Hazhar Rahmani, Postdoctoral Associate

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Research Interests

- **Algorithmic Robotics**
- **Artificial Intelligence**
- **Formal Methods in Robotics/Artificial Intelligence**
- **Computational Geometry**

Professional Experience

May 2022 – present
Postdoctoral Associate, Electrical and Computer Engineering Department, University of Florida, Gainesville, Florida, USA.
Working with Dr. Jie Fu (postdoc advisor) on developing algorithms and theories for planning and decision-making in robotics and intelligent systems.

May. 2018 – April 2022
Graduate Research Assistant, Computer Science and Engineering Department, University of South Carolina, Columbia, South Carolina, USA.
Worked with Prof. Jason O'Kane (P.hD. advisor) on a collection of new discrete planning algorithms for robotic problems.

Education

2016 – 2022
Ph.D., Computer Science and Engineering, University of South Carolina, Columbia, South Carolina, USA.
Dissertation title: *Automata-theoretic approaches to planning in robotics: combinatorial filter minimization, planning to chronicle, temporal logic planning with soft specifications, and sensor selection for detecting deviations from a planned itinerary.*
Advisor: *Prof. Jason M. O'Kane*
GPA: *4.0*

2010 – 2012
M.Sc., Computer Science, Sharif University of Technology, Tehran, Iran.
Thesis title: *Analyzing agent-oriented design patterns, and propose an approach for formalizing design patterns.*
Advisor: *Dr. Rasoul Ramezanian*
GPA: *4.0 (18.82/20)*

2002 – 2008
B.Sc. Computer Engineering (Software), Iran University of Science and Technology, Tehran, Iran.
Thesis title: *A Survey on approaches for security and access control in XML-based databases, and implement one of them.*
Advisor: *Dr. Mostafa Haghjoo*
GPA: *3.3 (14.93/20)*

Industrial Experience (Pre P.hD.)

April 2015 - July 2016 — **Senior software engineer,** Paydar Samane Co, Tehran, Iran.
Led a team of three developers to develop an E-Shop builder and an accounting software.
Used technologies: C#, Microsoft SQL Server, Fast report.NET, ASP.NET MVC, JavaScript, JQuery, CSS, HTML.

Nov. 2013-March 2015 — **Part-Time software developer,** Persis Raybin Information Technology Co, Tehran, Iran.
Participated in an Agile team of 12 engineers to create a web-based BPMS for holding companies. Engineered a web-based dynamic report generator and several subsystems (accounting, warehouse, sales, and treasury) within the BPMS framework. Implemented BPMS successfully, utilized by a holding with around 3000 employees. Designed and implemented an offline-capable desktop application for weighbridges, seamlessly integrated with BPMS. Used Technologies: C#, Microsoft SQL Server, ASP.NET MVC, and Stimul Report.

July 2006-Sep. 2011 — **Part-Time software developer and shareholder of the Co,** Rayasepehr Co, Tehran, Iran, Tehran, Iran.
Engineered organization's programming framework, comprising reusable software components, an entity framework, a code generator, a desktop report generator, and a multi-tier architecture. Developed 8 integral modules (accounting, sales, purchase, warehouse, treasury, manufacturing, loan, and CRM) for a financial software tailored to small and medium-sized enterprises Used Technologies: C#, C++, Microsoft SQL Server, Crystal Report, Fast report.NET, ASP.NET, JavaScript, JQuery, CSS, and HTML.

June 2005-June 2006 — **Part-Time software developer,** AsaaSoft Co, Tehran, Iran.
Developed the reporting subsystems of several windows applications.
Developed a web-based application.
Used technologies: C#, Microsoft SQL Server, Crystal Report, PhP, and MySQL.

Teaching

Fall 2020 — **Graduate Teaching Assistant: Foundations of Computation (undergraduate level)**, Computer Science and Engineering Department, University of South Carolina, Columbia, South Carolina, USA.

Fall 2017, 2018, 2019 — **Graduate Teaching Assistant: Analysis of Algorithms (graduate level)**, Computer Science and Engineering Department, University of South Carolina, Columbia, South Carolina, USA.

Fall 2016-Spring 2018 — **Graduate Teaching Assistant: Algorithm Design II (undergraduate level)**, Computer Science and Engineering Department, University of South Carolina, Columbia, South Carolina, USA.

Fall 2012 — **Lecturer: Basics of Computer and Introduction to Programming (in Java)**, Mathematics and Computer Sciences Department, Sharif University of Technology, Tehran, Iran.

Research Publications

Journal Articles

1. **H. Rahmani**, D. A. Shell, and J. M. O'Kane, "Planning to chronicle: Optimal policies for narrative observation of unpredictable events," *The International Journal of Robotics Research*, vol. 42, no. 6, pp. 412–432, 2023.

2. **H. Rahmani** and J. M. O'Kane, "Equivalence notions for state-space minimization of combinatorial filters," *IEEE Transactions on Robotics*, vol. 37, no. 6, pp. 2117–2136, 2021.
3. **H. Rahmani** and J. M. O'Kane, "Integer linear programming formulations of the filter partitioning minimization problem," *Journal of Combinatorial Optimization*, vol. 40, no. 2, pp. 431–453, 2020.

