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Institute for Systems Research (ISR)
University of Maryland
College Park, MD - 20742, USA

Education

- 2019–2024 **Ph.D. Computer Science**
University of Southern California | Los Angeles, CA, USA
- Advisors: [Jyotirmoy V. Deshmukh](#) and [Stefanos Nikolaidis](#)
 - Thesis: “Sample-Efficient and Robust Neurosymbolic Learning From Demonstrations”
- 2017–2018 **M.S. Computer Science (Intelligent Robotics)**
University of Southern California | Los Angeles, CA, USA
- 2012–2016 **B.E. Computer Science and Engineering**
Visvesvaraya Technological University | India
- B.M.S. College of Engineering, Bangalore

Work Experience

- 2024–on **University of Maryland | College Park, MD, USA**
Postdoctoral Associate: Systems Engineering
- Mentors: [John S. Baras](#) and [Calin Belta](#)
 - Developed formal Behavior Tree models for verifiable AI
 - Created hybrid RL architecture for heterogeneous multi-microbot teams
 - Developed mechanisms to ground LLMs to temporal logic for robotic tasks
 - Researching inference of temporal logic from visual data via VLMs
 - Collaborated with [Artly AI](#) to integrate robotics and AI into automated cafeteria operations
 - Provided consultation and expertise on advancing research for [Artly's General Intelligence \(AGI\)](#) through robotic system design, human-robot interaction, and AI applications for hospitality
 - Authored comprehensive strategic funding proposal outlining technical challenges and solutions for next-gen AGI robots, guiding [Artly AI](#) R&D priorities
 - Collaborated in drafting process of grants:
 - ARL: A2I2
 - DARPA: CoasterChase
 - NSF: SBIR/STTR
- 2022 **SRI International | Princeton, NJ, USA**
Intern: Reinforcement Learning
- Developed RL algorithms for continual/lifelong learning in multi-agent systems to overcome catastrophic forgetting
- 2019 **Toyota North America R&D - InfoTech Labs | Mountain View, CA, USA**
Researcher: Formal Methods for Connected Cars
- Member of Intelligent Connected Systems (ICS) division
 - Developed formal reasoning models of edge computing configurations for connected vehicle applications (V2V and V2X); resulting in 3 US patents (2 granted and 1 pending)

- Supervisor: [Dr. Andrew J. Hung](#) at Center for Robotic Simulation and Education (CRSE)
- Developed a tool using computer vision to estimate the deviation of surgical needle entry/exit points in dry-lab from videos obtained from the Da Vinci Si surgical robot
- Created automated inference of explainable performance metrics from human feedback and demonstrations

Publications and Patents

(Google Scholar: [6Ava7scAAAAJ](#))

Journal Articles

- [J1] **A. G. Puranic**, J. V. Deshmukh, and S. Nikolaidis, "Learning performance graphs from demonstrations via task-based evaluations," *IEEE Robotics and Automation Letters (RA-L)*; Oral presentation at ICRA 2023., vol. 8, no. 1, pp. 336–343, 2023. DOI: [10.1109/LRA.2022.3226072](#)
- [J2] **A. G. Puranic**, J. V. Deshmukh, and S. Nikolaidis, "Learning from demonstrations using signal temporal logic in stochastic and continuous domains," *IEEE Robotics and Automation Letters (RA-L)*; Presentation at IROS 2021., vol. 6, no. 4, pp. 6250–6257, 2021. DOI: [10.1109/LRA.2021.3092676](#)
- [J3] **A. G. Puranic**, K. Deepak, and V. Umadevi, "Vehicle number plate recognition system: A literature review and implementation using template matching," *International Journal of Computer Applications*, vol. 134, pp. 12–16, 2016.

