

Employment	Columbia University, Department of Computer Science	
	Lecturer in Discipline Associate in Discipline	January 2019 - present July 2018 - December 2018
Education	Carnegie Mellon University, The Robotics Institute	
	Doctor of Philosophy, Robotics Master of Science, Robotics - Thesis: Extensions of the Principal Fiber Bundle Model for Locomoting Robots - Completed Future Faculty Program at the Eberly Center for Teaching Excellence	August 2018 May 2015
	University of California, Berkeley	
	Bachelor of Science, Electrical Engineering and Computer Science (EECS) - Graduated with highest honors (<i>summa cum laude</i>) - Completed EECS Honors Program, minor program in Physics	May 2012
Teaching	Columbia University	
	COMS 3251, Computational Linear Algebra COMS 4701, Artificial Intelligence COMS 3203, Discrete Mathematics COMS 4733, Computational Aspects of Robotics COMS 4701, Artificial Intelligence	Spring 2020 Fall 2019 Spring 2019 Fall 2018
	Carnegie Mellon University	
	16-384, Robot Kinematics and Dynamics Course developer and TA with Prof. Howie Choset. Produced a package of online course materials in the form of lecture videos and curriculum hosted on CMU's Open Learning Initiative (OLI). Short, navigable lecture videos are hosted on Panopto and interleaved with interactive practice problems. The problems, both quantitative and qualitative, are designed with targeted hints and feedback in order to accommodate individual student submissions. www.robotkinematics.org	Fall 2013 - Summer 2018
	16-742, Geometry of Locomotion TA for Prof. Howie Choset. Developed and maintained course materials; advised 10 separate course projects, comprised of original research, a presentation, and a paper writeup. Continued to work with several groups post-course to submit project results as conference publications.	Fall 2015
	Future Faculty Program, Eberly Center for Teaching Excellence Completed graduate student program focusing on teaching skills and strategies. Milestones included attendance of interactive seminars on a variety of pedagogical topics, two teaching feedback consultations following lecture observations, a course and syllabus design project, and an individualized project. The latter included development of materials for a flipped version of 16-384, as well as a report on the approach and experience of the implementation.	Fall 2015
	University of California, Berkeley	
	Course ratings: https://hkn.eecs.berkeley.edu/coursesurveys/instructor/7113	
	EE 42/43/100, Electronic Techniques for Engineering Instructor of record for introductory circuits engineering course for computer science and non-electrical engineering majors. Homework assignments consisted of paper-and-pencil problems; labs developed in coordination with department staff included design of simple circuits such as oscillators, filters, boost converters, and ADCs.	Summer 2012
	EE 42/43/100, Electronic Techniques for Engineering TA for instructors Howard Lei, Prof. Ali Niknejad, Prof. Kameshwar Poolla, and Brian Gawalt. Ran discussion and lab sections. Designed homework assignments and solutions; held weekly office hours; interfaced among professor, other TAs, and students as head TA.	Summer 2010 - Spring 2012

Research

Columbia University

August 2018 - present

Currently pursuing several directions of research related to robot locomotion and motion planning. We are investigating ways to incorporate traditional planning and estimation tools, such as SLAM and RRTs, with robots that can be modeled using geometric mechanics. At the same time, we are also interested in learning such models without prior knowledge, through methods such as deep reinforcement learning.

Carnegie Mellon University

September 2012 - August 2018

Advisor: Prof. Howie Choset. Expanded applicability of geometric methods for modeling and controlling locomoting systems, including wheeled, snake, and swimming robots. We applied intuitive motion planning techniques to systems that deviate from ideal conditions, such as those with passive joints or those that have to coordinate their degrees of freedom with environmental interactions. We also validated the newly established theory through experiments on simple but representative robots, such as a multi-link wheeled snake robot with compliant joints.

