

Christoforos Mavrogiannis

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Last Update: Feb 2017

EDUCATION

Cornell University, Sibley School of Mechanical & Aerospace Engineering

Ph.D. in Mechanical Engineering

Dec 2018 (exp.)

Minors: Computer Science, Cognitive Studies

Tentative Thesis Title: "Socially Competent Navigation Planning for Dynamic Multi-Agent Environments"

Special Committee: Ross A. Knepper (chair), Kilian Weinberger, Shimon Edelman, Anca Dragan.

Cornell University, Sibley School of Mechanical & Aerospace Engineering

M.S. in Mechanical Engineering

Jan 2017

Selected Coursework: Advanced Artificial Intelligence, Advanced Machine Learning, Feedback Control Systems, Intermediate Dynamics and Vibrations, Autonomous Mobile Robots, Formal Methods for Robotics, Introduction to Mobile Manipulation.

GPA: 4.055/4.00

National Technical University of Athens (NTUA), Department of Mechanical Engineering

Diploma (eq. to M.Sc.) in Mechanical Engineering

Mar 2013

Concentration: Design & Control

Thesis Title: "Grasp Synthesis Algorithms for Multifingered Robot Hands"

Advisor: Kostas J. Kyriakopoulos

GPA: 8.46/10 (top 5% in a class of more than 200 students)

RESEARCH/PROFESSIONAL EXPERIENCE

Graduate Research Assistant, *Robotic Personal Assistants Lab (RPAL)*, Cornell University

Nov 2014-Present

- Developing mathematical models, algorithms and software (MATLAB, python, communication through ROS) for robots navigating around human pedestrians (NSF grant IIS-1526035).
- Conducting experiments with human subjects to understand the effects of robot behaviors to human pedestrians.
- Employing data-driven techniques to learn navigation strategies from humans.
- Supervising and mentoring undergraduate and M.Eng. students carrying out projects in the lab.

Research Associate, *OpenBionics* (www.openbionics.org)

July 2013-Present

- Consulting on the development of open-source robotic and prosthetic hands.

Undergraduate Research Assistant, *Control Systems Lab (CSL)*, NTUA

Mar 2011-Aug 2013

- Research on the development of grasp planning strategies and algorithms for dexterous and underactuated robot hands under the Integrated Project no. 248587, "THE Hand Embodied", (supported by the European Commission) within the FP7-ICT-2009-4-2-1 program "Cognitive Systems and Robotics".
- Implemented a software framework for gesture-based teleoperation of the Sony AIBO robot dog through MS Kinect.

IAESTE Summer Intern, *Hydron Unipress*, Lodz, Poland

July 2011-Aug 2011

- Designed solder production machines in the CAD software SolidEdge.

TEACHING EXPERIENCE

- **Teaching Assistant** for CS 4750/5750: Foundations of Robotics, Cornell University, Fall 2017.
- **Teaching Assistant** for CS 4750/5750: Foundations of Robotics, Cornell University, Fall 2016.

HONORS & AWARDS

- Cornell University Student Travel Grant to attend IROS 2017.
- Best Paper Award Finalist at the ACM/IEEE International Conference on Human-Robot Interaction (HRI) 2017.

- Cornell University Student Travel Grant to attend HRI 2017.
- Participant at the *Pioneers* Workshop of HRI 2017. [31% acceptance rate]
- Student Travel Support to attend the Workshop on the Algorithmic Foundations of Robotics (WAFR) 2016.
- 2nd Prize Award at the **Hackaday** Prize 2015 for the project “Openbionics Affordable Prosthetic Hands”.
- 1st Prize Award at the **Robotdalen** International Innovation Award 2015 for the project “Openbionics Affordable Prosthetic Hands”.
- Sibley School of Mechanical & Aerospace Engineering Graduate Fellowship 2013.
- Thomaidion Award for Scientific Publications 2013 for NTUA students presenting a peer-reviewed paper at an international conference.
- 2nd Prize Award at the NTUA Innovative Design Competition 2011 for the project “Design and Control of a Solar Tracking Device”.
- Qualified for an IAESTE internship as 3rd out of a pool of more than 30 applicants from NTUA.