Peer-reviewed Conference Proceedings

- [C1] M. Noorani, **A. G. Puranic**, J. Mirenzi, and J. S. Baras, "Self-supervised time-series anomaly detection with temporal logic explanations," in *Game Theory and AI for Security*, Cham: Springer Nature Switzerland, 2026, pp. 294–312, ISBN: 978-3-032-08067-7.
- [C2] C. Enwerem, **A. G. Puranic**, J. S. Baras, and C. Belta, "Safety-aware reinforcement learning for control via risk-sensitive action-value iteration and quantile regression," in *2025 64th IEEE Conference on Decision and Control (CDC) – Accepted*, 2025. [Online]. Available: <https://arxiv.org/abs/2506.06954>
- [C3] R. Matheu, **A. G. Puranic**, J. S. Baras, and C. Belta, "BT2Automata: Expressing behavior trees as automata for formal control synthesis," in *Proceedings of the 28th ACM International Conference on Hybrid Systems: Computation and Control*, ser. HSCC '25, Irvine, CA, USA: Association for Computing Machinery, 2025, ISBN: 9798400715044. DOI: [10.1145/3716863.3718042](#) [Online]. Available: <https://doi.org/10.1145/3716863.3718042>
- [C4] R. Matheu, **A. G. Puranic**, J. S. Baras, and C. Belta, "Omtbt: Online monitoring of temporal behavior trees with applications to closed-loop learning," in *2025 European Control Conference (ECC)*, 2025, pp. 2129–2135. DOI: [10.23919/ECC65951.2025.11187275](#)
- [C5] **A. G. Puranic**, J. V. Deshmukh, and S. Nikolaidis, "Signal temporal logic-guided apprenticeship learning," in *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2024, pp. 11147–11154. DOI: [10.1109/IROS58592.2024.10801924](#)
- [C6] **A. Puranic**, J. Deshmukh, and S. Nikolaidis, "Learning from demonstrations using signal temporal logic," in *Proceedings of the 2020 Conference on Robot Learning (CoRL)*, ser. Proceedings of Machine Learning Research, vol. 155, PMLR, 2021, pp. 2228–2242. [Online]. Available: <https://proceedings.mlr.press/v155/puranic21a.html>

- [C7] S. Mohammadinejad, J. V. Deshmukh, and **A. G. Puranic**, “Mining environment assumptions for cyber-physical system models,” in *2020 ACM/IEEE 11th International Conference on Cyber-Physical Systems (ICCPs)*, 2020, pp. 87–97. DOI: [10.1109/ICCPs48487.2020.00016](https://doi.org/10.1109/ICCPs48487.2020.00016)
- [C8] S. Mohammadinejad, J. V. Deshmukh, **A. G. Puranic**, M. Vazquez-Chanlatte, and A. Donzé, “Interpretable classification of time-series data using efficient enumerative techniques,” in *Proceedings of the 23rd International Conference on Hybrid Systems: Computation and Control*, ser. HSCC '20, Sydney, New South Wales, Australia: Association for Computing Machinery, 2020, ISBN: 9781450370189. DOI: [10.1145/3365365.3382218](https://doi.org/10.1145/3365365.3382218) [Online]. Available: <https://doi.org/10.1145/3365365.3382218>
- [C9] A. Balakrishnan, **A. G. Puranic**, X. Qin, A. Dokhanchi, J. V. Deshmukh, H. Ben Amor, and G. Fainekos, “Specifying and evaluating quality metrics for vision-based perception systems,” in *2019 Design, Automation & Test in Europe Conference & Exhibition (DATE)*, 2019, pp. 1433–1438. DOI: [10.23919/DATE.2019.8715114](https://doi.org/10.23919/DATE.2019.8715114)

US Patents and Applications

- [I1] **A. G. Puranic**, J. V. Deshmukh, and S. Nikolaidis, “System and method for robot learning from human demonstrations with formal logic,” U.S. Patent 12 208 521, 2025.
- [I2] **A. G. Puranic**, B. Kim, and A. Nakamura, “Extracting temporal specifications of features for functional compatibility and integration with oems,” U.S. Patent 12 307 173, 2025.
- [I3] **A. G. Puranic** and B. Kim, “Distributed systems and extracting configurations for edge servers using driving scenario awareness,” U.S. Patent 11 394 612, 2022.
- [I4] **A. G. Puranic**, B. Kim, and A. Nakamura, “Methods and systems for processing traffic data from vehicles,” U.S. Patent Application 16548221 – *Pending*, 2021.

Posters/Abstracts

- [P1] **A. Puranic**, J. Deshmukh, and S. Nikolaidis, “Poster abstract: Learning from demonstrations with temporal logics,” in *25th ACM International Conference on Hybrid Systems: Computation and Control*, ser. HSCC '22, Milan, Italy: Association for Computing Machinery, 2022, ISBN: 9781450391962. DOI: [10.1145/3501710.3524914](https://doi.org/10.1145/3501710.3524914) [Online]. Available: <https://doi.org/10.1145/3501710.3524914>
- [P2] **A. Puranic**, J. Chen, J. Nguyen, J. Deshmukh, and A. Hung, “MP35-04 automated evaluation of instrument force sensitivity during robotic suturing utilizing vision-based machine learning,” *Journal of Urology*, vol. 201, no. Supplement 4, e505–e506, 2019. DOI: [10.1097/01.JU.0000555994.79498.94](https://doi.org/10.1097/01.JU.0000555994.79498.94) [Online]. Available: <https://www.auajournals.org/doi/abs/10.1097/01.JU.0000555994.79498.94>

Thesis

- [T] A. G. Puranic, “Sample-efficient and robust neurosymbolic learning from demonstrations,” Ph.D. Dissertation, University of Southern California, Los Angeles, CA, USA, May 2024.

