

Christoforos Mavrogiannis

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Education

- Cornell University**, Ithaca NY, USA 2013-2019
PhD, Mechanical Engineering
Concentrations: Dynamics & Control, Artificial Intelligence, Cognitive Studies
Thesis title: "Motion Planning for Socially Competent Robot Navigation"
Committee: Ross Knepper (chair), Kilian Weinberger, Shimon Edelman, Guy Hoffman, Anca Dragan (UC Berkeley)
- Cornell University**, Ithaca NY, USA 2013-2017
MS, Mechanical Engineering
Concentration: Dynamics & Control
GPA: 4.055/4.000
- National Technical University of Athens (NTUA)**, Athens, Greece 2007-2013
Diploma, Mechanical Engineering
Concentration: Mechanical Design & Control
Thesis title: "Grasp Synthesis Algorithms for Multi-fingered Robot Hands"
Advisor: Kostas J. Kyriakopoulos
GPA: 8.46/10.00 (top 5%)

Honors & Awards

- Cornell Travel Grant**, Cornell Graduate School 2017(2), 2018
BMW Travel Grant, BMW Summer School 2018
RSS Travel Grant, Robotics: Science and Systems Conference 2018
Best Paper Finalist, International Conference on Human-Robot Interaction 2017
"Implicit Communication in a Joint Action"
NSF Travel Grant, International Conference on Human-Robot Interaction 2017
NSF Travel Grant, Workshop on the Algorithmic Foundations of Robotics 2016
2nd Prize, Hackaday Prize 2015
"OpenBionics Affordable Prosthetic Hands"
1st Prize, Robotdalen International Innovation Award 2015
"OpenBionics Affordable Prosthetic Hands"
Graduate Fellowship, Sibley School of Mechanical & Aerospace Engineering 2013
NTUA Award for Scientific Publications, Thomaidion Institution 2013
Greece Finalist, European BEST Engineering Competition 2012
Organized by the Board of European Students of Technology (BEST)
2nd Prize, NTUA Innovative Design Competition 2011
"Design and Control of a Solar Tracking Device"
IAESTE Internship 2011

Part of the Exchange Program by the International Association for the Exchange of Students for Technical Experience (IAESTE)
Awarded a funded internship as one of the top 10% students at NTUA

Experience

Cornell Robotic Personal Assistants Lab, Research Assistant 2014-Present
-Research on the design and evaluation of motion planning algorithms for socially competent robot navigation in crowded human environments
-NSF Grants IIS-1526035 and IIS-1563705

OpenBionics.org, Research Associate 2013-2015
-Research on the design of robotic and prosthetic hands

NTUA Control Systems Lab, Research Assistant 2011-2013
-Research on the development of Grasp Planning Algorithms
-European Commission CP-IP Grant No. 248587, "THE Hand Embodied"

Hydron Unipress, Łodz Poland, IAESTE Engineering Intern 2011
-Mechanical Design on SolidEdge

Teaching

CS 4750/5750: Foundations of Robotics, Teaching Assistant Fall 2016, Fall 2017
-Weekly office hours and guest lectures.
-Prepared notes and designed homework assignments, projects and exams.
-Graded assignments, projects and exams.

Doctoral Consortia

BMW Summer School 2018
"Intelligent Cars on Digital Roads–Frontiers in Machine Intelligence", Munich, Germany.

Pioneers Workshop 2018
Robotics: Science and Systems Conference, Pittsburgh, PA.
[Acceptance 38%]

Pioneers Workshop 2017
ACM/IEEE International Conference on Human-Robot Interaction, Vienna, Austria.
[Acceptance 31%]

Leadership and Teamwork

North East Robotics Colloquium (NERC), Student Volunteer 2016
Collaborated with a team of students to make local arrangements for 150 attendees.

CS4750/5750 Foundations of Robotics, Teaching Assistant Fall 2016, Fall 2017
Collaborated with the instructor and a team of students to provide teaching support for 80 (Fall 2016) and 57 (Fall 2017) students.

Openbionics.org 2013-2015
-Collaborated with a team of researchers to design and manage a series of open-source projects.
-Handled media relations, interviews and external collaborations.

European BEST Engineering Competition, NTUA team member 2011
Collaborated with mechanical and civil engineering undergraduate students to tackle a series of open-ended engineering design challenges.

NTUA Innovative Design Competition, Team Member 2011

Collaborated with a team of mechanical engineering undergraduates to design and control a solar tracking device.

