003

Undergraduate Research Assistant with Prof. Angelika Steger

Oct. 2001 - Sept. 2002

TEACHING

California Institute of Technology, Pasadena, California USA

Instructor, January - March 2009

Designed a course CS 101.2 – Active Learning and Optimized Information Gathering.

Carnegie Mellon University, Pittsburgh, Pennsylvania USA

Teaching Assistant, August - December 2006

“15-251: Great Theoretical Ideas in Computer Science” by Prof. John Lafferty and Prof. Anupam Gupta.

Teaching Assistant, January - May 2006

“10-701: Machine Learning” by Prof. Carlos Guestrin.

Ludwig Maximilian Universität München, Munich, Germany

Visitor, June 2006

Guest lecturer for “Machine Learning and Data Mining” by Prof. Kriegel and Dr. Tresp.

Technische Universität München, Munich, Germany

Teaching Assistant, May - August 2001

“Introduction to Computer Science II” by Prof. Bernd Brügge.

JOURNAL PUBLICATIONS

1. A. Krause, C. Guestrin. “Optimal Value of Information in Graphical Models”. To appear in the Journal of Artificial Intelligence Research, 2009.
2. A. Singh, A. Krause, C. Guestrin, W. Kaiser. “Efficient Informative Sensing using Multiple Robots”. To appear in the Journal of Artificial Intelligence Research (2009)
3. A. Krause, B. McMahan, C. Guestrin, and A. Gupta. “Robust Submodular Observation Selection”. Journal of Machine Learning Research Vol. 9 pp. 2761–2801, 2008. Preprint available as Technical Report: CMU-ML-08-100.
4. A. Krause, J. Leskovec, C. Guestrin, J. VanBriesen, and C. Faloutsos. “Efficient Sensor Placement Optimization for Securing Large Water Distribution Networks”. Journal of Water Resources Planning and Management Vol. 136 (6), November 2008.
5. A. Ostfeld, et.al. “The Battle of Water Sensor Networks (BWSN): A Design Challenge for Engineers and Algorithms”. Journal of Water Resources Planning and Management (Joint publication by all participants of the BWSN challenge).

6. A. Krause, A. Singh, and C. Guestrin. “Near-optimal Sensor Placements in Gaussian Processes: Theory, Efficient Algorithms and Empirical Studies”. *Journal of Machine Learning Research* Vol. 9 pp. 235-284, 2008.
7. A. Krause, A. Smailagic, and D. P. Siewiorek. “Context-Aware Mobile Computing: Learning Context-Dependent Personal Preferences from a Wearable Sensor Array”. *IEEE Transactions on Mobile Computing*, Vol. 5 No. 2 pp. 113-127, 2006 – *Winner of the NRW Undergraduate Science Award*.
8. H. Meier, A. Krause, and M. Kräutner. “Development and implementation of a parallel algorithm for the fast design of oligonucleotide probe sets for diagnostic DNA microarrays”. *Concurrency and Computation: Practice and Experience*, Vol. 16 pp. 873-893, 2004.
9. A. Krause, D. Hartl, F. Theis, M. Stangl, K. Gerauer, A. Mehlhorn. “Mobile decision support for transplantation patient data”. *Internat. Journal of Medical Informatics*, Vol. 73 pp. 461-464, 2004.
10. A. Krause, R. Rajagopal, C. Guestrin, A. Gupta. “Simultaneous Placement and Scheduling of Sensors”. To appear in *Information Processing in Sensor Networks 2009*. Longer version available as CMU-ML-08-114.
11. A. Krause, E. Horvitz. “A Utility-Theoretic Approach to Privacy and Personalization”. *Proc. 23rd Conference on Artificial Intelligence (AAAI) ’08, Special Track on AI & the Web*. Extended version: Technical Report (Microsoft Research) MSR-TR-2007-135.
12. A. Krause, E. Horvitz, A. Kansal, F. Zhao. “Toward Community Sensing”. *Proc. of Information Processing in Sensor Networks (IPSN) ’08*. Extended version: Technical Report (Microsoft Research) MSR-TR-2007-136.
13. A. Krause, B. McMahan, C. Guestrin, and A. Gupta. “Selecting Observations against Adversarial Objectives”. In *21st Annual Conference on Neural Information Processing Systems (NIPS) 2007*.
14. B. Mutlu, A. Krause, J. Forlizzi, C. Guestrin, and J. Hodgins. “Robust, Low-cost, Non-intrusive Sensing and Recognition of Seated Postures”. In *20th ACM Symposium on User Interface Software and Technology (UIST) 2007*.
15. J. Leskovec, A. Krause, C. Guestrin, C. Faloutsos, J. VanBriesen, N. Glance. “Cost-effective Outbreak Detection in Networks”. In *13th International Conference on Knowledge Discovery and Data Mining (KDD) 2007*. *Winner of the Best Student Paper Award*
16. A. Krause, C. Guestrin. “Nonmyopic Active Learning of Gaussian Processes – An Exploration-Exploitation Approach”. *24th International Conference on Machine Learning (ICML) 2007*.
17. A. Meliou, A. Krause, C. Guestrin, J. Hellerstein. “Nonmyopic Informative Path Planning in Spatio-Temporal Models”. In *22nd Conference on Artificial Intelligence (AAAI) 2007*.
18. A. Krause, C. Guestrin. “Near-optimal Observation Selection using Submodular Functions”. In *22nd Conference on Artificial Intelligence (AAAI) 2007 – Nectar track*.
19. A. Singh, A. Krause, C. Guestrin, W. Kaiser, M. Batalin. “Efficient Planning of Informative Paths for Multiple Robots”. In *20th International Joint Conference on Artificial Intelligence (IJCAI) 2007*.
20. A. Krause, J. Leskovec, C. Guestrin. “Data Association for Topic Intensity Tracking”. In *23rd International Conference on Machine Learning (ICML) 2006*. Extended version: Technical Report, CMU-ML-06-100
21. A. Krause, C. Guestrin, A. Gupta, and J. Kleinberg. “Near-optimal Sensor Placements: Maximizing Information while Minimizing Communication Cost”. In *5th International Conference on Information Processing in Sensor Networks (IPSN) 2006 – Winner of the Best Paper Award*, extended version: Technical Report, CMU-CALD-05-110