University of California, Berkeley

February 2011 - February 2012

Advisor: Prof. Stuart Russell. Developed and tested a seismic inference system in accordance with the Comprehensive Test Ban Treaty Organization (CTBTO) to detect nuclear explosions and seismic events worldwide; first system of its kind to use Bayesian inference. Implemented algorithms and computation through parallel and distributed computing on Amazon EC2, with results of up to 30 times speedup.

Space Sciences Lab (UC Berkeley)

June 2009 - August 2010

Advisor: Dr. James McFadden. Project: Mars Atmosphere and Volatile Evolution (MAVEN) mission. Assisted with PCB design, layout, and verification of modules in the Particles and Field package of a Mars orbiter designed to measure solar and magnetic properties of the atmosphere.

Journal Publications

T. Dear, B. Buchanan, R. Abajian-Guerrero, S. D. Kelly, M. Travers, and H. Choset. “Locomotion of a multi-link non-holonomic snake robot with passive joints”. The International Journal of Robotics Research, 2020. <https://doi.org/10.1177/0278364919898503>

R. L. Hatton, **T. Dear**, and H. Choset. “Kinematic Cartography and the Efficiency of Viscous Swimming”. IEEE Transactions on Robotics 33(3), 523-535, 2017.

Conference Publications

J. Grover, J. Zimmer, **T. Dear**, M. Travers, H. Choset, and S. D. Kelly. “Geometric Motion Planning for a Three-Link Swimmer in a Three-Dimensional Low Reynolds-Number Regime”. Proceedings of the 2018 American Control Conference. Milwaukee, WI, June 2018.

T. Dear, S. D. Kelly, M. Travers, and H. Choset. “Locomotion of a Multi-link Nonholonomic Snake Robot”. Proceedings of the ASME 2017 Dynamic Systems and Control Conference. Tysons Corner, VA, October 2017.

T. Dear, S. D. Kelly, and H. Choset. “Control and Locomotion of Hydrodynamically Coupled Rigid Spheres”. Proceedings of the 2017 American Control Conference. Seattle, WA, May 2017.

T. Dear, S. D. Kelly, M. Travers, and H. Choset. “Locomotive Analysis of a Single-Input Three-Link Snake Robot”. Proceedings of the 55th IEEE Conference on Decision and Control. Las Vegas, NV, December 2016.

H. Salman, **T. Dear**, S. Babikian, E. Shammass, and H. Choset. “A Physical Parameter-Based Skidding Model for the Snakeboard”. Proceedings of the 55th IEEE Conference on Decision and Control. Las Vegas, NV, December 2016.

A. Agrawal, H. Zaini, **T. Dear**, and H. Choset. “Experimental Gait Analysis of Waveboard Locomotion”. Proceedings of the ASME 2016 Dynamic Systems and Control Conference. Minneapolis, MN, October 2016.

T. Dear, S. D. Kelly, and H. Choset. “Variations on the Role of Principal Connections in Robotic Locomotion”. Proceedings of the ASME 2016 Dynamic Systems and Control Conference. Minneapolis, MN, October 2016.

R. Shu, A. Siravuru, A. Rai, **T. Dear**, K. Sreenath, and H. Choset. “Optimal Control for Geometric Motion Planning of a Robot Diver”. Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems. Daejeon, South Korea, October 2016.

T. Dear, S. D. Kelly, M. Travers, and H. Choset. “The Three-Link Nonholonomic Snake as a Hybrid Kinodynamic System”. Proceedings of the American Control Conference. Boston, MA, July 2016.

T. Dear, S. D. Kelly, M. Travers, and H. Choset. “Motion Planning and Differential Flatness of Mechanical Systems on Principal Bundles”. Proceedings of the ASME 2015 Dynamic Systems and Control Conference. Columbus, OH, October 2015.

J. Dai, M. Travers, **T. Dear**, C. Gong, H. C. Astley, D. I. Goldman, and H. Choset. “Robot-Inspired Biology: The Compound-Wave Control Template”. Proceedings of the IEEE International Conference on Robotics and Automation. Seattle, WA, May 2015.

