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, 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