LEADERSHIP AND TEAMWORK EXPERIENCE

Volunteer, North East Robotics Colloquium (NERC), Cornell University *October 2016*

- Part of a team of students that assisted in running the conference.

Graduate Teaching Assistant, CS4750 Foundations of Robotics, Cornell University *Fall 2016, Fall 2017*

- Providing teaching assistance to over 100 undergraduate and graduate students.
- Collaborating with a team of graduate students to prepare notes and grade assignments.

Research Associate, Openbionics *July 2013-Present*

- Collaborating with a team of researchers and undergraduate students.

Member, NTUA Team Design Team *May 2012*

- Collaborated with a team of engineering undergraduate students to provide efficient solutions to engineering design problems.
- Finalist in the Regional Final Round of EBEC, the European Best Engineering Competition, organized by BEST (the Board of European Students of Technology) 2012.

Member of the finalist team at the NTUA Innovative Design Competition 2011 *Sept 2011*

- Collaborated with a team of mechanical engineering undergraduate students to design a solar tracking device.

SKILLS, LANGUAGES AND HOBBIES

Extensive experience on Mathematical Modeling, Optimization, Machine Learning, Control Systems Design, Path/Motion Planning, Rigid Body Kinematics/Dynamics.

Programming Languages/Utilities: MATLAB/Simulink, C/C++, Python, Fortran, LaTeX.

Version Control: GitHub.

Engineering Software: ROS (Robot Operating System), Solidworks, ANSYS, SolidEdge, SolidCAM, AutoCAD (ECDL 2008).

Operating Systems: MS Windows, Mac OS X, Linux.

Languages: English (Fluent, CPE- Uni. of Cambridge 2006), French (Intermediate, DALF C2 2010), Greek (Native).

Hobbies: Table Tennis, Tennis, Soccer, Swimming, Guitar.

PUBLICATIONS

Journal Articles

[1] **Christoforos I. Mavrogiannis** and Ross A. Knepper, “Socially Competent Navigation Planning by Reasoning about Multi-Agent Path Topologies”, *International Journal of Robotics Research*, 2017. [Invited Submission, Under review]

Conference Proceedings

[9] **Christoforos I. Mavrogiannis**, Wil Thomason and Ross A. Knepper, “Social Momentum: A Framework for Legible Navigation in Dynamic Multi-Agent Environments”, *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Chicago, IL, USA, March 2018. [acceptance rate 23%]

- [8] **Christoforos I. Mavrogiannis**, Valts Blukis and Ross A. Knepper, “Socially Competent Navigation Planning by Deep Learning of Multi-Agent Path Topologies”, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, BC, CA, September 2017.
- [7] Ross A. Knepper, **Christoforos I. Mavrogiannis**, Julia Proft and Claire Liang, “Implicit Communication in a Joint Action”, *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Vienna, Austria, March 2017. [Best Paper Award Finalist]
- [6] **Christoforos I. Mavrogiannis** and Ross A. Knepper, “Decentralized Multi-Agent Navigation Planning with Braids”, *12th International Workshop on the Algorithmic Foundations of Robotics (WAFR)*, San Francisco, CA, December 2016.
- [5] George Kontoudis, Minas V. Liarokapis, Agisilaos G. Zisimatos, **Christoforos I. Mavrogiannis** and Kostas J. Kyriakopoulos, “Open-Source, Anthropomorphic, Underactuated Robot Hands with a Selectively Lockable Differential Mechanism: Towards Affordable Prostheses”, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, September 2015.
- [4] **Christoforos I. Mavrogiannis**, Minas V. Liarokapis and Kostas J. Kyriakopoulos, “Quantifying Anthropomorphism of Robot Arms”, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, September 2015.
- [3] Agisilaos G. Zisimatos, Minas V. Liarokapis, **Christoforos I. Mavrogiannis** and Kostas J. Kyriakopoulos, “Open-Source, Affordable, Light-Weight, Underactuated Robot Hands”, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Chicago, IL, September 2014.
- [2] **Christoforos I. Mavrogiannis**, Charalampos P. Bechlioulis, Minas V. Liarokapis and Kostas J. Kyriakopoulos, “Task-Specific Grasp Selection for Underactuated Hands”, *IEEE International Conference on Robotics and Automation (ICRA)*, Hong Kong, China, May 2014.
- [1] **Christoforos I. Mavrogiannis**, Charalampos P. Bechlioulis and Kostas J. Kyriakopoulos, “Sequential Improvement of Grasp based on Sensitivity Analysis”, *IEEE International Conference on Robotics and Automation (ICRA)*, Karlsruhe, Germany, May 2013.

