

# KRISTI A. MORGANSEN

## *Curriculum Vitae*

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## EDUCATIONAL HISTORY

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Harvard University, Cambridge, MA  
Doctor of Philosophy, Engineering Sciences  
1999  
Dissertation: Temporal Patterns in Learning and Control  
Advisor: Roger W. Brockett

Harvard University, Cambridge, MA  
Master of Science, Applied Mathematics  
1996  
Advisor: Roger W. Brockett

Boston University, Boston, MA  
Master of Science, Mechanical Engineering  
Thesis: Stabilization of a Super-Articulated Mechanical System  
1994  
Advisor: John Baillieul

Boston University, Boston, MA  
Bachelor of Science, Mechanical Engineering (summa cum laude)  
1993

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## EMPLOYMENT HISTORY

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University of Washington  
Seattle, WA  
Assistant Professor, Department of Aeronautics & Astronautics 8/02-Present

California Institute of Technology  
Pasadena, CA  
Senior Research Fellow, Control and Dynamical Systems and Mechanical Engineering 10/01-8/02  
Postdoctoral Scholar, Control and Dynamical Systems and Mechanical Engineering 9/99-10/01  
Course Lecturer, Control and Dynamical Systems 3/00-6/00

Harvard University  
Cambridge, MA  
Graduate Research Assistant, Division of Engineering and Applied Sciences 8/94-8/99

Oak Ridge National Laboratory  
Oak Ridge, TN  
Graduate Research Assistant 5/93-8/93, 5/94-8/94 and 6/95-8/95

Boston University  
 Boston, MA  
 Graduate Research Assistant, Aerospace and Mechanical Engineering

8/93-8/94

## AWARDS AND HONORS

Senior Member, 2006, Institute of Electrical and Electronic Engineers.  
 National Science Foundation CAREER Award, 2003-2009, National Science Foundation.  
 Clare Boothe Luce Assistant Professor of Engineering, 2002-2007, The Luce Foundation.  
 Harvard University Jury Prize, June 1999, Harvard University.  
 National Science Foundation Graduate Research Fellowship, 1993-1996, National Science Foundation.  
 National Science Foundation Research Experience for Undergraduates, summer 1992, Boston University.  
 Tau Beta Pi National Engineering Honor Society, awarded in Junior year, 1992, Boston University.  
 Boston University Trustee Scholar, 1989-1993, Boston University.

## AFFILIATIONS AND OTHER APPOINTMENTS

Adjunct Assistant Professor, Department of Electrical Engineering, University of Washington, Seattle, WA, 2003-present.

## PUBLICATIONS

### Refereed archival journal publications

1. B.I. Triplett, D.J. Klein and **K.A. Morgansen**, “Cooperative estimation for coordinated target tracking in a cluttered environment,” to appear in *ACM/Springer Mobile Networks and Applications Journal (MONET)*, (invited—special issue).
2. D.J. Klein, P. Lee, **K.A. Morgansen** and T. Javidi, “Integration of communication and control using discrete time Kuramoto models for multivehicle coordination over broadcast networks,” *IEEE Journal on Selected Areas in Communication* **26**(4):695-705, May 2008.
3. **K.A. Morgansen**, B.I. Triplett and D.J. Klein, “Geometric methods for modeling and control of free-swimming fin-actuated underwater vehicles,” *IEEE Transactions on Robotics* **23**(6):1184-1199, December 2007.
4. B.I. Triplett, D.J. Klein and **K.A. Morgansen**, “Discrete time Kuramoto models with delay,” in *Lecture Notes in Control and Information Sciences*, Springer, 2005.
5. D. Hristu and **K.A. Morgansen**, “Limited communication control,” *Systems & Control Letters* **43**(7):193-205, July 1999.
6. F.G. Pin, **K.A. Morgansen**, F.A. Tulloch, C.J. Hacker, and K.B. Gower, “Motion planning for mobile manipulators with a non-holonomic constraint using the FSP (full space parameterization) method,” *Journal of Robotic Systems* **13**(11):723-36, 1996.

### Journal articles in preparation

7. L. Vu and **K.A. Morgansen**, “Stability of feedback switched systems with state and switching delay,” *Systems & Control Letters*.

