Daniel M. Lofaro Ph.D

2016-011-02

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Research Interest My research interests lie primarily in Humanoid Robotics, Complex Control Systems and Robotics with most recent ventures relating to Robot Design, Secure Robotics, and Cloud Robotics.

Position

George Mason University 2014 - Present
Assistant Professor in Electrical and Computer Engineering and Robotics

Lofaro Labs LLC. 2016 - Present
Owner - Technology Related Small Business

Education

Drexel University 2008 - 2013
PhD in Electrical and Computer Engineering in Control Systems and Advisor: Dr. Paul Oh
Robotics. Dissertation Title:
Unied Algorithmic Framework for High Degree of Freedom Complex Systems and Humanoid Robots

Drexel University 2006 - 2008
Masters in Electrical and Computer Engineering in Control Systems Graduated with Honors
Thesis Title: *Control Design to Reduce the Effects of Torsional Resonance in Coupled Systems*

Drexel University 2003 - 2008
Bachelor of Science in Electrical and Computer Engineering in Control Systems Graduated Cum Laude and with Honors

Fellowships and Awards

ONR-SFRP Fellow 2015,2016
The Summer Faculty Research 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

NSF-GRFP Honorable Mention 2009
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.

NSF-EAPSI Fellow 2008
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.

Lester Kraus Award 2008
Awarded to Electrical Engineering student who has shown the greatest promise of developing into a creative and socially responsible engineer.

Dean's Fellowship 2008
Non-need-based award for full-time graduate students designed to assist outstanding applicants.

Publications

Low Latency Bounty Hunting and Geographically Adjacent Server Configuration for Real-Time Cloud Control ICRA 2016
Authors: Lofaro, D. and Asokan, A.
IEEE International Conference on Robotics and Automation (ICRA) 2016

From Autonomy to Cooperative Traded Control of Humanoid Manipulation Tasks with Unreliable Communication JIRS 2016
Authors: Phillips-Grafflin, C.; Bener Suay, H.; Mainprice, J.; Alunni N.; Lofaro, D.; Berenson, D.; Chernova, S.; Lindeman, R.; Oh, P.
Journal of Intelligent & Robotic Systems, 2016

Secure Robotics URAI 2016
Authors: Lofaro, D.
International Conference on Ubiquitous Robotics and Ambient Intelligence

ARCHR - Apparatus for Remote Control of Humanoid Robots Humanoids 2015
Authors: Lofaro, D.; Martyna, B.; Early, P.; Eide, E. and Javid, M.; Humanoid Robots (Humanoids), 2015 10th IEEE-RAS International Conference

Feasibility of Cloud Enabled Humanoid Robots: Development of Low Latency Geographically Adjacent Real-Time Cloud Control Humanoids 2015
Authors: Lofaro, D.; Asokan, A. and Roderik, E.; Humanoid Robots (Humanoids), 2015 10th IEEE-RAS International Conference

The Ach Library: A New Framework for Real-Time Communication RAM 2015
Authors: Dantam, N.; Lofaro, D.; Hereid, A.; Oh, P.; Ames, A.; Stilman, M.
IEEE Robotics and Automation Magazine

A lightweight, cross-platform robot visualization using the cloud IROS 2014
Authors: Hilton, W.; Lofaro, D.; Kim, Y.
Intelligent Robots and Systems (IROS), 2014 IEEE/RSJ International Conference

From autonomy to cooperative traded control of humanoid manipulation tasks with unreliable IROS 2014

*Under Peer-Review

communication: System design and lessons learned
Authors: J. Mainprice, C. Phillips-Grafflin, H. Suay, N. Alunni, D. Lofaro, D. Berenson, S. Chernova, R. Lindeman, and P. Oh, Intelligent Robots and Systems (IROS), 2014 IEEE/RSJ International Conference

Unied Algorithmic Framework for High Degree of Freedom Complex Systems and Humanoid Robots Dissertation 2013
Authors: Lofaro, D.
Doctoral Dissertation
Electrical and Computer Engineering Department, Drexel University

Multi-Process Architecture for Robust Control for the Hubo2+ Robot TePRA 2013
Authors: Grey, M.; Dantam, N.; Stilman, M.; Lofaro, D.
IEEE International Conference on Technologies for Practical Robot Applications

Toward A User-Guided Manipulation Framework for high-DOF robots with limited communication TePRA 2013
Authors: Alunni, N.; Phillips-Graffin, C; Suay, H.; Lofaro, D.; Berenson, D. Chernova, S; Lindeman, R; Oh, P.;
IEEE International Conference on Technologies for Practical Robot Applications

