Daniel M. Lofaro Ph.D 2018-09-15

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Research Interests

Robot Design, Real-World Human/Robot Interaction, Humanoid Robotics, Complex Control Systems, Secure Robotics, Cloud Robotics, Unique Musical Instrument Design, and Real-Time Systems.

Education

Drexel University	Ph.D	Electrical and Computer Engineering in Control Systems and Robotics. Dissertation Title: *Unified Algorithmic Framework for High Degree of Freedom Complex Systems and Humanoid Robots* Advisor: Paul Oh	2008-2013
Drexel University	M.S.	Electrical and Computer Engineering in Control Systems Thesis Title: *Control Design to Reduce the Effects of Torsional Resonance in Coupled Systems - Honors School* graduate Advisors: Tom Chmielewski and Paul Kalata	2006-2008
Drexel University	B.S.	Electrical and Computer Engineering in Control Systems *Cum Laude* and *Honors School* graduate	2003-2008

Work Experience

George Mason University Assistant Professor *Fairfax, VA, USA*	Assistant Professor in Robotics at George Mason University in the Electrical and Computer Engineering Department.	2014 - Present
U.S. Naval Research Laboratory Research Scientist *Washington D.C., USA*	Affiliate faculty and research scientist in Electrical Engineering, Computer Science, and Robotics at the U.S. Naval Research Laboratory (NRL) in the Navy Center for Applied Research in Artificial Intelligence (NCARAI) within the Laboratory for Autonomous Systems Research (LASR)	2017 - Present
George Mason University Laboratory Director *Fairfax, VA, USA*	Director of the Lofaro Labs Robotics and the DASL Autonomous Systems Lab (DASL) at George Mason University. The primary focus of the lab is robotics including Humanoids, Complex Control Systems, Robot Design, and Cloud Robotics.	2014 - Present
Lofaro Labs LLC. Owner & President *Fairfax, VA*	Owner and President of Lofaro Labs LLC. The primary focus of the company is mechatronic hardware and software solutions for real-world and real-time systems.	2016 - Present
ExPlus Automation Consultant *Sterling, VA*	Create automation software for animated and interactive museum displays.	2015 - 2016

DARPA Research Lead *Philadelphia, PA*	Research Lead and Systems Engineer for the Track-A DARPA Robotics Challenge team DRC-Hubo. I work directly with Dmitry Berenson at WPI on the valve opening/closing task of the challenge. In collaboration with Mike Stilman and Neil Dantam at Gerogia Tech I lead the developed of the needed open-source, Linux based, BSD licensed controller for humanoid robots. Our software is the primary control system for the DRC-Hubo team and is currently being used by MIT, WPI, Purdue, Ohio State, Swarthmore College, Georgia Tech, and Drexel University. Team Website: *http://www.drc-hubo.com*	2012 - 2014
Drexel Autonomous Systems Lab Research Assistant *Philadelphia, PA*	Researching Complex Control Systems and Robotics. Daniel's dissertation topic is end-effector velocity control for bipedal robots, also known as throwing. Primary care taker of the full-size humanoid robot Jaemi Hubo.	2008 - 2013
Dragonfly Incorporated Engineer *Philadelphia, PA*	Testing and modeling of linear actuators for dual rotor unmanned aerial vehicles.	2011 - 2013
Drexel University Teaching Assistant *Philadelphia, PA*	Assist professor with electrical engineering lab courses as well as organizing and maintaing Senior Design for the electrical and computer engineering dept.	2008 - 2013
IEEE (ICRA-2012) Web Designer *Piscataway, NJ*	Design and maintain events and website for the International Conference on Robotics and Automation.	2011 - 2012
NATO (ASI-2012) Workshop Chair *Cesme, Turkey*	Organize and maintain 6 workshops for an international audience with participation from 23 countries	2011 - 2012
FIRST Robotics Mentor, Judge, and Volunteer *Villanova, PA*	Coach/mentors for the all girls high school, Agnes Irwin School (Bryn Mawr, PA), FIRST Robotics team and Philadelphia Regional Competition volunteer.	2006 - 2010
Moog Component Group Assistant Design Engineer *Springfield, PA*	Temperature response testing - Error analysis on positional and rotational actuators - Fault detection circuit design and implementation for positional and rotator actuators - PCB trace verification, Trained in MIL-SPEC soldering.	2005 - 2006
Evaporated Coatings Inc. Vacuum Deposited Thin Film Assistant Design Engineer *Willow Grove, PA*	Design and implementation of vacuum deposited tin films for the control of optical, thermal and electrical surface properties, design using computer simulations. Implementation via vacuum deposition using electron beam gun.	2004 - 2005