8. **K.A. Morgansen**, “Oscillatory signals and optimal control of dynamic nonholonomic systems,” in preparation for submission to *Systems & Control Letters*.
9. D.J. Klein, P.K. Bettale, B.I. Triplett and **K.A. Morgansen**, “Autonomous underwater multivehicle control with limited communication: theory and experiment,” in preparation for submission to the *IEEE Journal on Ocean Engineering*.
10. D.J. Klein and **K.A. Morgansen**, “Controlled collective motion for trajectory tracking,” in preparation for submission to the *IEEE Transactions on Automatic Control*.
11. L. Vu and **K.A. Morgansen**, “Modeling and analysis of dynamic decision making in sequential two-choice tasks,” in preparation for submission to the *Journal of Mathematical Psychology*.

### Conference Proceedings and Other Non-journal Articles

#### *Fully refereed conference publications (27 total)*

1. D.J. Klein, E. Lalish and **K.A. Morgansen**, “On controlled sinusoidal coupling,” *American Control Conference*, to appear June 2009.
2. L. Vu and **K.A. Morgansen**, “Stability of feedback switched systems with state and switching delay,” *American Control Conference*, to appear June 2009.
3. L. Vu and **K.A. Morgansen**, “Modeling and analysis of dynamic decision making in sequential two-choice tasks,” to appear in the *IEEE Conference on Decision and Control*, December 2008.
4. E. Lalish and **K.A. Morgansen**, “Decentralized reactive collision avoidance for multivehicle systems,” to appear in the *IEEE Conference on Decision and Control*, December 2008.
5. D.J. Klein and **K.A. Morgansen**, “Set stability of phase-coupled agents in discrete time,” in *Proceedings of the American Control Conference*, June 2008.
6. E. Lalish, **K.A. Morgansen** and T. Tsukamaki, “Decentralized reactive collision avoidance for multiple unicycle-type vehicles,” in *Proceedings of the American Control Conference*, June 2008.
7. D.J. Klein, P.K. Bettale, B.I. Triplett and **K.A. Morgansen**, “Autonomous underwater multivehicle control with limited communication: Theory and experiment,” in *Proceedings of the Second IFAC Workshop on Navigation, Guidance and Control of Underwater Vehicles*, April 2008.
8. D.J. Klein, P. Lee, **K.A. Morgansen** and T. Javidi, “Integration of communication and control using discrete time Kuramoto models for multivehicle coordination over broadcast networks,” in *Proceedings of the IEEE Conference on Decision and Control*, December 2007.
9. E. Lalish, **K.A. Morgansen** and T. Tsukamaki, “Oscillatory control for constant-speed unicycle-type vehicles,” in *Proceedings of the IEEE Conference on Decision and Control*, December 2007.
10. A. Pongpunwattana, B.I. Triplett and **K.A. Morgansen**, “Target tracking control with limited communication and steering dynamics,” in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, November 2007.
11. B.I. Triplett, D.J. Klein, and **K.A. Morgansen**, “Distributed estimation for coordinated target tracking in a cluttered environment,” in *Proceedings of ROBOCOMM*, October 2007.
12. D.J. Klein, C. Matlack and **K.A. Morgansen**, “Cooperative target tracking using oscillator models in 3D,” in *Proceedings of the American Control Conference*, July 2007.
13. E. Lalish, **K.A. Morgansen** and T. Tsukamaki, “Formation tracking control using virtual structures and deconfliction,” in *Proceedings of the IEEE Conference on Decision and Control*, December 2006.