Refereed Workshop Papers

- [5] **Christoforos I. Mavrogiannis**, Valts Blukis and Ross A. Knepper, “Inferring Strategies of Avoidance: Towards Socially Competent Navigation in Human Environments”, *Workshop on Mathematical Models, Algorithms and Human Robot-Interaction, in Robotics Science and Systems (RSS) 2017*, Boston, MA, July 2017.
- [4] **Christoforos I. Mavrogiannis**, “Designing Algorithms for Socially Competent Robotic Navigation”, *Pioneers Workshop, ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Vienna, Austria, March 2017.
- [3] **Christoforos I. Mavrogiannis** and Ross A. Knepper, “Towards Socially Competent Navigation of Pedestrian Environments”, *Workshop on Social Trust in Autonomous Robots, in Robotics Science and Systems (RSS) 2016*, Ann Arbor, MI, June 2016.
- [2] **Christoforos I. Mavrogiannis** and Ross A. Knepper, “Interpretation and Communication of Pedestrian Intentions Using Braid Groups”, *Workshop on Intention Recognition in Human-Robot Interaction, 11th ACM / IEEE International Conference on Human-Robot Interaction (HRI) 2016*, Christchurch, New Zealand, March 2016.
- [1] Minas V. Liarokapis, Agisilaos G. Zisimatos, **Christoforos I. Mavrogiannis** and Kostas J. Kyriakopoulos, “OpenBionics: An Open-Source Initiative for the Creation of Affordable, Modular, Light-Weight, Underactuated Robot Hands and Prosthetic Devices”, *2nd ASU Rehabilitation Robotics Workshop, Arizona State University (ASU)*, Tempe, AZ, 2014.

Theses

- [1] Christoforos I. Mavrogiannis, “Grasp Synthesis Algorithms for Multifingered Robot Hands”, Diploma Thesis, National Technical University of Athens (NTUA), Athens, Greece, March 2013.

Technical Reports

- [2] George P. Kontoudis, Minas V. Liarokapis, Agisilaos G. Zisimatos, **Christoforos I. Mavrogiannis**, George P. Kontoudis and Kostas J. Kyriakopoulos, “How to Create Affordable, Anthropomorphic, Personalized, Light-Weight Prosthetic Hands”, Control Systems Lab, School of Mechanical Engineering, National Technical University of Athens, October 2015.
- [1] Agisilaos G. Zisimatos, Minas V. Liarokapis, **Christoforos I. Mavrogiannis**, George P. Kontoudis and Kostas J. Kyriakopoulos, “How to Create Affordable, Modular, Light-Weight, Underactuated, Compliant Robot Hands”, Control Systems Lab, School of Mechanical Engineering, National Technical University of Athens, January 2015.

