

# Joshua R. Bhagat Smith

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## Education

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### Oregon State University

PhD Robotics and AI

Corvallis, OR

2020-2024

### University of Arkansas

MS Computer Science

Fayetteville, AR

2015-2017

### University of Arkansas

BS Computer Engineering

Fayetteville, AR

2011-2015

## Skills

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**Software/Tools:** C++ | Python | C# | Java | ROS2 | Pytorch | Pyro | Docker | DDS | ZeroMQ | AWS | Protobuf | MATLAB

**Technical Skills:** Machine Learning | Bayesian Inference | Reinforcement Learning | Modeling & Simulation | Optimization | Sensor Fusion | Human-Robot Interaction | Multi-Robot Systems

**Soft Skills:** Leadership | Cross-functional Collaboration | Effective Communication | Technical Writing | Critical Thinking | Time Management | Research Presentation | Mentoring

## Professional Experience

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### AI & ML Lead Engineer, Peraton

2024-

- Autonomy R&D team, developing novel autonomy capabilities for multi-robot systems.
  - Built a prototype agent communication language enabling the interoperability of autonomy frameworks.
  - Developed modeling and simulation infrastructure for uncrewed underwater vehicle to facilitate more in-depth evaluation of multi-robot systems, prior to deployment.
- Researched reinforcement learning techniques for safe, adaptive control laws for the DARPA LINC program.

### Graduate Research Assistant, Oregon State University

2020-2024

- Led technical efforts for several projects focused on multi-robot systems and human-robot interaction.
- Adaptive Workload Estimation for Human-Robot Teams
  - Created an novel human state estimation system that leverages wearable sensors and Bayesian meta-learning to model the dynamics of cognitive workload.
  - Led a team of five researchers in training machine learning models, programming autonomous robots, and developing real-time physiological signal processing software.
- Transparent Management of Robot Swarm using Graph-based Dynamic Models
  - Developed human-swarm interface that allowed a single human to simultaneously control four robot swarms each containing 200 agents.
  - Enhanced transparency of the system by leveraging a heuristic prediction and a discrete-time Markov chain algorithm to inform users about the swarm's long-term behavior.
- Multi-Vehicle Management for Drone Delivery Systems
  - Collaborated to design and conduct human subject evaluations to establish appropriate performance parameters for human supervision of multiple uncrewed aircraft (i.e., 500+).

### Senior Software Engineer, HERE Technologies

2017-2020

- Highly Autonomous Driving group. Our team built an automated, high-accuracy map to enable autonomous driving functionality from large scale vehicle sensor systems.
- Assisted in designing machine learning and statistical models of vehicle sensor data.
- Developed cloud infrastructure to scale data processing to analyze millions of kilometers daily.

### Research Intern, NASA Langley Research Center

Summer 2016

- Research near-ground UAV navigation methods to avoid fixed obstacles such as trees or power lines.

## Publications

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### UNPUBLISHED MANUSCRIPTS (IN PREP. OR UNDER REVIEW):

- J. Bhagat Smith**, J.A. Adams. "Improving Cross-task Workload Estimation with Bayesian Meta-Learning", IEEE Transactions on Human Machine Systems, 2025. (In Prep).
- J. Bhagat Smith**, P. Baskaran, J.A. Adams. "Influence of Honeybee Inspired Drifter Agents." PloS one, 2025. (In Review).
- J. Bhagat Smith**, J.A. Adams. "A Survey of Machine Learning for Estimating Workload: Considering Unknown Tasks", in Journal of Cognitive Engineering and Decision Making, 2025. (In Review).
- J. Bhagat Smith**, J.A. Adams. "Adaptive Workload Modeling for Unknown Tasks", ACM Transactions on Human-Robot Interaction, 2025. (In Preparation).

### PEER REVIEWED PUBLICATIONS:

- J.A. Adams, C.A. Sanchez, V. Mallampati, **J. Bhagat Smith**, E. Burgess, A. Dassonville (2024). OSU-Wing PIC Phase I Evaluation: Baseline Workload and Situation Awareness Results. arXiv preprint arXiv:2411.18750.
- J. Bhagat Smith**, M.R. Giolando, V. Mallampati, P. Baskaran, J.A. Adams. "Experimental Design Principles for Develop Machine Learning Models for Human-Robot Interaction", Springer Nature, Discovering Frontiers in Human-Robot Interaction, 2024.
- J. Bhagat Smith**, P. Baskaran, J.A. Adams. "Improving Transparency in Human-Collective Visualizations", *IEEE International Symposium on Robot and Human Interactive Communication*, Pasadena, CA, USA, pp. 1-7 2024.
- J. Bhagat Smith**, V. Mallampati, P. Baskaran, M.R. Giolando, J.A. Adams, 'Design Principles for Building Robust Human-Robot Interaction Machine Learning Models', in *Companion of the ACM/IEEE International Conference on Human-Robot Interaction*, Late Breaking Report, 2024
- F. Aderinto\*, **J. Bhagat Smith\***, M.R. Giolando, P. Baskaran, J.A. Adams, 'Improving Human-Robot Team Transparency with Eye-tracking based Situation Awareness Assessmen', in *Companion of the ACM/IEEE International Conference on Human-Robot Interaction*, Late Breaking Report, USA, 2024 [**Best LBR Nominee**]
- J. Bhagat Smith\***, S.A Toribio\*, P. Baskaran, J.A. Adams. "Uncertainty-Aware Visual Workload Estimation for Human-Robot Teams" in *Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA)*, Philadelphia, PA, USA, 2023, pp. 1-8
- J. Bhagat Smith**, P. Baskaran and J. A. Adams, "Decomposed Physical Workload Estimation for Human-Robot Teams," IEEE International Conference on Human-Machine Systems (ICHMS), Orlando, FL, USA, 2022, pp. 1-6
- P. Baskaran, , **J. Bhagat Smith**, J.A. Adams. "Visual Task Recognition for Human-Robot Teams" in *IEEE International Conference on Human-Machine Systems*, Orlando, FL, USA, 2022, pp. 1-6
- A. Moore, M. Schubert, T. Fang, **J. Smith**, N. Rymer. "Lidar-derived Navigational Geofences for Low Altitude Flight Operations," in *AIAA AVIATION FORUM*, Virtual Event, 2020.
- A. Moore, M. Schubert, S. Balachandran, M. Consiglio, C. Munoz, **J. Smith**, D. Lewis, P. Schneide. "Inspection of Electrical Transmission Structures with UAV Path Conformance and Lidar-based Geofences," in *2018 IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT)*, Washington, DC, USA, 2018, pp. 1-5. 2018.
- J. Smith**, M. Gashler. "An Investigation of How Neural Networks Learn from the Experiences of Peers Through Periodic Weight Averaging," in *IEEE International Conference on Machine Learning and Applications (ICMLA)* Cancun, Mexico, 2017, pp. 731-736

## Mentoring

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### Mentees:

- 2024 **Vivek Mallampati**, Junior PhD student, OSU
- 2024 **Favour Aderinto**, Junior PhD student, OSU
- 2023 **Robert Lucas**, Undergraduates Research Assistant, OSU
- 2022 **Simone Angelo S. Toribio**, Research Experience for Undergraduates Student, OSU