

Catholic University of America  
EECS Department  
Washington, DC 20064

phone: 202-319-6465  
email: [plaku@cua.edu](mailto:plaku@cua.edu)  
<http://www.robotmotionplanning.org>

# Erion Plaku

[updated: September 22, 2017]

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## EMPLOYMENT

- Catholic University of America, Washington, DC** 09/2016–present  
Associate Professor  
Department of Electrical Engineering and Computer Science
- Catholic University of America, Washington, DC** 08/2010–08/16  
Assistant Professor  
Department of Electrical Engineering and Computer Science
- Johns Hopkins University, Baltimore, MD** 08/2010–07/2012  
Adjunct Assistant Professor  
Department of Computer Science
- Johns Hopkins University, Baltimore, MD** 08/2008–08/2010  
Postdoctoral Fellow  
Laboratory for Computational Sensing and Robotics  
Department of Computer Science  
Postdoctoral Advisor: Gregory Hager

## EDUCATION

- Rice University, Houston, TX** 08/2002–07/2008  
Ph.D. in Computer Science  
Thesis Title: *From High-Level Tasks to Low-Level Motions: Motion Planning for High-Dimensional Nonlinear Hybrid Robotic Systems*  
Thesis Advisor: Lydia E. Kavraki
- Clarkson University, Potsdam, NY** 08/2000–05/2002  
M.S. in Computer Science  
Thesis Title: *Lower and Upper Bounds for Constant-Depth Circuits*  
Thesis Advisor: Alexis Maciel
- State University of New York, Fredonia, NY** 08/1996–05/2000  
B.S. in Computer Science  
Two majors: (1) Computer Science (2) Mathematics

## RESEARCH

### Computational Robotics

- ◇ **Combined Task and Motion Planning:** Enhancing autonomy for robots operating in complex domains through computational frameworks that take a holistic ap-

proach to planning to account for temporal specifications, motion dynamics, collision avoidance, robust replanning, and human-robot interactions.

- ◇ **Mobile Robotics:** Enabling mobile robots to safely and efficiently accomplish assigned tasks while avoiding collisions with obstacles
- ◇ **Autonomous Underwater Vehicles (AUVs):** Enhancing autonomy of underwater vehicles both in terms of mission and motion-planning capabilities in order to effectively operate in the littoral zone and confined waterways (collaboration with Naval Research Laboratory)
- ◇ **Unmanned Aerial Vehicles (UAVs):** Enhancing autonomy of UAVs for persistent surveillance of risk-sensitive areas (collaboration with Naval Research Laboratory)
- ◇ **Robotic Minimally Invasive Surgery:** Computational framework that learns from expert demonstrations to assist in training novice surgeons
- ◇ **Minimally Invasive Robotic Exploration of Osteolytic Lesions:** Planning to control a flexible cannula robot to explore osteolytic lesions during minimally invasive surgical treatments of “particle diseases,” which result from material wear in total hip replacements
- ◇ **Robotic Manipulation through Haptic Sensing, Exploration, and Planning:** Novel approaches to enable robots equipped with haptic sensors to perform manipulation of unknown objects based on geometric and tactile appearance information

#### **Hybrid Systems: Automatic Discovery of Safety Violations**

- ◇ Novel approach based on combination of model checking and motion planning to automatically discover safety violations in hybrid systems. Applications in conflict-resolution protocols in air-traffic control and general transportation networks

#### **Approximate Nearest Neighbors and Nonlinear Dimensionality Reduction**

- ◇ Efficient approximations of the nearest-neighbors graph to significantly reduce the major bottleneck in nonlinear dimensionality reduction while maintaining accuracy
- ◇ Methods reliably extract from molecular simulation data the main nonlinear modes of motion while reducing the time to analyze the data from months to hours

#### **Large-Scale High-Performance Distributed Computing**

- ◇ Distributed computation of large nearest-neighbors graphs with millions of points with hundreds of dimensions, yielding near linear speedup over hundreds of processors
- ◇ Distributed motion-planning methods providing a platform to solve high-dimensional problems with hundreds of dimensions for articulated or multi-robot systems

#### **Research and Educational Software**

- ◇ Developed OOPSMP as an extensive toolkit for teaching and robotics research. OOPSMP has been adopted by numerous universities worldwide

