

Joshua R. Bhagat Smith

☎ +1 501-499-2407 | ✉ bhagatsj@oregonstate.edu | 🏠 jbs023.github.io

Education

Oregon State University

PhD Robotics and AI (GPA: 3.9/4.0)

- Advisor: Dr. Julie A. Adams
- Dissertation: "Adaptive Workload Estimation for Human-Robot Teams"

Corvallis, OR

2020-current

University of Arkansas

MS Computer Science (GPA: 3.8/4.0)

- Advisor: Dr. Michael Gashler
- Thesis: "How neural networks learn from the experiences of peers through periodic weight averaging."

Fayetteville, AR

2015-2017

University of Arkansas

BS Computer Engineering (GPA: 3.3/4.0)

- Minors in Math, Physics

Fayetteville, AR

2011-2015

Professional Experience

2023- **Lab Lead**, 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

Skills

- **Technical Skills:** Python | C++ | Java | C# | Scala | Pytorch | ROS | Pandas | AWS | Scipy/Numpy | Git | CUDA | Machine Learning | Bayesian Inference | Distribution Shift | Meta-Learning | Deep Learning | Reinforcement Learning | Experimental Design
- **Soft Skills:** Time Management | Effective Communication | Collaboration | Critical Thinking | Technical Writing | Research Presentation | Mentoring | Leadership

Research Experience

Oregon State University - Robotics/Artificial Intelligence

Advisor: Dr. Julie A. Adams

Corvallis, OR

2020-current

- Dissertation: "Adaptive Workload Estimation for Human-Robot Teams"
 - Created an innovative human state estimation system by 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.
- "Multi Vehicle Management", Sponsor: Universities Space Research Agency
 - Collaborated to design and conduct human subject evaluations to establish appropriate performance parameters for human supervision of multiple uncrewed aircraft operating beyond visual line of sight.
 - Analyzed human factors and hardware considerations required to develop a Concept of Operations outlining criteria for a multi-uncrewed aircraft system monitoring for signs of early wildland fire.

- “Transparent Management of Hub-based Colonies using a Graph-based Dynamic Model”, Sponsor: Office of Naval Research
 - Enhance a human-swarm interface by incorporating a heuristic prediction algorithm that informed operators of the long-term impact of their actions.
- “Resilient Emergent Properties for Autonomous Agent Interactions”, Sponsor: Defense Advanced Research Projects Agency
 - Evaluated a novel swarm agent algorithm that utilized density estimation to evaluate behavioral characteristics of adversarial agents to prevent them from influencing a swarm’s decision making.

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: “Unmanned Aerial Vehicle Inspection of Electrical Transmission Structures”
 - Developed clustering algorithms of light detection and ranging 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.

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, 2024. (In Review).
- J. Bhagat Smith**, P. Baskaran, J.A. Adams. “Improving Transparency in Human-Collective Visualizations”, IEEE International Symposium on Robot and Human Interactive Communication, 2024. (In Preparation).
- J. Bhagat Smith**, J.A. Adams. “Improving Cross-task Workload Estimation with Meta-Learning”, IEEE Transactions on Human Machine Systems, 2024. (In Preparation).
- J. Bhagat Smith**, P. Baskaran, M.R. Giolando, V. Mallampati, J.A. Adams. “Experimental Design Principles for Develop Machine Learning Models for HRI”, Springer Nature, Emerging Frontiers in Human-Robot Interaction, 2024. (In Preparation).
- J. Bhagat Smith**, J.A. Adams. “Adaptive Workload Modeling for Unknown Tasks”, ACM Transactions on Human-Robot Interaction, 2024. (In Preparation).

PEER REVIEWED CONFERENCE PAPERS:

- 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 Assessment’, 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_____

Responsibilities

- Designed, planned, and supervised undergraduate research projects.
- Reviewed, edited, and provided guidance on research papers.
- Organized lab working groups to educate younger students on technical concepts, software engineering tools and best practices, and skills for navigating research projects efficiently.

Mentees:

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