14. D.J. Klein and **K.A. Morgansen**, “Controlled collective motion for trajectory tracking,” in *Proceedings of the American Control Conference*, June 2006.
15. B.I. Triplett and **K.A. Morgansen**, “Abbreviated zero order hold for formation control in the presence of communication and sensing delays,” in *Proceedings of the American Control Conference*, June 2006.
16. C. Gonzalez and **K.A. Morgansen**, “Stabilization of dynamic vehicle formation configurations using graph Laplacians,” in *Proceedings of the IFAC World Congress*, July 2005.
17. **K.A. Morgansen**, “Oscillatory signals with nonlinear frequencies for control of nonholonomic systems,” in *Proceedings of the IEEE Conference on Decision and Control*, December 2003.
18. P.A. Vela, **K.A. Morgansen** and J.W. Burdick, “Underwater locomotion from oscillatory shape deformations,” in *Proceedings of the IEEE Conference on Decision and Control*, pp. 2074-2080, December 2002.
19. P.A. Vela, **K.A. Morgansen** and J.W. Burdick, “Second order averaging methods for oscillatory control of underactuated mechanical systems,” in *Proceedings of the American Control Conference*, pp. 4672-4677, May 2002.
20. **K.A. Morgansen**, P.A. Vela and J.W. Burdick, “Trajectory stabilization for a planar carangiform robot fish,” in *Proceedings of the IEEE International Conference on Robotics and Automation*, pp. 756-762, May 2002.
21. **K.A. Morgansen**, “Controllability and trajectory tracking for classes of cascade form second-order nonholonomic systems,” in *Proceedings of the IEEE Conference on Decision and Control*, pp. 3031-3036, December 2001.
22. **K.A. Morgansen**, V. Duindam, R.J. Mason, J.W. Burdick and R.M. Murray, “Nonlinear control methods for planar carangiform robot fish locomotion,” in *Proceedings of the IEEE International Conference on Robotics and Automation*, pp. 427-434, May 2001.
23. **K.A. Morgansen** and R.W. Brockett, “Optimal regulation and reinforcement learning for the nonholonomic integrator,” in *Proceedings of the American Control Conference*, pp. 462-466, June 2000.
24. **K.A. Morgansen** and R.W. Brockett, “Nonholonomic control based on approximate inversion,” in *Proceedings of the American Control Conference*, pp. 2515-19, June 1999.
25. F.G. Pin, C.J. Hacker, K.B. Glower and **K.A. Morgansen**, “Including a nonholonomic constraint in the FSP (full space parameterization) method for mobile manipulators’ motion planning,” in *Proceedings of the IEEE International Conference on Robotics and Automation*, pp. 2914-19, May 1997.
26. F.G. Pin, **K.A. Morgansen**, F.A. Tulloch and C.J. Hacker, “Motion planning for mobile manipulators using the FSP (full space parameterization) approach,” in *Proceedings of the 6th International Symposium on Robotics and Manufacturing*, pp. 739-44, May 1996.
27. **K.A. Morgansen** and F.G. Pin, “Impact mitigation using kinematic constraints and the full space parameterization method,” in *Proceedings of the IEEE International Conference on Robotics and Automation*, pp. 1897-902, April 1996.

*Fully refereed conference papers in review*

28. L. Vu, Q. Hui, and **K.A. Morgansen**, “Distributed multiagent dynamic networks with heterogeneous time-varying communication delays,” submitted to the *IEEE Conference on Decision and Control*, March 2009.

29. E. Lalish and **K.A. Morgansen**, “Distributed reactive collision avoidance for multivehicle systems,” submitted to the *IEEE Conference on Decision and Control*, March 2009.

### Abstracts, Letters, Non-Refereed Papers, Technical Reports

#### *Non-refereed papers*

1. **K.A. Morgansen**, “Geometric methods for modeling and control of a free-swimming carangiform fish robot,” in *Proceedings of the 13<sup>th</sup> International Symposium on Unmanned Untethered Submersible Technology*, August 2003.
2. **K.A. Morgansen**, T.M. La Fond, and J.X. Zhang, “Agile maneuvering for fin-actuated underwater vehicles,” in *Proceedings of the 2006 Second International Symposium on Communications, Control and Signal Processing*, invited paper, March 2006.

#### *Technical reports*

1. **K.A. Morgansen**, “Temporal Patterns in Learning and Control,” *Ph.D. Thesis*, Harvard University, 1999.
2. N.J. Ferrier, **K.A. Morgansen** and D. Hristu, “Implementation of membrane shape reconstruction,” Harvard University Technical Report, 1997.
3. **K.A. Morgansen** and F.G. Pin, “Enhanced code for the full space parameterization approach to solving underspecified systems of algebraic equations version 1.0,” Oak Ridge National Laboratory Technical Report, 1995.

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## INVITED LECTURES

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### Invited lectures and seminars

1. University of Washington Robotics, Controls and Mechatronics Colloquium, “Oscillatory Feedback Control with Applications to Underwater Locomotion,” November 2002.
2. Air Force Research Laboratory and University of Florida Graduate Engineering and Research Center, “Coordinated Control of Agile Autonomous Vehicles with Dynamic Communication,” Research Institute for Autonomous Guided Systems, Annual Technical Review, December 2002.
3. University of Washington Applied Physics Lab, “Design and Control for Carangiform Robot Fish Locomotion,” February 2003.
4. Johns Hopkins University, “Modeling and Control of Fin-Actuated Underwater Vehicles,” February 2004.
5. Stanford University, “Modeling and Control of Fin-Actuated Underwater Vehicles,” April 2004.
6. Caltech, “Geometric Methods for Design and Control of Fin Actuated Autonomous Underwater Vehicles,” November 2004.
7. University of California San Diego, “Oscillator Models for Coordinated Control with Limited Communication,” December 2005.
8. Oregon State University, “Modeling and Control of Fin-Actuated Underwater Vehicles,” February 2006.