Publications

Journal Articles

[1] **Christoforos I. Mavrogiannis** and Ross A. Knepper, “Multi-Agent Path Topology in Support of Socially Competent Navigation Planning”, *The International Journal of Robotics Research*, 38 (2–3), 2019, pp. 338–356. [Invited Submission]

Refereed Conference Proceedings

[11] **Christoforos I. Mavrogiannis**, Alena Hutchinson, John Macdonald, Patrícia Alves-Oliveira and Ross A. Knepper, “Effects of Distinct Robot Navigation Strategies on Human Behavior in a Crowded Environment”, *Proceedings of the 2019 ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Daegu, Korea, March 2019. [Acceptance rate 24%]

[10] **Christoforos I. Mavrogiannis** and Ross A. Knepper, “Multi-Agent Trajectory Prediction and Generation with Topological Invariants Enforced by Hamiltonian Dynamics”, *Proceedings of the 2018 International Workshop on the Algorithmic Foundations of Robotics (WAFR)*, Mérida, Mexico, December 2018.

[9] **Christoforos I. Mavrogiannis**, Wil Thomason and Ross A. Knepper, “Social Momentum: A Framework for Legible Navigation in Dynamic Multi-Agent Environments”, *Proceedings of the 2018 ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Chicago, IL, USA, 2018, pp. 361-369. [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”, *Proceedings of the 2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, BC, CA, 2017, pp. 6817-6824.

[7] Ross A. Knepper, **Christoforos I. Mavrogiannis**, Julia Proft and Claire Liang, “Implicit Communication in a Joint Action”, *Proceedings of the 2017 ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Vienna, Austria, 2017, pp. 283-292. [Acceptance rate 24%][Best Paper Finalist]

[6] **Christoforos I. Mavrogiannis** and Ross A. Knepper, “Decentralized Multi-Agent Navigation Planning with Braids”, *Proceedings of the 2016 International Workshop on the Algorithmic Foundations of Robotics (WAFR)*, San Francisco, CA, USA, 2016. [Direct acceptance rate 25%]

[5] George Kontoudis, Minas V. Liarakapis, 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”, *Proceedings of the 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, 2015, pp. 5857-5862.

[4] **Christoforos I. Mavrogiannis**, Minas V. Liarakapis and Kostas J. Kyriakopoulos, “Quantifying Anthropomorphism of Robot Arms”, *Proceedings of the 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, 2015, pp. 4084-4089.

[3] Agisilaos G. Zisimatos, Minas V. Liarakapis, **Christoforos I. Mavrogiannis** and Kostas J. Kyriakopoulos, “Open-Source, Affordable, Light-Weight, Underactuated Robot

Hands”, *Proceedings of the 2014 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Chicago, IL, USA, 2014, pp. 3207-3212.

[2] **Christoforos I. Mavrogiannis**, Charalampos P. Bechlioulis, Minas V. Liarokapis and Kostas J. Kyriakopoulos, “Task-Specific Grasp Selection for Underactuated Hands”, *Proceedings of the 2014 IEEE International Conference on Robotics and Automation (ICRA)*, Hong Kong, China, 2014, pp. 3676-3681.

[1] **Christoforos I. Mavrogiannis**, Charalampos P. Bechlioulis and Kostas J. Kyriakopoulos, “Sequential Improvement of Grasp based on Sensitivity Analysis”, *Proceedings of the 2013 IEEE International Conference on Robotics and Automation (ICRA)*, Karlsruhe, Germany, 2013, pp. 1094-1099. [Acceptance rate 39%]

Refereed Workshop Papers

[7] **Christoforos I. Mavrogiannis** and Ross A. Knepper, “Decentralized Navigation Planning Using Multi-Agent Trajectory Prediction Governed by Hamiltonian Dynamics”, *Workshop on Multi-robot Perception-Driven Control and Planning, 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Madrid, Spain, 2018.

[6] **Christoforos I. Mavrogiannis**, “Online Multi-Agent Trajectory Generation for Adaptive Navigation Planning”, *Pioneers Workshop, 2018 Robotics: Science and Systems Conference (RSS)*, Pittsburgh, PA, USA, 2018.

[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, 2017 Robotics Science and Systems Conference (RSS)*, Boston, MA, 2017.

[3] **Christoforos I. Mavrogiannis** and Ross A. Knepper, “Designing Algorithms for Socially Competent Robotic Navigation”, *Pioneers Workshop, Proceedings of the Companion of the 2017 ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Vienna, Austria, 2017, pp. 357-358.

[3] **Christoforos I. Mavrogiannis** and Ross A. Knepper, “Towards Socially Competent Navigation of Pedestrian Environments”, *Workshop on Social Trust in Autonomous Robots, 2016 Robotics Science and Systems Conference (RSS)*, Ann Arbor, MI, 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, 2016 ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Christchurch, New Zealand, 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”, *Arizona State University Rehabilitation Robotics Workshop*, Tempe, AZ, 2014.

Theses

[2] **Christoforos I. Mavrogiannis**, “Motion Planning for Socially Competent Robot Navigation”, PhD Dissertation, Cornell University, 2019. [In preparation]

[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.

