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

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:

S.A Toribio*, **J. Bhagat Smith***, 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