

Nare Karapetyan

Curriculum Vitae

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Email: knare@umd.edu

Research Interests: Area Coverage, Marine Robotics, Multi-robot Systems, Path Planning, Exploration

EDUCATION

2016 - 2021 **PhD in Computer Science**, University of South Carolina
Dissertation: "Robot Area Coverage Path Planning in Aquatic Environments"

2013 - 2015 **MSc in Computer and Information Science**, American University of Armenia (AUA)
Thesis: "Area Coverage for Multi-robot Systems"

2008 - 2012 **BSc in Applied Mathematics and Informatics**, Yerevan State University (YSU)
Thesis: "Global Value Numbering Optimization for WebKit Jit compiler"

02 - 05/2012 Visiting Undergraduate Student, Lomonosov Moscow State University, Moscow, Russia

EXPERIENCE

01/2022 - current Postdoctoral Associate, **University of Maryland (UMD)**, MD, USA

08/2016 - 12/2021 Research and Teaching Assistant, **University of South Carolina, Columbia**, SC, USA

02/2020 - 07/2020 Software Engineering Intern, **iRobot**, Pasadena, CA, USA

02/2015 - 08/2016 Research and Teaching Associate, **American University of Armenia**, Yerevan, Armenia

05/2013 - 07/2014 Software Engineer, **Improvis LLC**, Yerevan, Armenia

09/2011 - 11/2012 Software Developer, **Ivannikov Institute of Russian Academy of Sciences (ISP RAS)**

01/2010 - 06/2011 Software Engineering Trainee, **Instigate LLC**, Yerevan, Armenia

AWARDS

2023, Jul RSS 2023 Pioneer

2023, May ICRA RAS Travel Award funded by the US NSF

2023, May Maryland Robotics Center (MRC) "Best Poster Involving Graduate Student Research"

2021, Dec 2022 Breakthrough Graduate Scholars award

2021-2022 Maryland Robotics Center Postdoctoral Fellowship

2020-2021 JSPS Postdoctoral Fellowship for Research in Japan, Short Term Program (covid affected)

2019, Oct Third Prize in OCEANS'19 Seattle Student Poster Competition

2017 - 2019 Armenian General Benevolent Union (AGBU), US Graduate Scholarship

2016 - 2019 Graduate Assistantship, University of South Carolina

2019, Nov IROS Student and Developing Countries (SDC) Travel Award

2018, 2019 University of South Carolina Graduate School Travel Grant

2018, May ICRA RAS Travel Award funded by the US NSF

2017, Oct IROS Travel Award for Doctoral Consortium funded by the US NSF

07/2015 Calouste Gulbenkian Foundation, Short Term Conference Travel Grant

2013 - 2015 AUA/MoES full tuition fee scholarship, American University Of Armenia (AUA)

2014 Annual Presidential IT Award as Best Master Student in the IT sector, Armenia

09/2011 - 05/2012 Undergraduate Research Scholarship, ISP RAS

08/2011 - 12/2011 Nominal Award for building the "Mobot" mine detecting robot, ArmRobotics Competition

2009 - 2012 MoES full tuition fee scholarship, Yerevan State University

Grants

[G4] Army Research Lab (ARL) ArtIAMAS Year 3: Developing Novel Risk Sensitive Maneuver Tradeoffs for a Team of Ground Vehicles; Dinesh Manocha, Pratap Tokekar, Amrit Singh Bedi, **Nare Karapetyan**, Brian M Sadler (\$125k, 03/2023 - 03/2024)

[G3] ARL ArtIAMAS Year 3 MIPS: Autonomous Planning and Navigation for Multi-Robot Ground and Aerial Collaborative Coordination and Decision Making; Pratap Tokekar, **Nare Karapetyan**, James Dotterweich (\$150k, 03/2023-03/2024)

[G2] ARL MIPS-Pilot: Autonomous Planning and Navigation for Multi-Robot Ground and Aerial Collaborative Coordination and Decision Making; Pratap Tokekar, **Nare Karapetyan**, Johny Cruppi, James Dotterweich (\$60k, 09-12/2022)

[G1] SPARC Graduate Research Grant, University of South Carolina: **Nare Karapetyan** (\$5k, 06-08/2019)

PUBLICATIONS

Journal Papers

[J2] Jing Liang, Kasun Weerakoon, Tianrui Guan, **Nare Karapetyan** and Dinesh Manocha, AdaptiveON: Adaptive Outdoor Navigation Method For Stable and Reliable Motions; *Robotics and Automation Letters (RA-L)*, 2022