HIGHLY
SELECTIVE
CONFERENCE
PUBLICATIONS
(REFEREED)

22. V. Singhvi, A. Krause, C. Guestrin, J. Garrett, H.S. Matthews. “Intelligent Light Control using Sensor Networks”, In 3rd ACM Conference on Embedded Networked Sensor Systems (SenSys) 2005.
 23. A. Krause, C. Guestrin. “Near-optimal Nonmyopic Value of Information in Graphical Models”, In 21st Conference on Uncertainty in Artificial Intelligence (UAI) 2005 – *Winner of the Best Paper Runner-Up Award*.
 24. C. Guestrin, A. Krause, A. Singh. “Near-optimal Sensor Placements in Gaussian Processes”, In 22nd International Conference on Machine Learning (ICML) 2005 – *Winner of the Best Paper Runner-Up Award*.
 25. A. Krause, C. Guestrin. “Optimal Nonmyopic Value of Information in Graphical Models – Efficient Algorithms and Theoretical Limits”, In 19th International Joint Conference on Artificial Intelligence (IJCAI) 2005.
 26. A. Krause, M. Ihmig, E. Rankin, S. Gupta, D. Leong, D. P. Siewiorek, A. Smailagic, M. Deisher, U. Sengupta. “Trading off Prediction Accuracy and Power Consumption for Context-Aware Wearable Computing”, In 9th International Symposium on Wearable Computers (ISWC) 2005.
 27. A. Krause, D. P. Siewiorek, A. Smailagic, and J. Farrington. “Unsupervised, Dynamic Identification of Physiological and Activity Context in Wearable Computing”. In 7th International Symposium on Wearable Computers (ISWC) 2003.
- SUBMITTED
JOURNAL
PAPERS
28. A. Krause, C. Guestrin, A. Gupta, J. Kleinberg. “Robust Sensor Placements at Informative and Cost-Effective Locations”. Submitted to the Transactions on Sensor Networks
- SUBMITTED
CONFERENCE
PAPERS
29. A. Singh, A. Krause, W. Kaiser. “Nonmyopic Adaptive Informative Path Planning for Multiple Robots”. In submission to International Joint Conference on Artificial Intelligence (IJCAI) 2009.
- THESES
30. A. Krause. “Optimizing Sensing – Theory and Applications”, Ph.D. Thesis, Carnegie Mellon University, 2008.
 31. A. Krause. “Multimodal Projection Pursuit - Using the Dip to Measure Departure from Unimodality”, Diplomarbeit (German Master’s Thesis equivalent in Mathematics), Technische Universität München, 2004.
 32. A. Krause. “Adaptive Reflection of Individual User States”, Diplomarbeit (German Master’s Thesis equivalent in Computer Science), Technische Universität München, 2004.
- TECHNICAL
DEMOS
1. A. Krause and C. Guestrin. “Near-optimal Data-driven Placement of Light Sensors under Communication Constraints”, at 5th International Conference on Information Processing in Sensor Networks (IPSN) 2006.
 2. A. Krause and C. Guestrin. “Near-optimal Placement of Light Sensors in Gaussian Processes under Communication Constraints”, at 19th Annual Conference on Neural Information Processing Systems (NIPS) 2005.
 3. N. Moraveji, A. Krause, A. Smailagic, D. Siewiorek. “SenSay: Context Aware Mobile Phone”, at 7th International Symposium on Wearable Computers (ISWC) 2003.
- TUTORIALS
1. A. Krause and C. Guestrin. “Intelligent Information Gathering and Submodular Function Optimization” at IJCAI 2009 (accepted).
 2. A. Krause and C. Guestrin. “Beyond Convexity: Submodularity in Machine Learning” at ICML 2008.