Skills

Programming

MaTLaB, R, C++, C, Python, Fortran

Engineering Software

Solidworks, ANSYS, SolidEdge, SolidCAM, AutoCAD (ECDL 2008).

Technologies

Linux, ROS, Git

Languages

English (Fluent, CPE, University of Cambridge 2006)

French (Intermediate, DALF C2 2010)

Greek (Native)

Selected Talks and Presentations

“Multi-Agent Trajectory Prediction and Generation with Topological Invariants Enforced by Hamiltonian Dynamics”

-*Robotics Seminar*, Cornell University, Ithaca, NY, November 2018.

-*WAFR '18*, Mérida, Mexico, December 2018. [Oral presentation]

“Socially Competent Robot Navigation”

-*Robotics Colloquium*, Paul G. Allen School of Computer Science and Engineering, University of Washington, Seattle, WA, USA, October 2018. [Invited talk]

-*Intelligent Agents and Synthetic Characters Group Seminar*, Instituto Superior Técnico, Lisbon, Portugal, November 2018. [Invited talk]

“Inferring and Expressing Intentions in Systems of Multiple Navigating Agents”

BMW Summer School, Munich, Germany, July 2018. [Spotlight and Poster]

“Online Multi-Agent Trajectory Generation for Adaptive Navigation Planning”

RSS Pioneers Workshop, Pittsburgh, PA, 2018. [Spotlight talk and poster presentation]

“Social Momentum: A Framework for Legible Navigation in Dynamic Multi-Agent Environments”

HRI '18, Chicago, IL, USA, March 2018. [Oral Presentation]

“Socially Competent Navigation Planning by Deep Learning of Multi-Agent Path Topologies”

-*A.I. Seminar*, Cornell University, Ithaca NY, September 2017. [Oral Presentation]

-*IROS '17*, Vancouver, BC, Canada, September 2017. [Oral Presentation]

“Inferring Strategies of Avoidance: Towards Socially Competent Navigation in Human Environments”

-*Workshop on Mathematical Models, Algorithms and Human Robot-Interaction*, RSS '17, Boston, MA, July 2017. [Spotlight talk and poster presentation]

“Designing Algorithms for Socially Competent Robotic Navigation”

Pioneers Workshop, HRI '17, Vienna, Austria, March 2017. [Poster presentation]
“Decentralized Multi-Agent Navigation Planning with Braids”
-NERC '16, Ithaca, NY, October 2016. [Poster presentation]
-Robotics Seminar, Cornell University, Ithaca, NY, December 2016. [Oral Presentation]
-WAFR '16, San Francisco, CA, December 2016. [Oral Presentation]
“Towards Socially Competent Navigation of Pedestrian Environments”
Workshop on Social Trust in Autonomous Robots, RSS '16, Ann Arbor, MI, June 2016. [Poster presentation]
“Socially Competent Pedestrian Navigation Using Braid Groups”
Graduate Visit Weekend Poster Session, Sibley School of Mechanical & Aerospace Engineering, Ithaca, NY, March 2016. [Poster Presentation]
“OpenBionics Workshop: From Robot Hands to Prosthetic Devices”
Athens Hackerspace, Athens, Greece, December 2015. [Oral Presentation]
“Sequential Improvement of Grasp based on Sensitivity Analysis”
ICRA '13, Karlsruhe, Germany, May 2013. [Oral Presentation]

Mentoring

Alena Hutchinson (currently Masters student at Cornell University)
John Macdonald (currently Masters student at Carnegie Mellon University)
Joshua Lee (currently software engineer at Google)

Selected Press Coverage

Cornell Chronicle, Jan 19, 2017: “Humans must overcome distrust of robots”.
ERT (Greece National Public TV), Dec 27, 2016: Interview about the OpenBionics Project at a news show.
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”.

Professional Service

Editorial Duties

-Program Committee Member, *International Symposium on Multi-Robot and Multi-Agent Systems (MRS) 2019*
-Program Committee Member, *Pioneers Workshop at RSS 2019*.

-Program Committee Member, *Combined Workshop on Spatial Language Understanding (SpLU) and Grounded Communication for Robotics (RoboNLP) at the Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL) 2019.*

Reviewing Activities

- IEEE Transactions on Robotics (T-RO)
- IEEE Robotics and Automation Magazine (RAM)
- ACM/IEEE International Conference on Human-Robot Interaction (HRI)
- 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
- IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob)
- IEEE International Conference on Automation Science and Engineering (CASE)
- International Workshop on the Algorithmic Foundations of Robotics (WAFR)

Memberships

- IEEE Student Member
- ACM Student Member
- IEEE Robotics and Automation Society (RAS)
- IAESTE Alumni Network
- Technical Chamber of Greece