[J1] **Nare Karapetyan**, James Johnson, and Ioannis Rekleitis, Human Diver Inspired Visual Navigation for Coverage Path Planning of Shipwrecks, *Marine Technology Society Journal*, "Best of OCEANS 2020" July/August issue 2021

Fully-Refereed Conference Papers

[C16] **Nare Karapetyan**, Ahmad Bilal Asghar, Guangyao Shi, Harnaik Dhami, Dinesh Manocha and Pratap Tokekar; AG-Cvg: Coverage Planning with a Mobile Recharging UGV and an Energy-Constrained UAV; *IEEE International Conference on Robotics and Automation (ICRA)*, 2024 [under review]

[C15] Ahmad Asghar, Guangyao Shi, **Nare Karapetyan**, Jean-Paul Reddinger, James Dotterweich, James Humann, and Pratap Tokekar; Risk-aware Recharging Rendezvous for a Collaborative Team of UAVs and UGVs; *In IEEE International Conference on Robotics and Automation (ICRA)*, 2023.

[C14] Xiaomin Lin, Nitin J. Sanket, **Nare Karapetyan**, Yiannis Aloimonos; Oyster Simulation Augmented Oyster Segmentation, *In IEEE International Conference on Robotics and Automation (ICRA)*, 2023.

[C13] Kasun Weerakoon, Souradip Chakraborty, **Nare Karapetyan**, Amrit Singh Bedi and Dinesh Manocha; HTRON: Efficient Outdoor Navigation with Sparse Rewards via Heavy Tailed Adaptive Reinforce Algorithm, *Conference of Robot Learning (CoRL)*, Auckland, NZ, 2022

[C12] Guangyao Shi, **Nare Karapetyan**, Ahmad Bilal Asghar, Jean-Paul Reddinger, James Dotterweich, James Humann, Pratap Tokekar; Risk-aware UAV-UGV Rendezvous with Chance-Constrained Markov Decision Process, *Conference on Decision and Control (CDC)*, Cancún, Mexico, 2022

[C11] Ibrahim Salman*, Jason Raiti*, **Nare Karapetyan***, Annie Bourbonnais, Jason M. O’Kane, and Ioannis Rekleitis; Confined Water Body Coverage under Resource Constraints, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Kyoto, Japan, 2022 (*equal contributors)

[C10] Marios Xanthidis, Michail Kalaitzakis, **Nare Karapetyan**, Alex Johnson, Nikolaos Vitzilaios, Jason M. O’Kane, and Ioannis Rekleitis; AquaVis: A Perception-Aware Autonomous Navigation Framework for Underwater Vehicles, *International Conference on Intelligent Robots and Systems (IROS)*, Prague, Czech Republic, 2021

[C9] Marios Xanthidis, **Nare Karapetyan**, Hunter Damron, Sharmin Rahman, James Johnson, Allison O’Connell, Jason M. O’Kane, and Ioannis Rekleitis; Navigation in the Presence of Obstacles for an Agile Autonomous Underwater Vehicle, *In IEEE International Conference on Robotics and Automation (ICRA)*, Paris, France, 2020

[C8] **Nare Karapetyan**, Adam Braude, Jason Moulton, Joshua A. Burstein, Scott White, Jason M. O’Kane, and Ioannis Rekleitis, Riverine Coverage with an Autonomous Surface Vehicle over Known Environments, *In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Macau, China, 2019

[C7] Bharat Joshi, Sharmin Rahman, Michail Kalaitzakis, Brennan Cain, James Johnson, Marios Xanthidis, **Nare Karapetyan**, Alan Hernandez, Alberto Quattrini Li, Nikolaos Vitzilaios, Ioannis Rekleitis, Experimental Comparison of Open Source Visual-Inertial-Based State Estimation Algorithms in the Underwater Domain, *In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Macau, China, 2019

[C6] **Nare Karapetyan**, Jason Moulton and Ioannis Rekleitis, Meander Based River Coverage by an Autonomous Surface Vehicle, *Field and Service Robotics: Recent Advances in Research and Applications (FSR)*. Springer, Tokyo, Japan, 2019

[C5] Jason Moulton, **Nare Karapetyan**, Michail Kalaitzakis, Alberto Quattrini Li, Nikolaos Vitzilaios, Ioannis Rekleitis, Effects Modeling – Dynamic Autonomous Surface Vehicle Controls Under Changing Environmental Forces, Field and Service Robotics: Recent Advances in Research and Applications (FSR). Springer, Tokyo, Japan, 2019

[C4] **Nare Karapetyan**, Jason Moulton, Jeremy Lewis, Alberto Quattrini Li, Jason O'Kane, Ioannis Rekleitis, Multi-robot Dubins Coverage with Autonomous Surface Vehicles, *In IEEE International Conference on Robotics and Automation (ICRA)*, Brisbane, Australia, 2018

