

# Sangwon Seo

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## Research Objectives

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My research centers on Human-Robot Collaboration, Human-Centered AI, and Human Behavior Modeling. During my Ph.D., I have developed imitation learning algorithms to model human behavior and computational methods to improve both human-human and human-robot teamwork.

## Education

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- 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

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- 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

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- 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 compulsory military service in South Korea.

## Publications

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### Full Papers

- **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**, 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

### Short Papers

- **S. Seo**, "AI-Assisted Human Teamwork", *AAAI-24 Doctoral Consortium*, 2024
- M. Khalid, **S. Seo**, M. A. Zenati, M. Ebnali, L. R. Kennedy-Metz, R. D. Dias, V. V. Unhelkar and E. Salas, "Opportunities and Challenges of Real-Time Measurement of Team Performance on the Cardiac Operating Room", *Human Factors and Ergonomics Society (HFES) 67th International Annual Meeting*, 2023
- 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

## Honors & Awards

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**National Scholarship for Science and Engineering**, Korea Student Aid Foundation

Mar 2009

## Teaching Experience

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### 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 – Present*  
**Bing (Tim) Han**, Undergraduate Student, Rice University *May 2022 – Present*  
**Zhanyi Sun**, Undergraduate Student, Rice University *Jan 2022 – Jun 2022*

## Reviewer

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

## Extra

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**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*