# Joshua R. Bhagat Smith

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## Education

**Oregon State University**                                                                                  Corvallis, OR
PhD Robotics and AI (GPA: 3.9/4.0)                                                                                    2020-
- Advisor: Dr. Julie A. Adams
- Dissertation: "Adaptive Workload Estimation for Human-Robot Teams"

**University of Arkansas**                                                                                Fayetteville, AR
MS Computer Science (GPA: 3.8/4.0)                                                                               2015-2017

**University of Arkansas**                                                                                Fayetteville, AR
BS Computer Engineering (GPA: 3.3/4.0)                                                                           2011-2015
- Minors in Math, Physics

## Professional Experience

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|----------:|------------------------------------------------------------------------------------|
| 2023-     | **Lab Manager**, Oregon State University, Human Machine Teaming Lab                 |
| 2020-     | **Graduate Research Assistant**, Oregon State University, Human Machine Teaming Lab |
| 2017-2020 | **Senior Software Engineer**, HERE Technologies                                     |
| 2016      | **Research Intern**, Dynamic Systems and Controls Branch, NASA Langley Research Center |

## Technical Skills

- **Programming Languages:** Python, C++, Java, C#, Scala

- **Software Tools:** Pytorch, ROS, Pandas, AWS, Scipy/Numpy, Git, CUDA

- **ML Techniques:** Non-IID Machine Learning, Bayesian Inference, Deep Learning, Reinforcement Learning

## Research Experience

**Oregon State University - Robotics**                                                                        Corvallis, OR
Advisor: Dr. Julie A. Adams                                                                                           2020-
- Dissertation: "Adaptive Workload Estimation for Human-Robot Teams"
  - Created an innovative human state estimation system, applying non-IID machine learning to estimate a human's workload for unknown tasks (i.e., under distribution shift) in real-time.
  - Led a team of five researchers in building real-time physiological signal processing software, conducting human-subject studies, creating machine learning models, and programming autonomous robots.

- NASA Project: "Multi-UAV Management"
  - Collaborated with three researchers to design human subject evaluations that sought to establish appropriate human-to-robot ratios for remote multi-UAV supervision.
  - Analyzed human factors and hardware considerations required to develop a Concept of Operations outlining criteria for a Mutli-UAV system to monitor for signs of wildland fire.

- ONR Project: "Transparent Management of Hub-based Colonies using a Graph-based Dynamic Model"
  - Enhancing human-swarm interface by incorporating a heuristic prediction algorithm informing operators of the long-term impact of their actions.

- DARPA Project: "Resilient Emergent Properties for Autonomous Agent InteRactions"
  - Created novel swarm agent algorithm that utilized density estimation to evaluate behavioral characteristics of foreign agents, to prevent them from influencing a swarm's decision making algorithms.

**HERE Technologies**                                                        Boulder, CO
Supervisor: Dr. Jake Anderson                                                2017-2020
- Lane Topology Optimization Team
    – Scaled HD mapping algorithms for self-driving cars to update all of North America every 5 minutes.

**NASA Langley Research Center - Dynamic Systems and Controls Branch**        Hampton, VA
Advisor: Dr. Andrew Moore                                                     Summer 2016
- Project: "UAV Inspection of Electrical Transmission Structures"
    – Developed a clustering algorithms of LIDAR data to generate geofences around electrical power lines.

**University of Arkansas - Computer Science**                                Fayetteville, AR
Advisor: Dr. Michael Gashler                                                  2015-2017
- Thesis: "How neural networks learn from the experiences of peers through periodic weight averaging."
    – Investigated the impact of communication topologies had on federated learning algorithms.

## Selected Publications

*UNPUBLISHED MANUSCRIPTS (IN PREP. AND UNDER REVIEW):*

**J. Bhagat Smith**, J.A. Adams. "Towards Workload Estimation for Unknown Tasks: A Survey of Non-IID Machine Learning for HRI," in IEEE Transactions on Cognitive and Developmental Systems, 2023. (In Review).

**J. Bhagat Smith**, P. Baskaran, M.R. Giolando, J.A. Adams. "Experimental Design Principles for Develop Machine Learning Models for HRI", Springer Nature, 2024. (In Preparation).

**J. Bhagat Smith**, P. Baskaran, J.A. Adams. "Improving Transparency in Human-Collective Visualizations" IEEE Transactions on Human-Machine Systems, 2024. (In Preparation).

*PEER REVIEWED CONFERENCE PAPERS:*

**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, 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

2023  **Robert Lucas**, Undergraduates Research Assistant, OSU
2022  **Simone Angelo S. Toribio**, Research Experience for Undergraduates Student, OSU