Fellowships and Awards

ONR-SFRP	The Office of Naval Research - Summer Faculty Research Program and Sabbatical Leave Program provides science and engineering faculty members from institutions of higher education the opportunity to participate in research of mutual interest to the faculty member and peers at U.S. Navy Laboratories	2015-2016
NSF-GRFP Honorable Mention	The program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master's and doctoral degrees in the U.S. and abroad.	2009
NSF-EAPSI Fellow	The primary goals of EAPSI are to introduce students to East Asia and Pacific science and engineering in the context of a research setting, and to help students initiate scientific relationships that will better enable future collaboration with foreign counterparts.	2008
Lester Kraus Award	Awarded to Electrical Engineering student who has shown the greatest promise of developing into a creative and socially responsible engineer.	2008
Dean's Fellowship	Non-need-based award for full-time graduate students designed to assist outstanding applicants.	2008

Funded Projects

[1] D. Lofaro, "Doctoral consortium at the 2017 ieee/ras international conference on intelligent robotics and systems (iros) 2017," in *National Science Foundation (NSF)*, Grant #1748482, 08/17 to 01/18

[2] D. M. Lofaro, "Amazon robotics challenge - team gmu-bgu," in *Autonomous Robotic Manipulation and Stowing System for Warhorse Settings - Amazon Inc.*, Grant #117683, 04/17 to 12/17

[3] D. Lofaro, "Smart hive," in *Institute of Electrical and Electronics Engineers (IEEE)*, 05/17 to 12/17

[4] D. M. Lofaro, "Instruments in the attic (collaborator)," in *Potomac Arts Academy*, 2014 - Ongoing

Competitions

[1] "Team robo patriots," in *Amazon Robotics Challenge, Nagoya, Japan*, 2017

[2] "Team robo patriots," in *Grasping and Manipulation Challenge at IEEE-ICRA, Daejeon, South Korea*, 2016

[3] "Team robo patriots," in *RoboCup (Child-Size Humanoid League), Hefi, China*, 2015

[4] "Team drc-hubo," in *DARPA Robotics Challenge, USA*, 2012-2014

Publications

[1] E. Dessalene and D. Lofaro, "Complete robotic systems for the iros grasping and manipulation challenge," in *Robotic Grasping and Manipulation.* Springer, 2018

[2] K. Nishimura, M. Bugajska, D. Sofge, P. Oh, and D. M. Lofaro, "On humanoid co-robot locomotion when mechanically coupled to a human partner," in *2018 15th IEEE International Conference on Ubiquitous Robots (UR)*, 2018

[3] A. Perez, M. Orsag, and D. Lofaro, "Design, implementation, and control of the underwater legged robot aquashoko for low-signature underwater exploration," in *2018 15th IEEE International Conference on Ubiquitous Robots (UR)*, 2018

[4] E. Wiese, P. Weis, and D. Lofaro, "Embodied social robots trigger gaze following in real-time hri," in *2018 15th IEEE International Conference on Ubiquitous Robots (UR)*, 2018

[5] A. Perez, G. Hernandez, N. Folta, R. Regalado, S. McElwain, and D. Lofaro, "Designing an autonomous vehicle lean recovery system for motorcycles," in *2018 15th IEEE International Conference on Ubiquitous Robots (UR)*, 2018

[6] E. Dessalene, C. Korpela, and D. Lofaro, "Push grasping with anthropomorphic hands," in *2018 15th IEEE International Conference on Ubiquitous Robots (UR)*, 2018

