Christoffer R. Heckman

CONTACT INFORMATION

Autonomous Robotics & Perception Group
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EDUCATION

Field of Theoretical and Applied Mechanics, Cornell University

Doctor of Philosophy with Prof. Richard Rand — *August 2012*

Department of Mechanical Engineering, University of California at Berkeley

Bachelor of Science (cum Laude) — *May 2008*

PROFESSIONAL EXPERIENCE

Department of Computer Science, University of Colorado at Boulder

Assistant Professor — *August 2016–Present*

Department of Computer Science, University of Colorado at Boulder

Research Scientist with Prof. Gabe Sibley — *October 2014–Present*

U.S. Naval Research Laboratory

Post-doctoral Research Associate with Dr. Ira Schwartz — *January 2013–October 2014*

JOURNAL ARTICLES

Szwaykowska K, Schwartz IB, Luis MTR, **Heckman CR**, Mox D, Hsieh MA. Collective motion patterns of swarms with delay coupling: Theory and experiment. *Physical Review E* **93** 032307 2016.

Heckman CR, Hsieh MA, Schwartz IB. Toward efficient navigation in uncertain gyre-like flows. *International Journal of Robotics Research* **34** 13 1590–1603 2015.

Heckman CR, Hsieh MA, Schwartz IB. Going with the flow: enhancing stochastic switching rates in multi-gyre systems. *ASME Journal of Dynamic Systems, Measurement and Control* **137** 031006 2014.

Heckman CR, Schwartz IB. Stochastic switching in slow-fast systems: a large fluctuation approach. *Physical Review E* **89** 022919 2014.

Heckman CR, Rand RH. Dynamics of microbubble oscillators with delay coupling. *Nonlinear Dynamics* **71** 121–132 2013.

Heckman CR, Kotas J, Rand RH. Asymptotic Analysis of the Hopf-Hopf Bifurcation in a Time Delay System. *Journal of Applied Nonlinear Dynamics* **1** 159–171 2012.

Heckman CR, Kotas J, Rand RH. Center Manifold Reduction of the Hopf-Hopf Bifurcation in a Time Delay System. *Proceedings of the European Society of Industrial and Applied Mathematics* **39** 57–65 2013.

Heckman CR, Sah SM, Rand RH. Dynamics of microbubble oscillators with delay coupling. *Communications in Nonlinear Science and Numerical Simulation 15* 2735–2743 2010.

CONFERENCES

Kasper M, Keivan N, Sibley GT, **Heckman CR**. Light Source Estimation in Synthetic Images. *European Conference on Computer Vision* (ECCV) Workshop on Virtual/Agumented Reality for Visual Artificial Intelligence; 2016 Oct 16; Amsterdam, Netherlands.

Nobre F, **Heckman CR**, Sibley GT. Multi-Sensor SLAM with Online Self-Calibration and Change Detection. *International Symposium on Experimental Robotics on Intelligent Robots*; 2016 Oct 3–6; Tokyo, Japan.

Heckman CR, Hsieh MA, Schwartz IB. Using Stochastic Effects in Fluid Environments with Minimal Control. *International Conference on Structural Nonlinear Dynamics and Diagnosis*; 2016 May 23–25; Marrakech, Morocco.

Hsieh MA, Hajieghrary H, Kularatne D, **Heckman CR**, Forgoston E, Schwartz IB, Yecko PA. Small and Adrift with Self-Control: Using the Environment to Improve Autonomy. *International Symposium on Robotics Research (ISRR)*; 2015 Sept 12–15; Sestri Levante, Italy.

Heckman CR, Keivan N, Sibley G. Simulation-in-the-loop for Planning and Model-Predictive Control. *Robotics Science and Systems (RSS)* Workshop on Realistic, Rapid and Repeatable Robot Simulation; 2015 Jul 12–17; Rome, Italy.

Heckman CR, Hsieh MA, Schwartz IB. Controlling Long-Term Spatial Distributions of Autonomous Vehicles in Stochastic Flow Environments. *SIAM Conference on Applications of Dynamical Systems*; 2015 May 13–17; Snowbird, Utah.

Heckman CR, Schwartz IB, Hsieh MA. Controlling Basin Breakout for Robots Operating in Uncertain Flow Environments. *International Symposium on Experimental Robotics*; 2014 Jun 15–18; Marrakech/Essaouira, Morocco.

Heckman CR, Scwhartz IB. Rare Event Prediction in Stochastic Systems with Multiple Time Scales. *Dynamics Days Europe XXXIII*; 2013 Jul 3–7; Madrid, Spain.

Heckman CR, Kotas J, Rand RH. Center Manifold Reduction of the Hopf-Hopf Bifurcation in a Time Delay System. *International Conference on Structural Nonlinear Dynamics and Diagnosis 2012*; 2012 Apr 30–May 2; Marrakech, Morocco.

Heckman CR, Rand RH. Dynamics of Coupled Microbubbles with Large Fluid Compressibility Delays. *EUROMECH 2011 European Nonlinear Oscillations Conference*; 2011 July 24–29; Rome, Italy.

Rand RH, **Heckman CR**. Dynamics of Coupled Bubble Oscillators with Delay. *ASME 2009 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE2009)*; 2009 Aug 30–Sep 2; San Diego, California.

Szeri AJ, Toilliez JO, **Heckman CR**, Eslami P. Bubble-bubble interaction in disperse bubble clouds. *Acoustics 2008*; 2008 Jun 30–Jul 4; Paris, France. *Journal of the Acoustical Society of America 123* (5):3557 2008 (abstract only).

Teaching Experience

University of Colorado at Boulder

CSCI 7000, robot perception, planning and control	*Fall 2016*
CSCI 7000, autonomous perception & action	*Fall 2015*
CSCI 5722, computer vision (6 lectures)	*Spring 2015*

Cornell University

Instructor

MATH 2930, differential equations	*Summer 2012*

Teaching Assistant

MATH 2940, linear algebra for scientists & engineers	*Fall 2011*
MATH 6170, graduate-level dynamical systems	*Fall 2010*
TAM 6130, perturbations & asymptotics	*Fall 2009*

University of California at Berkeley

Teaching Assistant

E28, engineering design & computer-aided drafting	*Spring 2007*

Funding

PI, NSF-CPS: Synergy: Verified Control of Cooperative Autonomous Vehicles ($777k), Award #1646556, October 2016–Present.
PI, DARPA Defense Sciences Office: Ninja Car ($813k), January 2016–Present.
PI, Toyota Motor Corporation: Autonomous Vehicle Research ($474k), June 2015–Present.

Honors

National Research Council Research Apprenticeship Program Fellowship, 2013–2014
National Science Foundation Graduate Research Fellowship, 2009–2012
Cornell University College of Engineering Olin Fellowship, 2008–2009
Berkeley Undergraduate Scholarship, 2006–2008
Eagle Scout, Boy Scouts of America, April 2004

Service

IEEE Transactions on Robotics Referee
IEEE Conference on Decision and Control Referee
SIAM DS 2015 Minisymposium Organizer
RSS Program Committee Member
Provost's Graduate Committee on CornellNYC
Cornell Faculty Senate Ad-Hoc Academic Calendar Committee
Cornell University Trustee Nominating Committee
Cornell Graduate School General Committee
Tau Beta Pi CA-A (UC Berkeley) Chapter Adviser