

Sangwon Seo

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Research Objectives

My research centers on Human-Robot Collaboration, Human-Centered AI, and Human Behavior Modeling. During my PhD, I developed imitation/reinforcement learning algorithms that can learn more general agent policies from diverse human behaviors, and an AI-based coaching algorithm that improves human-human and human-robot(AI) teamwork.

Education

Rice University, Houston, TX

Aug 2019 – Present

Ph.D. in Computer Science

- Thesis (Tentative): AI-Assisted Teamwork

Seoul National University, Seoul, South Korea

Mar 2013 – Feb 2015

M.S in Bioengineering

- Thesis: Performance Enhancement in Heart Rate Variability Analysis with Constrained Missing RR Interval Estimation

Seoul National University, Seoul, South Korea

Mar 2009 – Feb 2013

B.S. in Electrical and Computer Engineering

- Thesis: Multiplexing of Bead-Based Immunoassays using a BioMEMS

Research Experience

Human-Centered AI and Robotics Group, Rice University

Aug 2020 – Present

Ph.D. Candidate (Advisor: Prof. Vaibhav Unhelkar)

- Proposed an automated task-time intervention system to improve teamwork during tasks
- Developed sample- and label-efficient imitation learning algorithms to learn a generative model of team behavior
- Developed a hierarchical imitation learning algorithm to learn the intentional behavior of experts from demonstrations
- Implemented multiple web-based teamwork simulators

Biomedical Signal and Information Lab, Seoul National University

Feb 2013 – Feb 2015

M.S Student (Advisor: Prof. Kwang Suk Park)

- Developed signal processing algorithms for daily monitoring of physiological signals
- Developed autoregressive-moving-average-based interpolation methods to fill in missing RR-interval values to enhance heart rate variability analysis

Biophotonics and Nano Engineering Lab, Seoul National University

Dec 2011 – Jun 2012

Research Intern (Advisor: Prof. Sunghoon Kwon)

- Designed and implemented biomedical microelectromechanical systems (Bio-MEMS)

Industry Experience

Honda Research Institute USA, San Jose, CA

May 2024 – Aug 2024

Research Intern

- Human behavior modeling and optimization for human-aware automation
- Developed mathematical models to capture changes in human propensities for interacting with other agents and learned these models from demonstrations.
- Inferred individual interaction propensities with other agents from observable states and actions using sequential Monte Carlo methods

Coreline Soft, Seoul, South Korea

Apr 2016 – Jun 2019

Associate Research Engineer

- Responsible for developing algorithms for AVIEW MODELER, a medical 3D printing solution
- Developed geometric modeling and processing algorithms
- Implemented a volume and surface rendering pipeline

Agency for Defense Development, Daejeon, South Korea
Researcher

Mar 2015 – Mar 2016

- Developed a telemetry system for aircraft

* My employment at the Agency for Defense Development and Coreline Soft is recognized as fulfilling the military service in South Korea.

Publications

- **S. Seo** and V. V. Unhelkar, "IDIL: Imitation Learning of Intent-Driven Expert Behavior", *23rd International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2024 (Acceptance rate 25%)
- **S. Seo**, "AI-Assisted Human Teamwork", *AAAI-24 Doctoral Consortium*, 2024
- **S. Seo**, B. Han and V. V. Unhelkar, "Automated Task-Time Interventions to Improve Teamwork using Imitation Learning", *22nd International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2023 (Acceptance rate 23.3%)
- **S. Seo** and V. V. Unhelkar, "Semi-Supervised Imitation Learning of Team Policies from Suboptimal Demonstrations", *31st International Joint Conference on Artificial Intelligence (IJCAI)*, 2022 (Acceptance rate 14.9%)
- **S. Seo**, L. R. Kennedy-Metz, M. A. Zenati, J. A. Shah, R. D. Dias and V. V. Unhelkar, "Towards an AI coach to infer team mental model alignment in healthcare", *2021 IEEE Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA)*, pp. 39-44, 2021
- S. Kwon, D. Lee, J. Kim, Y. Lee, S. Kang, **S. Seo** and K. Park, "Sinabro: A smartphone-integrated opportunistic electrocardiogram monitoring system", *Sensors*, 16(3), p.361, 2016
- S. H. Hwang, **S. Seo**, H. N. Yoon, H. J. Baek, J. Cho, J. W. Choi, Y. J. Lee, D.-U. Jeong and K. Park, "Sleep period time estimation based on electrodermal activity", *IEEE journal of biomedical and health informatics (J-BHI)*, 21(1), pp.115-122, 2015
- S. Kang, S. Kwon, C. Yoo, **S. Seo**, K. Park, J. Song and Y. Lee, "Sinabro: Opportunistic and unobtrusive mobile electrocardiogram monitoring system", *15th Workshop on Mobile Computing Systems and Applications (HotMobile)*, pp. 1-6, 2014
- J. Kim, S. Kwon, **S. Seo** and K. Park, "Highly wearable galvanic skin response sensor using flexible and conductive polymer foam", *36th annual international conference of the IEEE engineering in medicine and biology society (EMBC)*, pp. 6631-6634, 2014

Working / Under-review Papers

- **S. Seo** and V. V. Unhelkar, "Imitation Learning of Diverse Team Behavior from Heterogeneous Demonstrations", *Under Review*
- **S. Seo**, B. Han, R. E. Harari, R. D. Dias, M. A. Zenati, E. Salas and V. V. Unhelkar, "Socratic: Enhancing Human Teamwork via AI-enabled Coaching", *Under Review*
- Z. Qian, **S. Seo**, and V. V. Unhelkar, "Learning Human Preferences for Agent Behavior using Demonstrations and Large Language Models"

Honors & Awards

National Scholarship for Science and Engineering, Korea Student Aid Foundation

Mar 2009

Teaching Experience

Teaching Assistant

COMP 646: Deep Learning for Vision and Language (Prof. Vicente Ordóñez-Román) *Spring 2023*

COMP 440/557: Artificial Intelligence (Prof. Devika Subramanian) *Fall 2021*

Advising & Mentoring

Arnav Adhikari, Highschool Student, Houston, TX

May 2023 – Dec 2023

Bing (Tim) Han, Undergraduate Student, Rice University

May 2022 – May 2024

Zhanyi Sun, Undergraduate Student, Rice University

Jan 2022 – Jun 2022

Reviewer

International Conference on Autonomous Agents and Multiagent Systems (AAMAS)

International Conference on Advanced Robotics and Its Social Impacts (ARSO)

Robotics and Automation Letters (RA-L)

International Conference on Robotics and Automation (ICRA)

Skills

PROGRAMMING LANGUAGES	Python C C++ Javascript HTML SQL Matlab LaTeX
FRAMEWORKS & LIBRARIES	OpenGL OpenMP Flask Gym PyTorch Tensorflow WandB
SOFTWARE DEVELOPMENT	Git Docker CMake VSCode Jupyter
ROBOT DEVELOPMENT	Motion Capture (OptiTrack) ROS MoveIt OMPL
LANGUAGES	English Korean

Extra

AAMAS Student Volunteer

2023

Student Venture Network, Seoul National University

Mar 2012 – July 2012

College of Engineering Tennis Club, Seoul National University

Mar 2010 – Feb 2013

System Administrator, ECE Department, Seoul National University

Mar 2010 – Feb 2011

SNU Mentoring, Seoul National University

Sep 2009 – Feb 2010