## GRANTS

- ◇ (2015) NSF IIS<sup>1</sup> EAGER (IIS1548406): “*A Synergistic Framework for Motion and Task Planning in Mixed Continuous and Discrete Spaces*”
  - ▷ PI: **Plaku E**
  - ▷ Funding awarded: **\$99,924.00** (09/01/2015–08/31/2018)
- ◇ (2014) NSF IIS EAGER (IIS1449505): “*Toward Supervised Autonomy for Robotic Systems*”
  - ▷ PI: **Plaku E**
  - ▷ Funding awarded: **\$149,995.00** (09/01/2014–08/31/2017)
- ◇ (2014) NSF ACI<sup>2</sup> Software Infrastructure for Sustained Innovation (ACI1440581): “*A plug-and-play software platform of robotics-inspired algorithms for modeling biomolecular structures and motions*”
  - ▷ PI: **Plaku E**, (collaboration with Shehu A (GMU), Roitberg A (Florida U))
  - ▷ Funding awarded to Plaku E: **\$215,476.00**, overall: \$499,999 (02/01/2015–01/31/2018)
- ◇ (2015) U.S. Naval Research Laboratory: “*Adaptive Mission and Motion Planning to Enhance the Autonomy of Underwater Vehicles*”
  - ▷ PI: **Plaku E**
  - ▷ Funding awarded: **\$55,298.00** (05/30/2015–05/29/2016)
- ◇ CUA School of Engineering Grants (PI: **Plaku E**)
  - ▷ (2014): “Motion Planning for Unmanned Aerial Vehicles” \$14,000
  - ▷ (2012): “Robotic Manipulation with the KUKA youBot” \$40,000
  - ▷ (2011): “Motion Planning and Exploration with iCreate Robots” \$13,000

## AWARDS

- ◇ Best Robotics Paper  
**Le D** and **Plaku E** (2017): “*Cooperative Multi-Robot Sampling-Based Motion Planning with Dynamics.*”, Proceedings of the International Conference on Planning and Scheduling, pp. 513–521
- ◇ Best Student Paper  
**Wells A** and **Plaku E** (2015): “*Adaptive Sampling-Based Motion Planning for Mobile Robots with Differential Constraints.*” Springer LNCS Towards Autonomous Robotic Systems, vol. 9287, pp. 283–295
- ◇ Kaman Best Researcher Award  
School of Engineering, Catholic University of America, 2015
- ◇ Faculty Research Fellowship  
Office of Naval Research Fellowship, Summer 2014
- ◇ Burns Fellowship  
School of Engineering, Catholic University of America, 2011

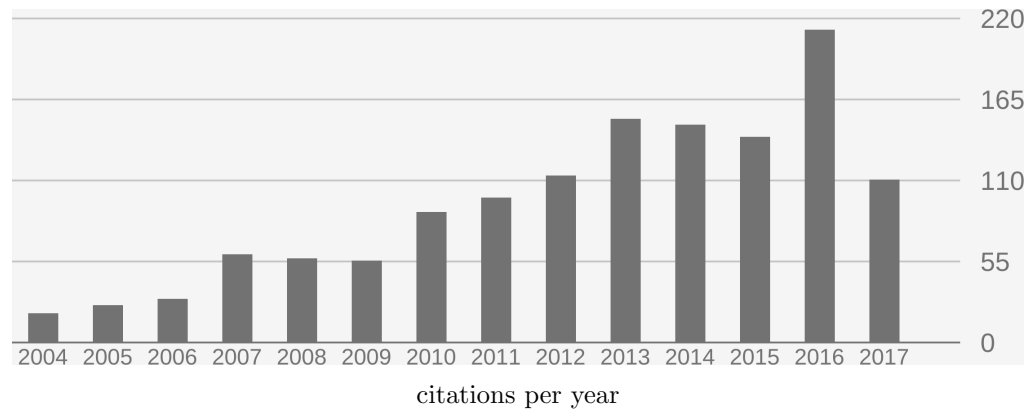
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<sup>1</sup>Division of Information & Intelligent Systems