9. University of Illinois Urbana-Champaign, “Optimal Foil Thrust and Agile Maneuvering for Fin-Actuated Underwater Vehicles,” April 2006.
10. University of California Santa Barbara, “Oscillatory Methods for Coordinated Control with Limited Communication,” November 2006.
11. University of Washington Applied Physics Lab, “Oscillator Models for Coordinated Control with Limited Communication,” October 2006.
12. University of Washington A&A Department, “Nonlinear Methods for Coordinated Control with Limited Communication,” April 2007.
13. University of Washington EE Department, “Nonlinear Methods for Coordinated Control with Limited Communication,” October 2007.
14. Virginia Tech, “Nonlinear Methods for Coordinated Control with Limited Communication,” November 2007.
15. University of California San Diego, “Nonlinear Dynamical Control I,” Winter School in Chemical Discrimination and Localization using Biologically Based Olfactory Processing, January 2008.
16. University of California San Diego, “Nonlinear Dynamical Control II,” Winter School in Chemical Discrimination and Localization using Biologically Based Olfactory Processing, January 2008.
17. University of Southern California, “Nonlinear control and bioinspired underwater vehicle systems,” February 2008.
18. Georgia Institute of Technology, “Nonlinear control and bioinspired underwater vehicle systems,” February 2008.

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## SERVICE

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### Professional society memberships.

American Institute of Aeronautics and Astronautics	2002 – present
American Society of Engineering Educators	2002 – present
Institute of Electrical and Electronic Engineers (senior member 2006)	1996 – present
American Society of Mechanical Engineers	1992 – present
American Association for the Advancement of Science	2005 – 2006
American Physical Society	2004 – 2006

### Journal reviews

- Automatica
- IEEE Control Systems Magazine
- IEEE Journal on Oceanic Engineering
- IEEE Transactions on Automatic Control
- IEEE Transactions on Robotics and Automation
- IEEE Transactions on Robotics

- International Journal of Non-Linear Mechanics
- International Journal of Robotics Research
- Iranian Journal of Electrical and Computer Engineering
- Journal of Experimental Biology
- Journal of Vehicle System Dynamics
- Journal of Vibration and Control
- Systems, Man and Cybernetics, Part B
- PLoS Computational Biology
- American Control Conference
- Conference on Decision and Control
- International Conference on Robotics and Automation

### Professional Society Service

- *American Control Conference*, Local Arrangements Chair 2008  
This conference is the primary U.S. national conference in control theory with an attendance of over 1000 people from both the U.S. and international community.
- *ROBOCOMM*, Program Committee 2007-present
- Invited session organizer and chair, *IEEE Conference on Decision and Control* 2007
- *American Control Conference*, Program Committee 2005
- IEEE Control System Society Conference Editorial Board 2001-present  
This committee manages reviews for the *American Control Conference* and the *Conference on Decision and Control*, two of the major annual conferences in control theory.
- Invited session organizer and chair, *IEEE Conference on Decision and Control* 2003
- *International Conference on Intelligent and Robotic Systems*, Program Committee 2000

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## ADVISING

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### Postdoctoral Fellows

Dr. Anawat Pongpunwattana (7/07 – 11/07, now at L3 Communications), Dr. Linh Vu (11/07 to present)

### Chaired Doctoral Degrees

Benjamin I. Triplett (PhD AA, June 2008), Daniel J. Klein (PhD AA, September 2008), Emmett Lalish (PhD AA, expected September 2009)

### Chaired Masters Degrees

Brian Massey (MSAA, 2004), Thomas Yochum (MSAE, 2004), Daniel J. Klein (MSAA, 2005), Kudah Mushambi (MSAA, 2006), Emmett Lalish (MSAA, 2007), Patrick K. Bettale (MSEE, 2008), Randall

Svac (MSAA, 2008), Kyle Krogh (MSAA, 2009), JaeDong Hwang (MSAA, expected 2009), Andrew Melander (MSAA, expected 2010)