Humanoid Pitching at a Major League Baseball Game Humanoids 2012
Authors: Lofaro, D.; Sun, C.; Oh, P.;
Humanoid Robots (Humanoids), 2012 10th IEEE-RAS International Conference

A n-dimensional Convex Hull Approach for Fault Detection ICCAS 2012
Authors: Lofaro, D.; Lynch, K. Oh, P.;
International Conference on Control, Automation and Systems

Design of Collision-Free Trajectories with Sparse Reachable Maps IROS 2012
Authors: Lofaro, D.; Ellenberg, D. Oh, P.; Oh, JH.;
Intelligent Robots and Systems (IROS), 2012 IEEE/RSJ International Conference

Humanoid Throws Inaugural Pitch at a Major League Baseball Game URAI 2012
Authors: Lofaro, D.;Oh, P.;
International Conference on Ubiquitous Robotics and Ambient Intelligence

Design of Humanoids as Interactive Musical Participants IASTED 2011
Authors: Lofaro, D.; Grunberg, D. Oh, P.; Kim, Y.; Oh, J.;
International Association of Science and Technology

(IASTED), 2011 International Conference on Robotics

Robot Audition and Beat Identification in Noisy Environments — IROS 2011
Authors: Grunberg, D.; Lofaro, D. ; Oh, J.; Kim, Y;
Intelligent Robots and Systems (IROS), 2011 IEEE/RSJ International Conference

Towards a musically-aware humanoid for interactive music — EURASIP 2011
Authors: Kim, Y.; Lofaro, D; Batulaa, A; Grunberg, D;
EURASIP Journal on Audio, Speech, and Music Processing

Interactive musical participation with humanoid robots through the use of novel musical tempo and beat tracking techniques in the absence of auditory cues — Humanoids 2010
Authors: Lofaro, D.; Oh, P.; Oh, J.; Kim, Y.;
Humanoid Robots (Humanoids), 2010 10th IEEE-RAS International Conference

Interactive Games With Humanoids: Playing With Jaemi Hubo — Humanoids 2010
Authors: Lofaro, D.; Ellenberg, R.; Oh, P.;
Humanoid Robots (Humanoids), 2010 10th IEEE-RAS International Conference

Developing Humanoids for Musical Interaction — IROS 2010
Authors: Kim, Y.; Batula, A.; Grunberg, D.; Lofaro, D. ; Oh, J.;
Intelligent Robots and Systems (IROS), 2010 IEEE/RSJ International Conference

Mechatronics Education: From Paper Design to Product Prototype Using LEGO NXT Parts — FIRA 2009
Authors: Lofaro, D.; Le, T.; and Oh, P.;
Progress in Robotics, ser. Communications in Computer and Information Science

Control design to reduce the effects of torsional resonance in coupled systems — MS Thesis 2008
Author: Lofaro, D.
Masters Thesis, Drexel University Department of Electrical and Computer Engineering

Work Experience

George Mason University — Assistant Professor
Fairfax, VA — January 2014 - Present
Assistant Professor in Robotics at George Mason University in the Electrical and Computer Engineering Department.

George Mason University — Laboratory Director
Fairfax, VA — January 2014 - Present
Director of the Lofaro Labs at George Mason University. The primary focus of the lab is robotics including Humanoids and Complex Control Systems with most recent ventures relating to Robot Design and Cloud Robotics. Focus on science infused art/music and STEM outreach is also a big part of the Lofaro Labs' mission.

ExPlus Automation Consultant
Fairfax, VA September 2015 - Present
Create automation software for animated and interactive museum displays.

DARPA Robotics Challenge Track A Team: DRC-Hubo Research Lead
Philadelphia, PA July 2012 to December 2013
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*

Drexel Autonomous Systems Lab Research Assistant
Philadelphia, PA April 2008 to December 2013
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.

Dragonfly Incorporated Engineer
Philadelphia, PA April 2011 to Present
Testing and modeling of linear actuators for dual rotor unmanned aerial vehicles.

Drexel University Teaching Assistant
Philadelphia, PA April 2008 to Present
Assist professor with electrical engineering lab courses as well as organizing and maintaing Senior Design for the electrical and computer engineering dept.

IEEE (ICRA 2012) Intl conf origination, web des
Piscataway, NJ May 2011 to July 2012
Design and maintain events and website for the International Conference on Robotics and Automation.