[C3] Jason Moulton, **Nare Karapetyan**, Alberto Quattrini Li, Ioannis Rekleitis, External Force Field Modeling for Autonomous Surface Vehicles, *In International Symposium of Experimental Robotics (ISER)*, Buenos Aires, Argentina, 2018

[C2] **Nare Karapetyan**, Kelly Benson, Chris McKinney, Perouz Taslakian, Ioannis Rekleitis, Efficient Multi-Robot Coverage of a Known Environment, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, Canada, 2017

[C1] Nelson Baloian, Wolfram Luther, Daniel Biella, **Nare Karapetyan**, Jose A. Pino, Tobias Schreck, Nancy Hitschfeld, Exploring Collaboration in the Realm of Virtual Museums, *23rd International Conference on Collaboration and Technology (CRIWG)*, Saskatoon, Canada, 2017

Lightly-Refereed Conference and Workshop Papers

[E8] Xiaomin Lin, Nitesh Jha, Mayank Joshi, **Nare Karapetyan**, Yiannis Aloimonos and Miao Yu; Underwater Simulation for Enhancing Oyster Reef Monitoring, *In MTS/IEEE OCEANS*, Hampton Roads, 2022.

[E7] Ibrahim Salman, **Nare Karapetyan**, Archana Venkatachari, Alberto Quattrini Li, Annie Bourbonnais, Ioannis Rekleitis; Multi-Modal Lake Sampling for Detecting Harmful Algal Blooms, *In MTS/IEEE OCEANS*, Hampton Roads, 2022.

[E6] Marios Xanthidis, Bharat Joshi, **Nare Karapetyan**, Monika Roznere, Weihang Wang, James Johnson, Alberto Quattrini, Jesse Casana, Philippos Mordohai, Srihari Nelakuditi, Ioannis Rekleitis, Towards Multi-Robot Shipwreck Mapping, 1st Advanced Marine Robotics TC Workshop:Active Perception, *In IEEE International Conference on Robotics and Automation (ICRA)*, Xi'an, China (virtual), 2021.

[E5] **Nare Karapetyan**, James Johnson, and Ioannis Rekleitis, Coverage Path Planning for Mapping of Underwater Structures with an Autonomous Underwater Vehicle, *In MTS/IEEE OCEANS Singapore*, 2020 (accepted to Student Poster Competition)

[E4] **Nare Karapetyan**, Ioannis Rekleitis. Coverage of Rivers with Autonomous Surface Vehicles. Informed Scientific Sampling in Large-scale Outdoor Environments Workshop, *In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Macau, China, 2019.

[E3] **Nare Karapetyan**, Jason Moulton, and Ioannis Rekleitis, Dynamic Autonomous Surface Vehicle Control and Applications in Environmental Monitoring, *In MTS/IEEE OCEANS Seattle*, WA, USA, 2019 (winner of 3rd prize at the Student Poster Competition)

[E2] Sharmin Rahman, **Nare Karapetyan**, Alberto Quattrini Li, and Ioannis Rekleitis, A Modular Sensor Suite for Underwater Reconstruction, *In MTS/IEEE OCEANS Charleston*, SC, USA, 2018

[E1] Jason Moulton, **Nare Karapetyan**, Sharon Bukhsbaum, Chris McKinney, Sharaf Malebary, George Sophocleous, Alberto Quattrini Li, and Ioannis Rekleitis, An Autonomous Surface Vehicle for Long Term Operations, *In MTS/IEEE OCEANS Charleston*, SC, USA, 2018

SKILLS

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| Programming: | C/C++, Python, Java, bash scripting, octave |
| Libraries: | STL, QT, OpenCV, Boost (GBL), scikit-learn, Keras, pandas |
| Tools, Technologies: | Robotics Operating System (ROS), Linux (Ubuntu), GNU C++ compiler/debugger GCC and GDB, Docker, gtest, vim, git, LaTeX, QT creator, Arduino, Raspberry Pi, Pixhawk |
| Languages: | Armenian (native), Russian (fluent), English (professional) |

INVITED TALKS

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| May 15, 2023 | Woods Hole Oceanographic Institute (WHOI), MA, USA |
| May 1, 2023 | George Mason University (GMU), VA, USA |
| Apr 27, 2023 | University of Colorado, Denver (CUDenver), CO, USA |
| Apr 18, 2023 | University of Central Florida (UCF), FL, USA |
| Dec 14, 2022 | GRASPLab, University of Pennsylvania, PA, USA |
| Mar 15, 2019 | American University of Armenia (AUA), Yerevan, Armenia |