SELECTED TALKS AND PRESENTATIONS

- [11] “Socially Competent Navigation Planning by Deep Learning of Multi-Agent Path Topologies”, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, BC, Canada, September 2017. [Oral Presentation]
- [10] “Socially Competent Navigation Planning by Deep Learning of Multi-Agent Path Topologies”, *Microsoft Artificial Intelligence Seminar*, Cornell University, Ithaca NY, September 2017. [Oral Presentation]

- [9] “Inferring Strategies of Avoidance: Towards Socially Competent Navigation in Human Environments”, *Workshop on Mathematical Models, Algorithms and Human Robot-Interaction, in Robotics Science and Systems (RSS) 2017*, Boston, MA, July 2017. [Spotlight talk and Poster Presentation]
- [8] “Designing Algorithms for Socially Competent Robotic Navigation”, *Pioneers Workshop, ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Vienna, Austria, March 2017. [Poster Presentation]
- [7] “Decentralized Multi-Agent Navigation Planning with Braids”. *International Workshop on the Algorithmic Foundations of Robotics*, San Francisco, CA, December 2016. [Oral Presentation]
- [6] “Decentralized Multi-Agent Navigation Planning with Braids”. *Robotics Seminar*, Cornell University, Ithaca, NY, December 2016. [Oral Presentation]
- [5] “Decentralized Multi-Agent Navigation Planning with Braids”. *North East Robotics Colloquium (NERC)*, Cornell University, Ithaca, NY, October 2016. [Poster Presentation]
- [4] “Towards Socially Competent Navigation of Pedestrian Environments”, *Workshop on Social Trust in Autonomous Robots, in Robotics: Science and Systems (RSS)*, Ann Arbor, MI, June 19, 2016. [Poster Presentation]
- [3] “Socially Competent Pedestrian Navigation Using Braid Groups”, *Graduate Visit Weekend Poster Session, Sibley School of Mechanical & Aerospace Engineering*, Ithaca, NY, March 2016. [Poster Presentation]
- [2] “OpenBionics Workshop: From Robot Hands to Prosthetic Devices”, *Athens Hackerspace*, Athens, Greece, December 2015. [Oral Presentation]
- [1] “Sequential Improvement of Grasp based on Sensitivity Analysis”, *IEEE International Conference on Robotics and Automation (ICRA)*, Karlsruhe, Germany, May 2013. [Oral Presentation]

SELECTED PRESS

Cornell Chronicle, Jan 19, 2017: “Humans must overcome distrust of robots”.

ERT (Greek Public TV Station), Dec 27, 2016: Invited to a morning news show to talk about the OpenBionics Project.

3ders.org, Nov 5, 2015: “OpenBionics adds NFC ready fingers to 3D printed hand prosthetics for 2015 Hackaday Prize finals”.

blog.atmel.com, Nov 3, 2015: “1:1 interview with Hackaday Prize finalist OpenBionics”.

Hackaday.com, Oct 5, 2015: “10 finalist projects prove we can save the world”.

Hackaday.com, Sept 20, 2015: “Hackaday Prize Semifinalist: OpenBionics Affordable Prosthetic Hands”.

3dprint.com, Sept 23, 2015: “OpenBionics Affordable Bionic Hand is Selected as a Hackaday Prize Semifinalist”.

Hackaday.com, June 17, 2015: “Hackaday Prize Entry: OpenBionics”.

GoodNews.gr, May 8, 2015: “The most Affordable Prosthetic Hands will be made in Greece”. [In greek]

RoboHub.com, April 9, 2015: “OpenBionics prosthetic hands: Open source, affordable, lightweight, anthropomorphic”.

3ders.org, March 18, 2015: “Greek OpenBionics unveils affordable, light-weight 3D printed bionic hands with 144 grasp movements”.

3DPrint.com, March 18, 2015: “OpenBionics open source prosthetic hand can execute 144 different grasps & costs under \$200”.

MEMBERSHIPS AND SERVICE

Memberships

IEEE Student Member

ACM Student Member

IEEE Robotics and Automation Society (RAS)

IAESTE Alumni Network

Technical Chamber of Greece

Reviewer

ACM/IEEE International Conference on Human-Robot Interaction (HRI)

IEEE Robotics and Automation Magazine (RAM)

IEEE International Conference on Robotics and Automation (ICRA)

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)

International Symposium on Experimental Robotics (ISER)

IEEE Mediterranean Conference on Control and Automation (MED)

IEEE/RAS International Conference on Humanoid Robots