T. Dear, S. D. Kelly, M. Travers, and H. Choset. “Snakeboard Motion Planning with Viscous Friction and Skidding”. Proceedings of the IEEE International Conference on Robotics and Automation. Seattle, WA, May 2015.

T. Dear, S. D. Kelly, M. Travers, and H. Choset. “Dissipation-Induced Self-Recovery in Systems on Principal Bundles”. Proceedings of the ASME 2014 Dynamic Systems and Control Conference. San Antonio, TX, October 2014.

T. Dear, R. L. Hatton, and H. Choset. “Nonlinear Dimensionality Reduction for Kinematic Cartography with an Application toward Robot Locomotion”. Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems. Chicago, IL, September 2014.

T. Dear, R. L. Hatton, M. Travers, and H. Choset. “Snakeboard Motion Planning with Local Trajectory Information”. Proceedings of the ASME 2013 Dynamic Systems and Control Conference. Stanford, CA, October 2013. Nominated for Best Student Paper.

T. Dear, S. D. Kelly, M. Travers, and H. Choset. “Mechanics and Control of a Terrestrial Vehicle Exploiting a Nonholonomic Constraint for Fishlike Locomotion”. Proceedings of the ASME 2013 Dynamic Systems and Control Conference. Stanford, CA, October 2013.

Presentations

T. Dear, S. D. Kelly, and H. Choset. “Locomotion and Coordination of Underactuated Bodies in An Ideal Fluid”. SIAM Annual Meeting, Pittsburgh, PA, July 2017.

T. Dear, S. D. Kelly, and H. Choset. “Compliant Joints and Locomotion of Wheeled Robotic Systems”. SIAM Conference on Applications of Dynamic Systems, Snowbird, UT, May 2017.

J. A. Adams, H. Choset, and **T. Dear**. “Biologically Inspired Human Supervision and Control of Agent Teams”. ONR Science of Autonomy Meeting, Arlington, VA, August 2014.

H. Choset, **T. Dear**, and R. L. Hatton. “Mapping Effort: Cartographically Inspired Methods for Representing the Energetic Cost of Locomotion”. SIAM Annual Meeting, Chicago, IL, July 2014.

Authored Grants

NSF CMMI-1727889, “An Expanded Analysis and Design Framework for Robots that Move by Reshaping their Limbs and Bodies”, 2017. PI: H. Choset.

Fellowships	National Defense Science and Engineering Graduate (NDSEG) Fellowship	2014 - 2017
	Jim & Donna Gray Endowment Award (UC Berkeley)	2011 - 2012
Service	Director of the Columbia Align M.S. program in Computer Science, 2019 - present	
	Advisor for Columbia undergraduate student groups, including Application Development Initiative (ADI) Labs and Columbia Space Robotics, as well as undergraduate and MS students on independent research projects	
	Reviewer for refereed journals, including IEEE T-ASE and NODY, and refereed conferences, including ICRA, IROS, CDC, ACC, DSCC, among others.	
	Mentor for undergraduate students (including international) participating in the Robotics Institute Summer Scholars (RISS) program to perform research in the laboratory.	
	Organized tour groups of Robotics Institute labs, including for K-12 students of the Big Brothers Big Sisters of Greater Pittsburgh program.	
	Language interpreter for international student finalists in the Intel International Science and Engineering Fair (ISEF), Pittsburgh, PA, May 2015.	
Professional Affiliations	IT lead and staff member for Pioneers in Engineering at UC Berkeley, 2011-2012. Organized robotics competitions and other STEM mentoring opportunities for local high school students.	
Skills	Tau Beta Pi , Initiated CA-Alpha Chapter, Fall 2009	
	IEEE-Eta Kappa Nu , Initiated CA-Alpha Chapter, Spring 2009	
Skills	<i>Programming/Tools</i> : Python, Java, C, Mathematica, MatLab, L ^A T _E X	
	<i>Languages</i> : English, Mandarin, Cantonese, conversational Spanish	