<sup>2</sup>Division of Advanced Cyberinfrastructure

## CITATION INDICES AND STATISTICS

	total nr. citations	h-index	i10-index
overall	1340	18	23
since 2012	879	16	21



Data obtained from Google Scholar, September 22, 2017

## PUBLICATIONS (PEER-REVIEWED)

*names of my students written in bold italic*

- ◇ **McMahon J** (CUA PhD) Spring 2012 – Spring 2016
- ◇ **Le D** (CUA PhD Candidate) Fall 2013 – present
- ◇ **Can Secim B** (CUA PhD Student) Fall 2015 – present
- ◇ **Rashidian S** (CUA MS Student) Fall 2013 – Summer 2014
- ◇ **Wells A** (CUA Undergraduate Student) Fall 2014 – Spring 2016
- ◇ **Wallar A** (Undergraduate at St Andrews, UK) Summer 2012 – Summer 2015

## PUBLICATIONS 2017

- 69 Maximova T, Zhang Z, Carr D, **Plaku E**, and Shehu A (2017): “**Sample-based Models of Protein Energy Landscapes and Slow Structural Rearrangements.**” *Journal of Computational Biology*, in press
- 68 Edelkamp S, Pomarlan M, and **Plaku E** (2017): “**Multi-Region Inspection by Combining Clustered Traveling Salesman Tours with Sampling-Based Motion Planning.**” *IEEE Robotics and Automation Letters*, vol. 2, pp. 428–435
- 67 Plaku E, **Plaku E**, and Simari P (2017): “**Direct Path Superfacets: An Intermediate Representation for Motion Planning.**” *IEEE Robotics and Automation Letters*, vol. 2, pp. 350–357
- 66 **McMahon J** and **Plaku E** (2015): “**Robot Motion Planning with Task Specifications via Regular Languages.**” *Robotica*, vol. 35, pp. 26–49
- 65 Edelkamp S, **Can Secim, B**, and **Plaku E** (2017): “**Surface Inspection via Hitting Sets and Multi-Goal Motion Planning.**” *Springer LNCS Towards Autonomous Robotic Systems*, vol. 10454, pp. 134–149
- 64 **Le D** and **Plaku E** (2017): “**Cooperative Multi-Robot Sampling-Based Motion Planning with Dynamics.**” *Proceedings of the International Conference on Planning and Scheduling*, pp. 513–521 (**Best Robotics Paper**)

- 63 Morris D, Maximova T, **Plaku E**, and Shehu A (2017): *“Out of One, Many: Exploiting Intrinsic Motions to Explore Protein Structure Spaces.”* Proceedings of the IEEE International Conference on Computational Advances in Bio and Medical Sciences, in press
- 62 Qiao W, Maximova T, **Plaku E**, and Shehu A (2017): *“Statistical Analysis of Computed Energy Landscapes to Understand Dysfunction in Pathogenic Protein Variants.”* Proceedings of the ACM International Conference on Bioinformatics, Computational Biology, and Health Informatics, pp. 679–684
- 61 Kvelashvili T, Kilic O, *Can Secim B*, and **Plaku E** (2017): *“UAV Swarm-Based Antenna System.”* Proceedings of the USNC-URSI National Radio Science, in press

#### PUBLICATIONS 2016

- 60 Shehu A and **Plaku E** (2016): *“A Survey of Computational Treatments of Biomolecules by Robotics-inspired Methods Modeling Equilibrium Structure and Dynamics”* Journal of Artificial Intelligence Research, vol. 57, pp. 509–572
- 59 *McMahon J* and **Plaku E** (2016): *“Autonomous Data Collection with Limited Time for Underwater Vehicles.”* IEEE Robotics and Automation Letters, vol. 2, pp. 112–119
- 58 Maximova T, **Plaku E**, and Shehu A (2016): *“Structure-guided Protein Transition Modeling with a Probabilistic Roadmap Algorithm.”* IEEE/ACM Transactions on Computational Biology and Bioinformatics, vol. 13, pp. 1–14
- 57 **Plaku E**, *Rashidian S*, and Edelkamp S (2016): *“Multi-Group Motion Planning in Virtual Environments.”* Computer Animation and Virtual Worlds, in press, doi: 10.1002/cav.1688
- 56 **Plaku E** and *Le D* (2016): *“Interactive Search for Action and Motion Planning with Dynamics.”* Journal of Experimental and Theoretical Artificial Intelligence, vol. 28, pp. 849–869
- 55 *McMahon J* and **Plaku E** (2016): *“Mission and Motion Planning for Autonomous Underwater Vehicles Operating in Spatially and Temporally Complex Environments.”* IEEE Journal of Oceanic Engineering, vol. 41, pp. 893–912
- 54 Maximova T, Carr D, **Plaku E**, and Shehu A (2016): *“Sample-based Models of Protein Structural Transitions.”* Proceedings of the ACM Conference on Bioinformatics and Computational Biology, pp. 128–137
- 53 Maximova T, **Plaku E**, and Shehu A (2016): *“The Sampling-based Algorithm for Modeling Protein Conformational Switching Method for Extended Sampling and Transition Paths Prediction with Probabilistic Roadmap Algorithm.”* Proceedings of the Structural Bioinformatics and Computational Biophysics, Intelligent Systems for Molecular Biology, pp. 66 (recognized with Outstanding Research Presentation)