[7] D. M. Lofaro, C. Ward, M. Bugajska, and D. Sofge, "Extending the life of legacy robots: Mds-ach, a real-time, process based, networked, secure middleware based on the x-ach methodology," in *15th International Workshop on Advanced Motion Control (IEEE-AMC2018)*, March 2018

[8] E. Dessalene, G. Georgakis, M. Reza, Y. Li, Y. Ovcharik, A. Shapiro, J. Kosecka, and D. Lofaro, "A contact exploitative approach to the amazon robotics challenge," in *2017 IEEE International Conference on Robotics and Automation (ICRA) - Warehouse Picking Automation Workshop*, May 2017

[9] D. Lofaro, C. Taylor, R. Tse, and D. Sofge, "Wearable interactive display for the local positioning system (lps)," in *19th ACM International Conference on Multimodal Interaction*, Nov 2017

[10] D. Lofaro, K. Nishimura, M. Bugajska, P. Oh, and D. Sofge, "Experimental setup and approach for co-robot locomotion when mechanically coupled to a human partner," in *2017 IEEE-RAS 17th International Conference on Humanoid Robots (Humanoids)*, Nov 2017

[11] D. M. Lofaro, P. Weis, and E. Wiese, "Experiments confirming gaze triggered effects in embodied social robots," in *2017 IEEE-RAS 17th International Conference on Humanoid Robots (Humanoids)*, Nov 2017

[12] D. M. Lofaro, "The honey bee initiative - smart hive," in *2017 14th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI)*, June 2017, pp. 446–447

[13] D. Lofaro, "Utilizing the android robot controller for robots, wearable apps, and the hotel room of the future," in *2017 14th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI)*, June 2017, pp. 570–575

[14] C. Phillips-Grafflin, H. B. Suay, J. Mainprice, N. Alunni, D. Lofaro, D. Berenson, S. Chernova, R. W. Lindeman, and P. Oh, "From autonomy to cooperative traded control of humanoid manipulation tasks with unreliable communication," *Journal of Intelligent & Robotic Systems*, vol. 82, no. 3, pp. 341–361, Jun 2016

[15] D. M. Lofaro and A. Asokan, "Low latency bounty hunting and geographically adjacent server configuration for real-time cloud control," in *2016 IEEE International Conference on Robotics and Automation (ICRA)*, May 2016, pp. 5277–5282

[16] D. M. Lofaro, "Secure robotics," in *2016 13th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI)*, Aug 2016, pp. 311–313

[17] D. M. Lofaro, M. Bula, P. Early, E. Eide, and M. Javid, "Archr - apparatus for remote control of humanoid robots," in *2015 IEEE-RAS 15th International Conference on Humanoid Robots (Humanoids)*, Nov 2015, pp. 229–236

[18] D. Lofaro, A. Asokan, and E. Roderik, "Feasibility of cloud enabled humanoid robots: Development of low latency geographically adjacent real-time cloud control," in *Humanoid Robots (Humanoids), 2015 15th IEEE-RAS International Conference on*, Nov 2015

[19] N. Dantam, D. Lofaro, A. Hereid, P. Oh, A. Ames, and M. Stilman, "The ach library: A new framework for real-time communication," *Robotics Automation Magazine, IEEE*, vol. 22, no. 1, pp. 76–85, March 2015

[20] W. Hilton, D. Lofaro, and Y. Kim, "A lightweight, cross-platform, multiuser robot visualization using the cloud," in *Intelligent Robots and Systems (IROS 2014), 2014 IEEE/RSJ International Conference on*, Sept 2014, pp. 1570–1575

[21] J. Mainprice, C. Phillips-Grafflin, H. Suay, N. Alunni, D. Lofaro, D. Berenson, S. Chernova, R. Lindeman, and P. Oh, "From autonomy to cooperative traded control of humanoid manipulation tasks with unreliable communication: System design and lessons learned," in *Intelligent Robots and Systems (IROS 2014), 2014 IEEE/RSJ International Conference on*, Sept 2014, pp. 3767–3774