PATENTS

1. A. Krause and E. Horvitz. “Balancing the Costs of Sharing Private Data with the Utility of Enhanced Personalization of Online Services”. Patent application filed by Microsoft Research in June 2008.
2. A. Krause, E. Horvitz, A. Kansal and F. Zhao. “Selection of Sensors for Monitoring Phenomena Considering the Value of Information and Data Sharing Preferences”. Patent application filed by Microsoft Research in June 2008.

SOFTWARE

1. A. Krause. “Matlab Toolbox for Submodular Function Optimization”, 2008 (available at <http://www.submodularity.org>).

INVITED
TALKS

Max Planck Institute for Biological Cybernetics, Tübingen (09/2007); Max Planck Institute for Computer Science, Saarbrücken, (09/2007); Fraunhofer IAIS, Sankt Augustin, (09/2007); Boeing M&CT, (07/2007); Microsoft Research, Redmond (07/2007, 05/2008); Technische Universität München, (04/2007, 01/2008); Siemens Corporate Technology (01/2006, 01/2008); CMU Machine Learning Research Day (03/2008); University of Southern California (03/2008); University of Michigan, Ann Arbor (03/2008); California Institute of Technology (03/2008); Duke University (03/2008); University of North Carolina at Chapel Hill (04/2008); Toyota Technological Institute at Chicago (04/2008); Purdue University (04/2008); Intel Research Seattle (05/2008); Johns Hopkins University (SPAR-Seminar 11/2008); Jet Propulsion Lab (02/2009).

ACADEMIC
AND DEPART-
MENTAL SERVICE

- Program committee member for
 - UAI 2009
 - IJCAI 2009 Workshop on Quantitative Risk Analysis for Security Applications
 - AAAI 2008 Main conference
 - AAAI 2008 Special Track on Physically Grounded AI
 - ICML 2008
 - ECML/PKDD 2008
- Admission committee member in Caltech CS and CNS 2009
- Journal reviewer for the
 - Journal of Machine Learning Research
 - Journal of Artificial Intelligence Research
 - Journal of Computational and Graphical Statistics
 - IEEE Transactions on Mobile Computing
 - IEEE Transactions on Pattern Analysis and Machine Intelligence
 - IEEE Transactions on Knowledge and Data Engineering
 - IEEE Transactions on Signal Processing
 - IEEE Signal Processing Letters
 - IEEE Pervasive Computing Magazine
 - IEEE Journal on Selected Areas in Communications
 - ACM Transactions on Sensor Networks
 - EURASIP Journal on Advances in Signal Processing
- External conference reviewer for ICRA 2008, 2009, FOCS 2007, NIPS 2006, UAI 2006, ICML 2006, 2007, IPSN 2006, 2007, 2009, WWW 2005 and ISWC 2003, 2005, 2007.
- Invited member of the NCEAS Machine Learning in Ecology working group 2008.
- Invited member of the DARPA ISAT incubator study on “Outformation” 2009.
- I co-organized the CMU Machine Learning Lunch and the Intelligence Seminar (2007-2008).
- Selected as member of the Computer Science Department Speaker’s Club (2006-2008).