Media/Press Appearances

- Learning-from-demonstrations using temporal logics featured in many of the major Computer Science news platforms:
 - [The RISKS Digest](#) by SRI’s Peter G. Neumann

- [ACM TechNews](#)
- [USC News](#)
- [USC Viterbi News](#)
- TQTL for vision-based perception systems in [USC Viterbi News](#)
- ACM SIGBED blog: [Robot Learning meets Formal Specifications: Designing Safer Embedded Software in the age of AI](#)

Invited Talks

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|------|---|
| 2025 | BT2Automata: Expressing Behavior Trees as Automata for Formal Control Synthesis
<i>19th International Conference on Reachability Problems (RP'25), Madrid, Spain</i> |
| 2024 | Sample-Efficient and Robust Neuro-Symbolic Learning from Demonstrations
<i>PRECISE Seminar Series, University of Pennsylvania</i> |
| 2021 | Reinforcement Learning from Demonstrations with Temporal Logics
<i>Galois, Inc.</i> |

Academic Service and Professional Activities

- Chair of *Robot Learning* selected paper oral presentation session at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2024.
- Program Committee (Poster and Demos):
 - [16th ACM/IEEE International Conference on Cyber-Physical Systems \(ICCPS\) 2025](#)
 - [26th ACM International Conference on Hybrid Systems: Computation and Control \(HSCC\) 2023](#)
- Review Editor for [Frontiers in Robotics and AI: Human-Robot Interaction](#)
- Volunteer for [32nd International Conference on Computer-Aided Verification \(CAV\) 2020](#)
- Refereed papers (reviewer) for the following journals and conferences (alphabetical):
 - ACM/IEEE International Conference on Human Robot Interaction (HRI): 2024
 - ACM International Conference on Hybrid Systems: Computation and Control (HSCC): 2023
 - European Control Conference (ECC): 2025
 - Frontiers in Robotics and AI (section Human-Robot Interaction): 2025
 - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS): 2021
 - IEEE International Conference on Robotics and Automation (ICRA): 2022, 2023, 2024
 - IEEE Robotics and Automation Letters (RA-L): 2021, 2022, 2023, 2024
 - IEEE Transactions on Computers (IEEE Trans. Comput.): 2020
 - IEEE Transactions on Cybernetics (IEEE Trans. Cybern.): 2023
 - IEEE Transactions on Intelligent Transportation Systems (T-ITS): 2020
 - International Journal of Robotics Research (IJRR): 2025
 - Learning for Dynamics & Control Conference (L4DC): 2023, 2025
 - Springer Nature - Autonomous Robots (AURO): 2022, 2023
 - Subreviewer/Delegated Reviewer:
 - * 2025: ICRA
 - * 2024: RSS Pioneers
 - * 2023: CAV, RSS, AAAI, EAAI
 - * 2022: ISRR
 - * 2021: ICRA, NeurIPS, DAC, ICCPS
 - * 2020: HRI, CDC, CAV, DAC, ICRA
 - * 2019: ICCPS, CLOUD

Technical Skills

- Programming: Python, MATLAB, \LaTeX , HTML
- AI/ML Frameworks: PyTorch, HuggingFace, Behavior Trees, OpenCV, JAX
- Simulators and robotics: Nvidia Isaac, PyBullet, MuJoCo, Gazebo, ROS2
- Formal Methods (verification, temporal logic and runtime monitors): RT-AMT, Breach, STaLiRo

Teaching Experience

- Fa 2025 **Module Instructor** - Robotics Project Laboratory (ENEE 467)
University of Maryland | College Park, MD, USA
- Class instructor: Calin Belta
- Sp 2025 **Module Instructor** - Formal Methods for Dynamical and Hybrid Systems (ENEE 769)
University of Maryland | College Park, MD, USA
- Class instructor: Calin Belta
- Fa 2022
Fa 2020 **Teaching Assistant** - Autonomous Cyber-Physical Systems (CSCI 513)
University of Southern California | Los Angeles, CA, USA
- Class instructor: Jyotirmoy V. Deshmukh
- Fa 2018 **Course Producer** - Introduction to Robotics (CSCI 445)
University of Southern California | Los Angeles, CA, USA
- Class instructor: Nora Ayanian
- Sp 2018 **Course Producer** - Robotics (CSCI 545)
University of Southern California | Los Angeles, CA, USA
- Class instructor: Stefan Schaal