#### PUBLICATIONS 2015

- 52 **Plaku E** and Karaman S (2015): *“Motion Planning with Temporal-Logic Specifications: Progress and Challenges.”* AI Communications, vol. 29, pp. 151–162

- 50 **McMahon J**, Dzikowicz B, Houston B, and **Plaku E** (2015): *“A Hybrid Planning Framework For Autonomous Underwater Vehicles.”* NRL Review, pp. 114–116
- 49 **Wallar A**, **Plaku E**, and Sofge D (2015): *“Reactive Motion Planning for Unmanned Aerial Surveillance of Risk-Sensitive Areas.”* IEEE Transactions on Automated Science and Engineering, vol. 12, pp. 969–980
- 48 **Plaku E** (2015): *“Region-Guided and Sampling-Based Tree Search for Motion Planning with Dynamics.”* IEEE Transactions on Robotics, vol. 31, pp. 723–735
- 47 **Wells A** and **Plaku E** (2015): *“Adaptive Sampling-Based Motion Planning for Mobile Robots with Differential Constraints.”* Springer LNCS Towards Autonomous Robotic Systems, vol. 9287, pp. 283–295 (Best Student Paper)
- 46 Maximova T, **Plaku E**, and Shehu A (2015): *“Computing Transition Paths in Multiple-Basin Proteins with a Probabilistic Roadmap Algorithm.”* Proceedings of the IEEE International Conference on Bioinformatics and Biomedicine, pp. 35–42
- 45 **McMahon J** and **Plaku E** (2015): *“Autonomous Underwater Vehicle Mine Countermeasures via the Physical Traveling Salesman Problem.”* MTS/IEEE Oceans, isbn 978-0-9339-5743-5
- 44 Edelkamp S, **Plaku E**, Greulich C, and Pomarlan M (2015): *“Solving the Inspection Problem via Colored Traveling Salesman Tours.”* Workshop on Task Planning for Intelligent Robots in Service and Manufacturing, IEEE International Conference on Robotics and Automation, pp. 26–31

## PUBLICATIONS 2014

- 43 **Plaku E** and **McMahon J** (2014): *“Motion Planning and Decision Making for Underwater Vehicles Operating in Constrained Environments in the Littoral.”* Springer LNCS Towards Autonomous Robotic Systems, vol. 8069, pp. 328–339
- 42 **Wallar A** and **Plaku E** (2014): *“Path Planning for Swarms by Combining Probabilistic Roadmaps and Potential Fields.”* Springer LNCS Towards Autonomous Robotic Systems, vol. 8069, pp. 417–428
- 41 **McMahon J** and **Plaku E** (2014): *“Sampling-Based Tree Search with Discrete Abstractions for Motion Planning with Dynamics and Temporal Logic.”* Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 3726–3733
- 40 **Le D** and **Plaku E** (2014): *“Guiding Sampling-Based Tree Search for Motion Planning with Dynamics via Probabilistic Roadmap Abstractions.”* Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 212–217
- 39 **Rashidian S**, **Plaku E**, and Edelkamp S (2014): *“Motion Planning with Rigid-Body Dynamics for Generalized Traveling Salesman Tours.”* Proceedings of the ACM SIGGRAPH Motion in Games, pp. 87–96