NATO (ASI-2012) Technical/Workshop Chair
Cesme, Turkey August 2009 to November 2010
Organize and maintain 6 workshops for an international audience with participation from 23 countries

FIRST Robotics Mentor, Judge, and Volunteer
Villanova, PA March 2006 to June 2010
Coach/mentors for the all girls high school, Agnes Irwin School (Bryn Mawr, PA), FIRST Robotics team and Philadelphia Regional Competition volunteer.

Moog Component Group Assistant Design Engineer
Springfield, PA August 2005 to March 2006
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.

Evaporated Coatings Inc. Vacuum Deposited Thin Film Assistant Design Engineer
Willow Grove, PA August 2004 to March 2005
Design and implementation of vacuum deposited tin films for the control of opti-

cal, thermal and electrical surface properties, design using computer simulations. Implementation via vacuum deposition using electron beam gun.

Invited Talks and Demonstrations

Smithsonian's National Air and Space Museum - Washington, DC Summer 2016
Speaker for kickoff to National Robotics Week 2015. Talk Title: 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.

URAI 2016 - Xi'an, China Summer 2016
Young faculty talk on Secure Robotics

Maker Faire - Washington, DC Summer 2016
Talk on Robots in Politics and demonstration. Showed the inner-workings of 3D printed humanoid robots to the do it yourself (DYI) community.

KAIST-KUSCO S&T Workshop Lecture - Vienna, VA Summer 2016
Talk on the DARPA Robotics Challenge

KUSCO S&T Policy Lecture Series - Vienna, VA Spring 2016
Talk on Robots in Politics

Mini Maker Faire - Fairfax, VA Spring 2016
Demonstration: Showed the inner-workings of 3D printed humanoid robots to the do it yourself (DYI) community.

Distinguished Lecture Series - Fairfax, VA Fall 2015
Talk Title: Team DRC-Hubo: The Road to the DARPA Robotics Challenge - Lessons Learned

Smithsonian's National Air and Space Museum - Washington, DC Summer 2015
Speaker for kickoff to National Robotics Week 2015. Talk Title: 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.

Maker Faire - Washington, DC Summer 2015
Demonstration: Showed the inner-workings of 3D printed humanoid robots to the do it yourself (DYI) community.

Mini Maker Faire - Fairfax, VA Spring 2015
Demonstration: Showed the inner-workings of 3D printed humanoid robots to the do it yourself (DYI) community.

University of Nevada Las Vegas - Las Vegas, NV Spring 2015
Seven day Jaemi Hubo Training session

IEEE-SPAC Student Professional Awareness Conference - Fairfax, VA Winter 2014/15
Talk Title: I can Robot and You Can Too

University of Nevada Las Vegas - Las Vegas, NV Winter 2014/15
Invited Professor: Seven day Jaemi Hubo Training session

Disney Research - Pittsburgh, PA Winter 2014

Talk Title: DARPA Robotics Challenge, Next Steps Forward

University of Zagreb - Zagreb, Croatia Fall 2014
Talk Title: Team DRC-Hubo: International Collaboration using a Three Phase Design Cycle

Bryn Mawr College - Bryn Mawr, PA Fall 2014
Talk Title: Building a robot club from the ground up (Part 2)

Society of Woman in Engineering (SWE) Invited Talk - Fairfax, VA Fall 2014
Talk Title: I can robot, and you can too - a cheat sheet for getting your Ph.D

Los Alamos National Laboratories - Los Alamos, NV Summer 2014
Talk Title: Team DRC-Hubo: International Collaboration using a Three Phase Design Cycle

Chung-Ang University - Seoul, S. Korea Summer 2014
Talk Title: Team DRC-Hubo: A US-Korea Collaboration

GMU Korea - Incheon, S. Korea Summer 2014
Talk Title: Team DRC-Hubo: A US-Korea Collaboration

Bryn Mawr College - Bryn Mawr, PA Spring 2014
Talk Title: Building a robot club from the ground up (Part 1)

Cornell University - Ithaca, NY Fall 2013
Talk Title: Team DRC-Hubo: A road-map to the DARPA Robot Challenge

University of Pennsylvania - Philadelphia, PA Spring 2013
Talk Title: DARPA Robot Challenge: The DRC-Hubo Team - Where we are and what we are doing.

Columbia University - New York, NY Fall 2012
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.

Maker Faire - New York, NY Fall 2012
Demonstration: Showed the inner-workings of Hubo the humanoid robot to the do it yourself (DYI) community.