[22] N. Alunni, H. Bener Suay, C. Phillips-Grafflin, J. Mainprice, D. Berenson, S. Chernova, R. Lindeman, D. Lofaro, and P. Oh, "Darpa robotics challenge: Towards a user-guided manipulation framework for high-dof robots," in *Robotics and Automation (ICRA), 2014 IEEE International Conference on*, May 2014, pp. 2088–2088

[23] N. Alunni, C. Phillips-Grafftin, H. Suay, D. Lofaro, D. Berenson, S. Chernova, R. Lindeman, and P. Oh, "Toward a user-guided manipulation framework for high-dof robots with limited communication," in *Technologies for Practical Robot Applications (TePRA), 2013 IEEE International Conference on*, April 2013, pp. 1–6

[24] M. Grey, N. Dantam, D. Lofaro, A. Bobick, M. Egerstedt, P. Oh, and M. Stilman, "Multi-process control software for hubo2 plus robot," in *Technologies for Practical Robot Applications (TePRA), 2013 IEEE International Conference on*, April 2013, pp. 1–6

[25] D. Lofaro, "Unified algorithmic framework for high degree of freedom complex systems and humanoid robots," in *Ph.D. dissertation, Drexel University, College of Engineering, Electrical and Computer Engineering Department*, May 2013

[26] D. Lofaro and P. Oh, "Humanoid throws inaugural pitch at major league baseball game: Challenges, approach, implementation and lessons learned," in *Ubiquitous Robots and Ambient Intelligence (URAI), 2012 9th International Conference on*, Nov 2012, pp. 153–157

[27] D. Lofaro, R. Ellenberg, P. Oh, and J. Oh, "Humanoid throwing: Design of collision-free trajectories with sparse reachable maps," in *Intelligent Robots and Systems (IROS), 2012 IEEE/RSJ International Conference on*, Oct 2012, pp. 1519–1524

[28] K. Lynch, D. Lofaro, and P. Oh, "A n-dimensional convex hull approach for fault detection and mitigation for high degree of freedom robots humanoid robots," in *Control, Automation and Systems (ICCAS), 2012 12th International Conference on*, Oct 2012, pp. 790–797

[29] D. Lofaro, C. Sun, and P. Oh, "Humanoid pitching at a major league baseball game: Challenges, approach, implementation and lessons learned," in *Humanoid Robots (Humanoids), 2012 12th IEEE-RAS International Conference on*, Nov 2012, pp. 423–428

[30] D. Grunberg, D. Lofaro, P. Oh, and Y. Kim, "Robot audition and beat identification in noisy environments," in *Intelligent Robots and Systems (IROS), 2011 IEEE/RSJ International Conference on*, Sept 2011, pp. 2916–2921

[31] Y. Kim, D. Grunberg, A. Batula, D. Lofaro, J. Oh, and P. Oh, "Enabling humanoid musical interaction and performance," in *Collaboration Technologies and Systems (CTS), 2011 International Conference on*, May 2011, pp. 212–215

[32] D. Lofaro, P. Oh, J. Oh, and Y. Kim, "Interactive musical participation with humanoid robots through the use of novel musical tempo and beat tracking techniques in the absence of auditory cues," in *Humanoid Robots (Humanoids), 2010 10th IEEE-RAS International Conference on*, Dec 2010, pp. 436–441

[33] D. M. Lofaro, T. T. G. Le, and P. Oh, "Mechatronics education: From paper design to product prototype using lego nxt parts," in *Progress in Robotics: FIRA RoboWorld Congress 2009, Incheon, Korea, August 16-20, 2009. Proceedings.* Berlin, Heidelberg: Springer Berlin Heidelberg, 2009, pp. 232–239

[34] D. M. Lofaro, "Control design to reduce the effects of torsional resonance in coupled systems," in *Ph.D. dissertation, Drexel University, College of Engineering, Electrical and Computer Engineering Department*, May 2008

Invited Talks and Demonstrations

[1] "[***scheduled***] semper force," in *National Museum of the Marine Corps, Triangle, VA*, 2018

[2] "[***scheduled***] robotics in politics and business," in *Breaking the Surface - BTS, International Interdisciplinary Field Workshop of Marine Robotics and Applications, Biograd na Moru, Croatia*, 2018