- 38 Edelkamp S and Plaku E (2014): *“Multi-Goal Motion Planning with Physics-Based Game Engines.”* Proceedings of the IEEE Conference on Computational Intelligence and Games, pp. 115–122
- 37 Wallar A and Plaku E (2014): *“Path Planning for Swarms in Dynamic Environments by Combining Probabilistic Roadmaps and Potential Fields.”* Proceedings of the IEEE Symposium on Swarm Intelligence, pp. 290–297
- 36 Wallar A, Plaku E, and Sofge D (2014): *“A Planner for Autonomous Risk-Sensitive Coverage (PARCov) by a Team of Unmanned Aerial Vehicles.”* Proceedings of the IEEE Symposium on Swarm Intelligence, pp. 283–289
- 35 McMahan J and Plaku E (2014): *“Combined Task and Motion Planning for AUVs.”* Workshop on AI and Robotics, IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 17–18

### PUBLICATIONS 2013

- 34 Plaku E, Kavrakı LE, and Vardi MY (2013): *“Falsification of LTL Safety Properties in Hybrid Systems.”* Springer International Journal on Software Tools for Technology Transfer, vol. 15, pp. 305–320
- 33 Plaku E (2013): *“Robot Motion Planning with Dynamics as Hybrid Search.”* Proceedings of the AAAI Conference on Artificial Intelligence, pp. 1415–1421
- 32 McMahan J and Plaku E (2013): *“Combined Mission and Motion Planning to Enhance Autonomy of Underwater Vehicles Operating in the Littoral Zone.”* Workshop on Combining Task and Motion Planning, IEEE International Conference on Robotics and Automation, pp. 17–22
- 31 McMahan J and Plaku E (2013): *“Motion Planning with Linear Temporal Logic for Underwater Vehicles Operating in Constrained Environments.”* Workshop on Planning in Continuous Domains, International Conference on Automated Planning and Scheduling, pp. 3
- 30 Plaku E (2013): *“From Navigation to Robotic-Assisted Surgery: Combined Planning in Discrete and Continuous Spaces.”* Workshop on Combining Robot Motion Planning and AI Planning for Practical Applications, Robotics: Science and Systems, pp. 5–6

### PUBLICATIONS 2012

- 29 Plaku E (2012): *“Planning in Discrete and Continuous Spaces: From LTL Tasks to Robot Motions.”* Springer LNCS Towards Autonomous Robotic Systems, vol. 7429, pp. 331–342.
- 28 Plaku E (2012): *“Guiding Sampling-Based Motion Planning by Forward and Backward Discrete Search.”* Springer LNCS Intelligent Robots and Applications, vol. 7508, pp. 289–300
- 27 Plaku E (2012): *“Motion Planning with Discrete Abstractions and Physics-Based Game Engines.”* Springer LNCS Motion in Games, vol. 7660, pp. 290–301
- 26 Plaku E (2012): *“Path Planning with Probabilistic Roadmaps and Linear Temporal Logic.”* Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 2269–2275

- 25 **Plaku E** (2012): *“Motion Planning with Differential Constraints as Guided Search over Continuous and Discrete Spaces.”* Proceedings of the International Symposium on Combinatorial Search, pp. 171–172
- 24 **Plaku E** (2012): *“Planning Robot Motions to Satisfy Linear Temporal Logic, Geometric, and Differential Constraints.”* Workshop on Combining Task and Motion Planning for Real-World Applications, International Conference on Automated Planning and Scheduling, pp. 21–28

#### PUBLICATIONS 2011

- 23 Pezzementi Z, **Plaku E**, Reyda C, and Hager GD (2011): *“Tactile Object Recognition From Appearance Information.”* IEEE Transactions on Robotics, vol. 27, pp. 473–487
- 22 Liu WP, Lucas BC, Guerin K, and **Plaku E** (2011): *“Sensor and Sampling-Based Motion Planning for Minimally Invasive Robotic Exploration of Osteolytic Lesions.”* Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 1346–1352
- 21 **Plaku E** (2011): *“Sampling-Based Motion Planning with High-Level Discrete Specifications.”* Workshop on Progress and Open Problems in Motion Planning, IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 29–30

#### PUBLICATIONS 2010

- 20 **Plaku E**, Kavraki LE, and Vardi MY (2010): *“Motion Planning with Dynamics by a Synergistic Combination of Layers of Planning.”* IEEE Transactions on Robotics, vol. 26, pp. 469–482
- 19 Reiley C, **Plaku E**, and Hager GD (2010): *“Motion Generation of Robotic Surgical Tasks: Learning from Expert Demonstrations.”* Proceedings of the International Conference of the IEEE Engineering in Medicine and Biology Society, pp. 967–970
- 18 **Plaku E** and Hager GD (2010): *“Sampling-Based Motion and Symbolic Action Planning with Geometric and Differential Constraints.”* Proceedings of the IEEE International Conference on Robotics and Automation, pp. 5002–5008