ASME - Drexel University - Philadelphia, PA Summer 2012
Talk Title: Humanoid Pitching at a Major League Baseball Game: Challenges, Approach, Implementation and Lessons Learned

Philadelphia Phillies and Philly Science Festival - Philadelphia, PA Spring 2012
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/phillies Game/

Friends of the Free Library - Philadelphia, PA Spring 2012
Talk Title: 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.

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

Philcon 2011 - New Jersey, NJ Fall 2011
Talk Title: 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.

State Senator Invitation - 5^{th} Annual Carole Smith Technology Symposium - Philadelphia, PA Fall 2011
Talk Title: Humanoid Robots, Past, Present, Future. 5^{th} Annual Carole I Smith Technology Symposium. Presented by State Senator LeAnna M. Washington, Hosted by Temple University

Daegu Institute of Science and Technology - Daegu, South Korea Spring 2011
Talk Title: Interactive Games With Humanoids.

Korean Advanced Institute of Science and Technology (KAIST) Daejeon, South Korea Spring 2011
Talk Title: Interactive musical participation with humanoid robots through the use of novel musical tempo and beat tracking techniques in the absence of auditory cues.

Hanyang University - Seoul, South Korea Spring 2011
Talk Title: Visual Beat Tracking

MY Robotics Club, Bryn Mawr College - Bryn Mawr, PA Winter 2010
Talk Title: Humanoid Robots, Past, Present, Future

Philadelphia Please Touch Museum - Philadelphia, PA Spring 2009
Demonstration: Live hands on demonstration for children and adults ages 3 to 99.

Extracurricular Activities

IEEE-Humanoids 2012 Student Activity Board Event Organizer 2012
Designed and implemented student socials and activities for the IEEE-Humanoids 2012 conference in Osaka, Japan. This included organizing daily group lunch and dinners for students, Karaoke night, a day trip to Kyoto, and a Student Banquette. My over all purpose for these events is to "*create an atmosphere conducive for students to get to know each other in a non-academic setting.*" Website: http://humanoids2012.danlofaro.com/

IEEE-ICRA 2012 Student Activity Board Event Organizer 2012
Designed and implemented student socials and activities for the IEEE-ICRA 2012 conference in St. Paul, MN. This included a student dinner with a comedian as well as daily events and activities. My over all purpose for these events is to "*create an atmosphere conducive for students to get to know each other in a non-academic setting.*" Website: http://icra2012.org/student/

Senior Design Robot Competition 2009 - 2011
Designed, implemented, and coached a robot competition for senior students in the

Drexel University Senior Design class. The competition consisted of multiple teams and multiple robots. Each robot was less then 1.0m x 1.0m x 1.0m and less then 10kg.

Indoor Aerial Robotics Competition 2008 - 2011
Designed and implemented the Indoor Aerial Robotics Competition from 2008-2011. The IARC was formed in 2005 by Dr. Paul Oh in parallel with the Congressional mandate that requires 30% of all U.S. deep-strike aircraft to be capable of autonomous navigation by 2015. To keep in line with this mandate, the competition was revised to increase the difficulty each year with the goal of having a "backpackable" vehicle that flies autonomously inside buildings by 2015.

CoE Engineers Week Annual Egg Drop Competition 2007 - 2011
The Egg Drop competition challenges student, faculty, and professional staff teams to create a recyclable contraption that will protect a large Grade A egg from a free fall of 40 feet or from it gliding down a steel zip line and crashes into a target more than 30 feet below. Scoring is based on a mathematical formula that calculates weight and speed.

IEEE Student Branch Technical Chair 2006 - 2008
Drexel University's IEEE Branch Technical Chair. Designed events and activities for IEEE student branch.

Eita-Kappa-Nu Popsicle Stick Bridge Contest 2008 - 2009
The goal of this competition is to build the lease expensive bridge that can span a 12 inches gap, have a width of at least 3 inches, and hold a load at its center using only the materials listed below. The functioning bridge with the lowest materials cost wins. Please note that this competition is geared towards middle school students to teach them some of the basics of engineering.

Biannual IEEE Lego Robot Competition 2006 - 2008
Design and implementation of the bi-annual Lego robot competition. The competition has the expressed goals of enforcing the knowledge the electrical and computer engineering students have learned in class including robot design, logic and autonomous systems.

ONR SeaPerch Challenge (regional and national competition) 2009-2011
Judge for high school student robot competition. The SeaPerch Program provides students with the opportunity to learn about robotics, engineering, science, and mathematics (STEM) while building an underwater ROV as part of a science and engineering technology curriculum. Throughout the project, students will learn engineering concepts, problem solving, teamwork, and technical applications.