Refereed conference papers

1. L. Li, **H. Rahmani**, and J. Fu, "Probabilistic planning with prioritized preferences over temporal logic objectives," in *International Joint Conference on Artificial Intelligence*, 2023.
2. **H. Rahmani**, A. N. Kulkarni, and J. Fu, "Probabilistic planning with partially ordered preferences over temporal goals," in *2023 IEEE International Conference on Robotics and Automation (ICRA)*, IEEE, 2023, pp. 5702–5708.
3. C. Shi, A. N. Kulkarni, **H. Rahmani**, and J. Fu, "Synthesis of opacity-enforcing winning strategies against colluded opponent," in *IEEE Conference on Decision and Control*, 2023.
4. S. Udupa, **H. Rahmani**, and J. Fu, "Opacity-enforcing active perception and control against eavesdropping attacks," in *International Conference on Decision and Game Theory for Security*, Springer, 2023, pp. 329–348.
5. D. Chaudhuri, **H. Rahmani**, D. A. Shell, and J. M. O'Kane, "Tractable planning for coordinated story capture: Sequential stochastic decoupling," in *Distributed Autonomous Robotic Systems: 15th International Symposium*, Springer, 2022, pp. 256–268.
6. D. Chaudhuri, R. Ike, **H. Rahmani**, D. A. Shell, A. T. Becker, and J. M. O'Kane, "Conditioning style on substance: Plans for narrative observation," in *2021 IEEE International Conference on Robotics and Automation (ICRA)*, IEEE, 2021, pp. 2687–2693.
7. **H. Rahmani**, D. A. Shell, and J. M. O'Kane, "Planning to chronicle," in *Algorithmic Foundations of Robotics XIV: Proceedings of the Fourteenth Workshop on the Algorithmic Foundations of Robotics 14*, Springer, 2021, pp. 277–293.
8. **H. Rahmani**, D. A. Shell, and J. M. O'Kane, "Sensor selection for detecting deviations from a planned itinerary," in *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, 2021, pp. 6511–6518.
9. Y. Zhang, **H. Rahmani**, D. A. Shell, and J. M. O'Kane, "Accelerating combinatorial filter reduction through constraints," in *2021 IEEE International Conference on Robotics and Automation (ICRA)*, IEEE, 2021, pp. 9703–9709.
10. **H. Rahmani** and J. M. O'Kane, "What to do when you can't do it all: Temporal logic planning with soft temporal logic constraints," in *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, 2020, pp. 6619–6626.
11. **H. Rahmani** and J. M. O'Kane, "Optimal temporal logic planning with cascading soft constraints," in *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, 2019, pp. 2524–2531.
12. **H. Rahmani** and J. M. O'Kane, "On the relationship between bisimulation and combinatorial filter reduction," in *2018 IEEE International Conference on Robotics and Automation (ICRA)*, IEEE, 2018, pp. 7314–7321.

Preprints

1. **H. Rahmani**, A. Ahadi, and J. Fu, "Optimal sensor deception to deviate from an allowed itinerary," 2023.

Reviews

ACM TOCL	**ACM Transactions on Computational Logic** (1).
IEEE T-RO	**IEEE Transactions on Robotics** (3).
IEEE RA-L	**IEEE Robotics and Automation Letters** (3).
ICRA 2023	**2023 IEEE International Conference on Robotics and Automation** (5).
IROS 2023	**2023 IEEE/RSJ International Conference on Intelligent Robots and Systems** (1).
ICRA 2022	**2022 IEEE International Conference on Robotics and Automation** (1).
IROS 2022	**2022 IEEE/RSJ International Conference on Intelligent Robots and Systems** (1).
WAFR XIV	**2020 International Workshop on the Algorithmic Foundations of Robotics** (1).

Invited Talks

Nov. 2023 (Virtual)	**Automata-theoretic approaches to planning with complex goals in robotics**, Combinatorics and computing weekly seminar, School of Mathematics, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran.
April 2022 (Virtual)	**A collection of new planning problems with complex goals in robotics**, Seminar, Computer Science Department, Tarbiat Modares University, Tehran, Iran.
Jan. 2022 (Virtual)	**Automata-theoretic approaches to planning in robotics** Seminar, Electrical and Computer Engineering Department, University of Florida, FL, USA.

Skills

Coding	Python, Java, C, C++, C Sharp, and PHP.
Databases	MySQL, Microsoft SQL Server, Microsoft Access, and XML/XSL.
Web Dev	HTML, CSS, JavaScript, JQuery, Apache Web Server, ASP.NET, ASP.NET MVC, and AJAX.
Frameworks	PyCharm, Eclipse IDE, IntelliJ IDEA, .Net Framework 2.0, 3.0, 3.5 and 4.0, 4.5, and Rational Rose.
Reporting	Crystal Report, Fast Report .Net, and Stimul Report.
Logic	Microsoft Z3, NuSMV, and KLEE.
Multi-agent	Repast Simphony.
Optimization	CPLEX, DoCplex, Python-MIP, and PulP.
Development	Object Oriented Design (OOD), Agent Oriented SE, Component Oriented Programming, Agile Development, and Software Design Patterns.
Operation Systems	Microsoft Windows, and Linux.
Type settings	Microsoft office, and LaTeX.

Awards and Achievements

2012	**Outstanding Student Award**, Mathematics and Computer Sciences Department, Sharif University of Technology, Tehran, Iran.