#### PUBLICATIONS 2009

- 17 **Plaku E**, Kavraki LE, and Vardi MY (2009): *“Hybrid Systems: From Verification to Falsification by Combining Motion Planning and Discrete Search.”* Springer Formal Methods in System Design, vol. 34, pp. 157–182
- 16 **Plaku E**, Kavraki LE, and Vardi MY (2009): *“Falsification of LTL Safety Properties in Hybrid Systems.”* Proceedings of the International Conference on Tools and Algorithms for the Construction and Analysis of Systems, pp. 368–382

#### PUBLICATIONS 2008

- 15 **Plaku E** and Kavraki LE (2008): *“Quantitative Analysis of Nearest-Neighbors Search in High-Dimensional Sampling-Based Motion Planning.”* Springer Tracts in Advanced Robotics, vol. 47, pp. 3–18



- 14 **Plaku E**, Kavraki LE, and Vardi MY (2008): *“Impact of Workspace Decompositions on Discrete Search Leading Continuous Exploration (DSLX) Motion Planning.”* Proceedings of the IEEE International Conference on Robotics and Automation, pp. 3751–3756

#### PUBLICATIONS 2007

- 13 **Plaku E**, Stamati H, Clementi C, and Kavraki LE (2007): *“Fast and Reliable Analysis of Molecular Motion Using Proximity Relations and Dimensionality Reduction.”* Proteins: Structure, Function, and Bioinformatics, vol. 67, pp. 897–907
- 12 **Plaku E** and Kavraki LE (2006): *“Distributed Computation of the  $k$ nn Graph for Large High-Dimensional Point Sets.”* Journal of Parallel and Distributed Computing, vol. 67, pp. 346–359
- 11 **Plaku E**, Kavraki LE, and Vardi MY (2007): *“Hybrid Systems: From Verification to Falsification.”* Proceedings of the International Conference on Computer Aided Verification, pp. 468–481
- 10 **Plaku E**, Kavraki LE, and Vardi MY (2007): *“Discrete Search Leading Continuous Exploration for Kinodynamic Motion Planning.”* Proceedings of the Robotics: Science and Systems, pp. 326–333
- 9 **Plaku E** and Kavraki LE (2007): *“Nonlinear Dimensionality Reduction Using Approximate Nearest Neighbors.”* Proceedings of the SIAM International Conference on Data Mining, pp. 180–191
- 8 **Plaku E**, Kavraki LE, and Vardi MY (2007): *“A Motion Planner for a Hybrid Robotic System with Kinodynamic Constraints.”* Proceedings of the IEEE International Conference on Robotics and Automation, pp. 692–697
- 7 **Plaku E**, Bekris KE, and Kavraki LE (2007): *“OOPS for Motion Planning: An Online Open-source Programming System.”* Proceedings of the IEEE International Conference on Robotics and Automation, pp. 3711–3716

#### PUBLICATIONS 2005

- 6 **Plaku E**, Bekris KE, Chen BY, Ladd AM, and Kavraki LE (2005): *“Sampling-Based Roadmap of Trees for Parallel Motion Planning.”* IEEE Transactions on Robotics, vol. 21, pp. 587–608
- 5 Akinc M, Bekris KE, Chen BY, Ladd AM, **Plaku E**, and Kavraki LE (2005):. *“Probabilistic Roadmaps of Trees for Parallel Computation of Multiple Query Roadmaps.”* Springer Tracts in Advanced Robotics, vol. 15, pp. 80–89
- 4 **Plaku E** and Kavraki LE (2005): *“Distributed Sampling-Based Roadmap of Trees for Large-Scale Motion Planning.”* Proceedings of the IEEE International Conference on Robotics and Automation, pp. 3879–3884

#### PUBLICATIONS 2003

- 3 Bekris KE, Chen BY, Ladd AM, **Plaku E**, and Kavraki LE (2003): *“Multiple Query Motion Planning using Single Query Primitives.”* Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 656–661

