# Sangwon Seo

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## About Me

My research focuses on *Generative Models of Human Behavior*, *Human-Robot Collaboration*, and *AI-Assisted Decision Making*. During my PhD, I developed *imitation/reinforcement learning* algorithms capable of learning generalized agent policies from diverse human behaviors, as well as an *AI-driven team coaching system* that automatically analyzes and enhances teamwork in real time. I have published multiple first-author papers at top AI conferences.

I have strong programming skills, honed through hands-on experience at a medical AI startup before starting my PhD, where I developed commercial software for 3D medical image modeling. I highly value code maintainability and reproducibility. I firmly believe that these practices enable much faster development in the long run.

## 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

## Experience

**Honda Research Institute USA**, San Jose, CA — *May 2024 – Aug 2024*
Research Intern
- Job Description: 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

**Human-Centered AI and Robotics Group**, Rice University, Houston, TX — *Aug 2020 – Present*
Ph.D. Candidate (Advisor: Prof. Vaibhav Unhelkar)
- Proposed a team coaching AI algorithm to improve teamwork in real time 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 teamwork simulators and research tools
- Implemented a web-based interactive experiment framework and conducted human subject experiments

**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 — *Mar 2015 – Mar 2016*

Researcher

- Developed a telemetry system for aircraft

**Biomedical Signal and Information Lab**, Seoul National University *Feb 2013 – Feb 2015*
M.S Student (Advisor: Prof. Kwang Suk Park)

- Developed signal/image processing algorithms for daily monitoring of physiological signals
- Developed autoregressive moving average-based interpolation methods to enhance heart rate variability analysis corrupted with missing measurements

* 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", *23nd 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

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|---|---|
| **Programming Languages** | Python \| C \| C++ \| Javascript \| HTML \| Matlab |
| **Frameworks & Libraries** | OpenGL \| Flask \| PyBullet \| PyTorch \| Tensorflow |
| **Software Development** | Git \| Docker \| CMake \| Shell Script \| 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*