[3] "Robotics day: In the field and at home," in *National Museum of the Marine Corps, Triangle, VA*, 2018

[4] "Robotics, an overview," in *International Visitor Leadership Program (IVLP) sponsored by the Department of State - Washington D.C.*, 2017

[5] "Demonstration: Showed the inner-workings of 3d printed humanoid robots to the do it yourself (dyi) community." in *Impact Design Summit with Autodesk and DARPA Tech Shop- Building Museum, Washington D.C.*, 2017

[6] "Children's' day - robotics," in *National Museum of the Marine Corps - Virginia (DC Metro Area)*, 2017

[7] "The future of drones," in *Escape Velocity Convention - Washington, DC*, 2017

[8] "The robots are coming," in *University of Bridgeport Engineering Department - Bridgeport, CT*, 2017

[9] "I can robot and you can too," in *Presidential Inauguration Leadership Summit - IEEE Robotics & Automation Society - Washington, DC*, 2017

[10] "Demonstration: Showed the inner-workings of 3d printed humanoid robots to the do it yourself (dyi) community." in *IEEE Robotics & Automation Society - Presidential Inauguration Leadership Summit 'Drones, Clones, and Genomes' - Fairfax, VA*, 2017

[11] "Design, implementation, and control of disaster relief humanoid robots. demonstration: Showed the inner-workings of 3d printed humanoid robots to the do it yourself (dyi) community." in *Kickoff to National Robotics Week, Smithsonian's National Air and Space Museum - Washington, DC*, 2016

[12] "Robots in politics," in *National Maker Faire - Washington, DC*, 2016

[13] "Demonstration: Showed the inner-workings of 3d printed humanoid robots to the do it yourself (dyi) community and the human powered vehicle challenge vehicle made by the sponsored asme team at gmu." in *National Maker Faire - Washington, DC*, 2016

[14] "Secure robotics," in *Young Scholars in Robotics, Ubiquitous Robots and Ambient Intelligence (URAI) 2016 - Xi'an, China*, 2016

[15] "Robots in politics," in *IEEE Croatia Section lecture series, University of Zagreb - Zagreb, Croatia*, 2016

[16] "Robots in politics and demonstration. showed the inner-workings of 3d printed humanoid robots to the do it yourself (dyi) community." in *Maker Faire - Washington, DC*, Summer 2016

[17] "Darpa robotics challenge - team drc-hubo," in *KAIST-KUSCO S&T Workshop Lecture - Vienna, VA*, 2016

[18] "Robots in politics," in *KUSCO S&T Policy Lecture Series - Vienna, VA*, 2016

[19] "Demonstration: Showed the inner-workings of 3d printed humanoid robots to the do it yourself (dyi) community." in *NoVA Mini Maker Faire - Fairfax, VA*, 2016

[20] "Team drc-hubo: The road to the darpa robotics challenge - lessons learned," in *Distinguished Lecture Series, George Mason University - Fairfax, VA*, 2015

[21] "Design, implementation, and control of disaster relief humanoid robots. demonstration: Showed the inner-workings of 3d printed humanoid robots to the do it yourself (dyi) community." in *Kkickoff to National Robotics Week, Smithsonian's National Air and Space Museum - Washington, DC*, 2015

[22] "Demonstration: Showed the inner-workings of 3d printed humanoid robots to the do it yourself (dyi) community." in *National Maker Faire - Washington, DC*, 2015

[23] "Demonstration: Showed the inner-workings of 3d printed humanoid robots to the do it yourself (dyi) community." in *NoVA Mini Maker Faire - Fairfax, VA*, 2015

[24] "Demonstration and training session: Seven day of jaemi hubo training," in *University of Nevada Las Vegas - Las Vegas, NV*, 2015

[25] "I can robot and you can too," in *IEEE-SPAC Student Professional Awareness Conference - Fairfax, VA*, 2014

[26] "Darpa robotics challenge, next steps forward," in *Disney Research - Pittsburgh, PA*, 2014

[27] "Team drc-hubo: International collaboration using a three phase design cycle," in *IEEE Croatia Section lecture series, University of Zagreb - Zagreb, Croatia*, 2014