- 2 **Plaku E** and Shparlinski IE (2001): *“On Polynomial Representations of Boolean Functions Related to some Number Theoretic Problems.”* Proceedings of the International Conference on the Foundations of Software Technology and Theoretical Computer Science, pp. 305–316

PUBLICATIONS 1999

- 1 Arnavut Z and **Plaku E** (1999): *“Lossless Compression of ECG Signals.”* Proceedings of the IEEE International Conference of the Engineering in Medicine and Biology Society, pp. 274

INVITED TALKS

- ◇ Robotics Seminar, MIT, 12/2016
- ◇ Workshop on Planning for Hybrid Systems (keynote talk), AAAI Conference on Artificial Intelligence, 02/2016
- ◇ Virginia Tech – Northern Virginia Center, Department of Computer Science, 12/2014
- ◇ Naval Research Laboratory, Washington, DC, 07/2014
- ◇ Workshop on Model Checking and Automated Planning, International Conference on Automated Planning and Scheduling, Portsmouth, NH, 06/2013
- ◇ University of Florida, Department of Mechanical Engineering, 01/2013
- ◇ Workshop on Planning in Continuous Domains, International Conference on Automated Planning and Scheduling, Rome, Italy, 06/2013
- ◇ Naval Research Laboratory, Washington, DC, 06/2012
- ◇ Virginia Tech – Northern Virginia Center, Department of Computer Science, 03/2012
- ◇ Johns Hopkins University, Laboratory for Computational Sensing and Robotics, 11/2011
- ◇ Stanford University, Department of Computer Science, 03/2010
- ◇ George Mason University, Department of Computer Science, 11/2009
- ◇ Robotics: Science and Systems, Workshop on Bridging the gap between high-level discrete representations and low-level continuous behaviors, Seattle, WA, 06/2009.
- ◇ Johns Hopkins University, Department of Computer Science, 10/2008
- ◇ Carnegie Mellon University, Department of Computer Science, 03/2008
- ◇ Willow Garage, Mountain View, CA, 05/2008
- ◇ Worcester Polytechnic Institute, Department of Computer Science, 02/2008
- ◇ Intel Research, Hillsboro, OR, 01/2007
- ◇ State University of New York at Fredonia, 11/2006
- ◇ Rutgers State University of New Jersey, 07/2005
- ◇ Texas A&M University, Department of Computer Science, 05/2005

## PROFESSIONAL DEVELOPMENT AND SERVICE

### Associate Editor

- ◇ IEEE/RSJ Intl Conf on Intelligent Robots and Systems (2011–2015)

### Steering Committee

- ◇ IEEE RAS Technical Committee on Algorithms for Planning and Control of Robot Motion (2008 – present)

### Dagstuhl Seminar Series

- ◇ Co-organizer of a one-week seminar on “Automated Planning and Model Checking” as part of the highly-ranked Dagstuhl seminar series, November 2014

### Workshops Organized

- ◇ “Model Checking and Automated Planning.” International Conference on Automated Planning and Scheduling, Portsmouth, New Hampshire, 2014 (role: co-organizer)
- ◇ “Combining Task and Motion Planning.” IEEE International Conference on Robotics and Automation, Karlsruhe, Germany, 2013 (role: main organizer)
- ◇ “Combined Robot Motion Planning and AI Planning for Practical Applications.” Robotics: Science and Systems, Berlin, Germany, 2013 (role: main organizer)
- ◇ “Motion planning with the OOPSMP toolkit: A hands-on tutorial on using state-of-the-art motion planning algorithms.” IEEE/RSJ International Conference on Intelligent Robots and Systems, Nice, France, 2008 (role: co-organizer)

### Program Committee

- ◇ IEEE International Conference on Robotics and Automation
- ◇ IEEE International Conference on Intelligent Robots and Systems
- ◇ AAI Conference on Artificial Intelligence
- ◇ Robotics: Science and Systems
- ◇ International Joint Conference on Artificial Intelligence
- ◇ European Conference on Artificial Intelligence
- ◇ International Conference on Automated Planning and Scheduling
- ◇ Hybrid Systems: Computation and Control
- ◇ IEEE International Conference on Biomedical Robotics and Biomechatronics
- ◇ Cognitive Robotics

### Journal Reviewer

- ◇ Science Translational Medicine
- ◇ PLoS One
- ◇ IEEE Transactions on Robotics
- ◇ International Journal of Robotics Research

