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
- Advisor: Dr. Michael Gashler

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 Cloud Infrastructure Engineer**, HERE Technologies
2016	**Research Intern**, Dynamic Systems and Controls Branch, NASA Langley Research Center

Research/Work Experience

Oregon State University - Robotics   Corvallis, OR
Advisor: Dr. Julie A. Adams   2020-
- Dissertation: "Adaptive Workload Estimation for Human-Robot Teams"
  - Created innovative human state estimation system, applying non-IID machine learning to estimate workload for unseen tasks (i.e., under distribution shift) in real-time.
  - Led a team of 3 researchers conducting large human-subject evaluations (i.e., 50+ subjects), built physiological sensor processing software, implemented autonomous robot capabilities (e.g., navigation, interaction).

- NASA Project: "Multi-UAV Management"
  - Collaborated with 3 others researchers to design human subject evaluations in order to determine ideal 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"
  - Improved human-swarm interface by visualizing a novel swarm prediction algorithm, enabling a single human to control four groups of 200 robots.

- DARPA Project: "Resilient Emergent Properties for Autonomous Agent InteRactions"
  - Implemented large scale robotic swarm simulations (i.e., 50,000+ simulations)
  - 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 map building algorithms for self-driving cars to update all of North America's maps every 5 minutes.

NASA Langley Research Center - Dynamic Systems and Controls Branch Hampton, VA
Advisors: Dr. Andrew Moore   Summer 2016
- Project: "Lidar-based Geofences for UAV Inspection of Electrical Transmission Structures"
    - Developed a clustering algorithms to generate geofences for UAVs inspecting electrical power lines.

University of Arkansas - Computer Science   Fayetteville, AR
Advisors: Dr. Michael Gashler   2015-2017
- Thesis: "An investigation of how neural networks learn from the experiences of peers through periodic weight averaging."
    - Investigated impact of five communication topologies had on early federated learning algorithms.

Publications

Peer-Reviewed Conference Papers:

J. Bhagat Smith, P. Baskaran, J.A. Adams. "Uncertainty-Aware Visual Workload Estimation for Human-Robot Teams" in *Proc. IEEE Conference on Cognitive and Computational Aspects of Situation Management*, 2023.

J. Bhagat Smith, P. Baskaran, J.A. Adams. "Decomposing Physical Workload Estimation for Human-Robot Teams" in *Proc. IEEE International Conference on Human-Machine Systems*, 2022.

P. Baskaran, , *J. Bhagat Smith*, J.A. Adams. "Visual Task Recognition for Human-Robot Teams" in *Proc. IEEE International Conference on Human-Machine Systems*, 2022.

A. Moore, M. Schubert, T. Fang, *J. Smith*, N. Rymer. "Lidar-derived navigational geofences for low altitude flight operations," in *Proc. 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 *Proc. of IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT)* Singapore. 2018.

J. Smith, M. Gashler. "An investigation of how neural networks learn from the experiences of peers through periodic weight averaging," in *Proc. IEEE International Conference on Machine Learning and Applications (ICMLA)* Cancun, Mexico. 2017.

Journal Articles In Preparation:

J. Bhagat Smith, P. Baskaran, J.A. Adams. "Influence of Honeybee Inspired Drifter Agents." PloS one, 2023.

J. Bhagat Smith, P. Baskaran, J.A. Adams. "Improving Transparency in Human-Collective Visualizations" IEEE Transactions on Human-Machine Systems, 2023.

J. Bhagat Smith, P. Baskaran, M.R. Giolando, J.A. Adams. Principles for Designing Complex HRI Evaluations", ACM Transactions on Human Robot Interaction, 2023.

J. Bhagat Smith, J.A. Adams. "Towards Task-aware Workload Estimation: A Survey of Non-IID Machine Learning for HRI," in IEEE Transactions on Cognitive and Developmental Systems, 2023.

Technical Skills

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

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

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

Mentoring

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