CONFERENCES

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| July 9 - 14 | RSS 2023 conference, Daegu, South Korea |
| May 28-June 3 | ICRA 2023 conference , London, UK |
| June 27-July 1 | RSS 2022 conference, NYC, USA |
| Oct 5-15, 2020 | OCEANS'20 conference, Singapore, Singapore, (Virtual) |
| Nov 4 -8, 2019 | IROS 2019 conference, Macao, Macau, China |
| Oct 27 - 31, 2019 | OCEANS'19 conference, Seattle, WA, USA |
| Sept 26 - 27, 2019 | 1st Annual Computing@SEC Meeting at the University of Alabama, AL, USA |
| Aug 29-31, 2019 | 12th Conference on Field and Service Robotics (FSR), Tokyo, Japan |
| May 21 - 26, 2018 | ICRA 2018 conference, Brisbane, Australia |
| April 15, 2018 | Discover USC: Three-minute thesis, UofSC, Columbia, SC, USA |
| Sept 21 - 28, 2017 | IROS and ROScon 2017 conference, Vancouver, Canada |

WORKSHOPS and TRAININGS

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| Jan 01 - 18, 2020 | Bellairs 16th Annual Field Trials and Workshop, Holetown, Barbados |
| Oct 1 - 04, 2019 | Grace Hopper Celebration, Orlando, Florida |
| Jan 01 - 18, 2019 | Bellairs 15th Annual Field Trials and Workshop, Holetown, Barbados |
| Aug 13 - 16, 2018 | AQUA Workshop at the University of Minnesota (UMN), Minneapolis, MN, USA |
| Jun 28 - Jul 5, 2017 | Deep Learning and Reinforcement Learning Summer School , Montreal, Canada |
| Jan 01 - 14, 2017 | Bellairs 13th Annual Field Trials and Workshop, Holetown, Barbados |
| Feb 22 - 25, 2015 | IBM Watson training , Yerevan, Armenia |
| Aug 23 - Sept 4, 2015 | Machine Learning Summer School, Kyoto, Japan |

TEACHING EXPERIENCE

Instructor:

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| Summer 2019 | Robotics, Upward Bound Program, Eau Claire High School |
| Fall 2018 | CSCE 274 Robotic Applications and Design, University of South Carolina |
| Summer 2015, Fall/Spring 2016 | MATH111 Discrete Math, American University of Armenia (AUA) |

Teaching Assistant:

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| Fall 2016, 2017, Spring 2018 | CSCE 145, 146 Algorithmic Design I, II, University of South Carolina |
| Spring/Fall 2015, 2016 | CIS311(grad), CS211 Theory of Algorithms, AUA |
| Spring 2016 | CIS332(grad), CS132 Theory of Communication Networks, AUA |

ACADEMIC SERVICES

Associate Editor:

- International Conference on Intelligent Robots and Systems IROS 2022, 2023
- Robotics Automation and Letters (RA-L) 2022 - current
- International Conference on Robotics and Automation ICRA 2023

Workshop Organizer:

- Heterogeneity in Multi-Robot Systems: Theory, Practice and Applications, ICRA 2023
- Envisioning an Infrastructure for Multi-Robot and Collaborative Autonomy Testing and Evaluation: RSS2022

Reviewer:

- International Conference on Robotics and Automation, (ICRA:19-23, RAL-ICRA: 19-23)

- IEEE Transactions on Robotics Journal (T-RO: 21-23)
- Journal of Autonomous Robots, 2018 (AURO)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS: 17-23)
- Woman in Machine Learning Workshop at NIPS (WiML17)

ORGANIZATIONS

- IEEE RAS member (since 2017)
 - IEEE OES member (since 2023)
 - Upsilon Pi Epsilon Honor Society for the Computing Sciences (since 2018)
 - The Oceanography Society (since 2021)
 - Armenian Society of Fellows (ASOF) (since 2022)
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VOLUNTEERING

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| Feb 2017 - 2019 | 701 Center for Contemporary Art - volunteering as an assistant for artists and the gallery |
| July 14-17, 2019 | Conference on Data and Applications Security (DBSec'19), Charleston, SC, USA |
| Sept 22 - 25, 2015 | CRIWG 2015 conference , Yerevan, Armenia |

NON-ACADEMIC

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|----------------|---|--------------|---|--------|---|-------------|---|------------------|
| Sustainability | - | Scuba diving | - | Hiking | - | Photography | - | Contemporary Art |
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REFERENCES

Dinesh Manocha

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College Park, MD 20742, USA
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Pratap Tokekar

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Columbia, SC 29208, USA
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