- ◇ Robotica
- ◇ Autonomous Robots
- ◇ Automatica
- ◇ IEEE Transactions on Automation Science and Engineering
- ◇ IEEE Transactions on Knowledge and Data Engineering
- ◇ IEEE Transactions on Biomedical Engineering
- ◇ IEEE Robotics and Automation Letters
- ◇ Artificial Intelligence Journal
- ◇ Artificial Intelligence in Medicine
- ◇ Journal of Experimental and Theoretical Artificial Intelligence
- ◇ AI Communications
- ◇ Journal of Franklin Institute

#### **NSF Panelist**

- ◇ CISE Information and Intelligent Systems 2015
- ◇ National Robotics Initiative 2013
- ◇ CISE Information and Intelligent Systems 2013
- ◇ CISE Computer Network Systems 2011

#### **Outreach Activities**

- ◇ DC FIRST Robotics (2012-2015)

DC FIRST Robotics organizes yearly robotics competitions which involve around 60 high schools from the Washington DC metro area and neighboring states. As part of the collaborative efforts with DC FIRST Robotics, I have trained high-school students and conducted robotics exhibits at the main competition events.

- ◇ High School Robotics Training Program (Summer 2011–2015)
- ◇ Engineering New Frontiers (Summer 2011–2012)

Organized the Robotics events, presentations, and competitions as part of the summer camp for high-school students.

- ◇ Robotics Competitions (2011–2015)

I am actively engaged in organizing robotics events such as robot soccer, robot wars, and drone competitions at CUA to broaden student participation and attract more students to science and engineering.

#### **CUA Committees**

- ◇ CUA University Undergraduate Board (2015–present)
- ◇ Chair of Computer Science Undergraduate Curriculum Committee (2013)
- ◇ EECS Computer Science Curriculum Revision Committee (Fall 2010, Spring 2011)
- ◇ EECS Computer Science Odyssey Day and Open House (2011–2017)

## TEACHING

### Curriculum Development

- ◇ CSC/EE 576: Introduction to Robotics (CUA)
- ◇ CS 336: Algorithms for Sensor-Based Robotics (JHU)

### Courses Redesigned

- ◇ CSC 542: Artificial Intelligence (CUA)
- ◇ CSC 212: Theory of Computing (CUA)
- ◇ CSC 223: Object-Oriented Programming (CUA)
- ◇ CSC 113: Introduction to Programming (CUA)

### Courses Taught

- ◇ CUA CSC/EE 576: Introduction to Robotics      Fall 2011, Spring 2014, Spring 2016
- ◇ CUA CSC 542: Artificial Intelligence              Spring 2011, 2013, 2015, 2017
- ◇ CUA CSC 223: Object-Oriented Programming              Fall 2014-2016
- ◇ CUA CSC 212: Theory of Computing                      Spring 2011–2017
- ◇ CUA CSC 113: Introduction to Computer Programming      Fall 2010–2015
- ◇ JHU CS 336: Algorithms for Sensor-Based Robotics              Spring 2010

## STUDENT MENTORING

### Ph.D. Advisor

- ◇ James McMahon (Ph.D., CUA)                                      Spring 2012–Spring 2016  
     Ph.D. Thesis: Towards Combined Task and Motion Planning for Autonomous Underwater Vehicles (04/11/2016)  
     10 papers; see Publications 64, 59, 55, 50, 45, 43, 41, 35, 32, 31
- ◇ Duong Le (Ph.D. Candidate, CUA)                                      Fall 2013–present  
     Topic: Motion Planning for Robotic Teams  
     3 papers; see Publications 62, 56, 40
- ◇ Baris Secim (Ph.D. Student, CUA)                                      Fall 2015 – present  
     Topic: Inspection with Aerial Vehicles  
     2 papers; see Publications 63, 61

### M.S. Advisor

- ◇ Sara Rashidian (M.S. Student, CUA)                                      Fall 2013–Summer 2014  
     Topic: Multi-Goal Motion Planning  
     2 papers; see Publications 57, 39

### Undergraduate Research Advisor

- ◇ Andrew Wells (Undergraduate, CUA)                                      2014–2016  
     1 paper; see Publication 47 (**best student paper**)
- ◇ Alex Wallar (Undergraduate, St. Andrews University, UK)              2012–2015  
     4 papers; see Publications 49, 42, 37, 36