[28] "Building a robot club from the ground up (part 2)," in *Bryn Mawr College - Bryn Mawr, PA*, 2014

[29] "I can robot, and you can too - a cheat sheet for getting your ph.d," in *Society of Woman in Engineering (SWE) Invited Talk - Fairfax, VA*, 2014

[30] "Team drc-hubo: International collaboration using a three phase design cycle," in *Los Alamos National Laboratories - Los Alamos, NV*, 2014

[31] "Team drc-hubo: A us-korea collaboration," in *Chung-Ang University - Seoul, S. Korea*, 2014

[32] "Team drc-hubo: A us-korea collaboration," in *GMU Korea - Incheon, S. Korea*, 2014

[33] "Building a robot club from the ground up (part 1)," in *Bryn Mawr College - Bryn Mawr, PA*, 2014

[34] "Team drc-hubo: A road-map to the darpa robot challenge," in *Cornell University - Ithaca, NY*, 2013

[35] "Darpa robot challenge: The drc-hubo team - where we are and what we are doing." in *University of Pennsylvania - Philadelphia, PA*, 2013

[36] "Demonstration: Hands on demonstration of the hubo2+ humanoid robot. following the demonstration there was a in depth q&a session with the graduate and undergraduate students in the college of engineering." in *Columbia University - New York, NY*, 2012

[37] "Demonstration: Showed the inner-workings of hubo the humanoid robot to the do it yourself (dyi) community." in *Maker Faire - New York, NY*, 2012

[38] "Humanoid pitching at a major league baseball game: Challenges, approach, implementation and lessons learned," in *ASME - Drexel University - Philadelphia, PA*, 2012

[39] "Demonstration: Developed a system to make hubo become the first full-size humanoid robot to successfully throw the inaugural pitch at a major league baseball game, philadelphia phillies vs. chicago cubs. 45,196 spectators according to the usa today.
video: http://danlofaro.com/projects/philliesgame/," in *Philadelphia Phillies and Philly Science Festival - Philadelphia, PA*, 2012

[40] "Humanoid robots, they are fun!
included live hands-on demonstration of a miniature humanoid.
purpose what to get the inner city students exposed to advanced robotics." in *Friends of the Free Library - Philadelphia, PA*, 2012

[41] "Demonstration: Hands on demonstration and interactive sessions of ground vehicles,
pick and place robots and miniature humanoids for elementary school students." in *Sugartown Elementary School - Sugartown, PA*, 2011

[42] "Humanoid robots, a step in the right direction?
about philcon: Started in 1936, philcon features cutting-edge programming about
literature, art, television, film, anime, comics, science, gaming, costuming and
cosplay, music, and other topics of interest to fans of sci-fi, fantasy, and horror." in *Philcon 2011 - New Jersey, NJ*, 2011

[43] "Humanoid robots, past, present, future." in *State Senator Invitation - 5^{th}, Annual Carole I Smith Technology Symposium, Presented by State Senator LeAnna M. Washington, Temple University, Technology Symposium - Philadelphia, PA*, 2011

[44] "Interactive games with humanoids." in *Daegu Institute of Science and Technology - Daegu, South Korea*, 2011

[45] "Interactive musical participation with humanoid robots through the use
of novel musical tempo and beat tracking techniques in the absence of auditory cues." in *Korean Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea*, 2011

[46] "Visual beat tracking," in *Hanyang University - Seoul, South Korea*, 2011

[47] "Humanoid robots, past, present, future," in *MY Robotics Club, Bryn Mawr College - Bryn Mawr, PA*, 2010

[48] "Demonstration: Live hands on demonstration for children and adults ages 3 to 99." in *Philadelphia Please Touch Museum - Philadelphia, PA*, 2009

Media Coverage Featuring Daniel M. Lofaro (recent only)

[1] S. Larimer, "New sounds from old instruments," in *The Washington Post*, March 2018

[2] M. Balderston, "Gmu professors are creating an electrical symphony," in *The Northern Virginia Magazine*, June 2018

[3] E. Koslov, "Uniquely dc: Project combines music and robot," in *WUSA-9 News - Get UP DC!*, Mar 2018