SOHEIL HABIBIAN

Curriculum Vitae

Email: habibian@vt.edu
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Research Interests

Robot learning, human-robot teams, and artificial intelligence.

Education

May 2024 (expected) **Virginia Polytechnic Institute and State University**
Ph.D. Student, Mechanical Engineering

January 2020 **Bucknell University**
M.Sc. Mechanical Engineering
Thesis: "Analysis and Control of Fiber-Reinforced Elastomeric Enclosures (FREEs)"

June 2015 **Qazvin Azad University (QIAU)***
B.Sc. Mechanical Engineering
Honors Thesis: "Design and Implementation of a Tele-operative Response Robot"

* QIAU organizes the International IranOpen RoboCup competition and has established the Mechatronics Research Laboratory (MRL) as one of the outstanding independent robotics research centers in Iran.

Research Experience

2020-Present **Collaborative Robotics Lab, Virginia Tech**
Advisor: Dylan P. Losey

- Created a communicative supervised learning framework to help novice robot users to enhance teaching tasks through kinesthetic demonstrations
- Implemented a representation learning approach using recurrent neural networks to enable robots robustly influence new human partners
- Developed a Bayesian-based optimization approach for encouraging human participation in robot teams by incorporating fairness and legibility of subtask allocations
- Developed an active preference-based learning algorithm for transparent robot teaching

2017-2020 **Integrated Design Manufacturing Robotics Lab, Bucknell University**
Advisor: Keith W. Buffinton

- Developed a dynamic lumped-parameter model and a finite element model to study the practicability of a fiber-reinforced soft robotic actuator for use in robotic arms
- Developed a controller-based trajectory following algorithm for the soft actuator
- Conducted workspace analysis for a module of multiple soft actuators using FEA

2011-2017 **Advanced Mobile Robotics Lab, Qazvin Azad University**
Advisor: Prof. Farshid Najafi

- Managed projects and led an engineering team of 10+ to design and develop mobile response robots for real-life rescue missions.
- Designed and implemented a compact 7-DoF robot arm for dexterous mobile manipulation
- Designed and implemented a tele-operative response robot for hazardous environments
- Developed a lightweight throwable two-wheeled robot for reconnaissance missions

Publications and Presentations

Papers

Antonio Alvarez Valdivia, **Soheil Habibian**, Carly A. Mendenhall, Francesco Fuentes, Ritish Shailly, Dylan P. Losey, and Laura H. Blumenschein, "Wrapping Haptic Displays Around Robot Arms to Communicate Learning," *arXiv preprint*: https://doi.org/10.48550/arXiv.2207.03315.

S. Parekh, **S. Habibian**, D. P. Losey, "RILI: Robustly influencing latent intent," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022. [just accepted]

S. Habibian, D. P. Losey, "Encouraging Human Interaction with Robot Teams: Legible and Fair Subtask Allocations," *IEEE Robotics and Automation Letters*, 2022.

S. Habibian, A. Jonnavittula, D. P. Losey, "Here's What I've Learned: Asking Questions that Reveal Reward Learning," *ACM Transactions on Human-Robot Interaction*, 2022.

M. Dadvar, **S. Habibian**, "Contemporary Research Trends in Response Robotics," *ROBOMECH Journal*, 2022.

S. Habibian, B. B. Wheatley, S. Bae, J. Shin, K. W. Buffinton, "Evaluation of Two Complementary Modeling Approaches for Fiber-Reinforced Soft Actuators," *ROBOMECH Journal*, 2022.

S. Habibian, M. Dadvar, "Design and Implementation of a Maxi-Sized Rescue Robot (Karo) for Rescue Missions," *ROBOMECH Journal*, 2021.

K.W. Buffinton, B. B. Wheatley, **S. Habibian**, J. Shin, Brielle H. Cenci, and A. E. Christy, "Investigating the Mechanics of Human-Centered Soft Robotic Actuators with Finite Element Analysis," *IEEE International Conference on Soft Robotics (RoboSoft)*, 2020.

F. Najafi, M. Dadvar, **S. Habibian**, et al., "Team Description Papers of Rescue Robots," *In Proceedings of the International Symposium of RoboCup*, 2018.

Thesis

S. Habibian, "Analysis and Control of Fiber-Reinforced Elastomeric Enclosures (FREEs)," *Master's thesis submitted to the Department of Mechanical Engineering - Bucknell University*, 2019.

Conference

"Leveraging Roles in Robot Teams to Encourage Human Participation" *Southeast Controls Conference*, 2021.

Poster

"Finite Element Analysis of Fiber Reinforced Elastomeric Enclosures (FREEs)," *3rd Toyota Research Institute Workshop*, 2019.

Awards and Fellowships

2017-9 Granted **Full Scholarship**, M.Sc. Mechanical Engineering, Bucknell University.

2018 Granted **Graduate Summer Research Fellowship**, Graduate Studies, Bucknell University.

2018 **2nd Place** & Best-in-Class Dexterity, Rescue Robot League, RoboCup Competition, Canada.

2017 **3rd Place**, Rescue Robot League, RoboCup Competition, Japan.

2013-7 **1st Places**, Rescue Robot League, IranOpen Competitions.

2013-7 Best-In-Class Mobility, Autonomy, Dexterity, Rescue Robot League, IranOpen Competitions.

2016 **2nd Place** & Best-in-Class Exploration, Rescue Robot League, RoboCup Competition, Germany.

2015 **1st Place**, Rescue Robot League, RoboCup Competition, China.

2014 **2nd Place** and Best-in-Class Mobility, Rescue Robot League, RoboCup Competition, Brazil.

2012 **1st Place**, Rescue Robot League, World RoboCup Competition, Mexico.

Professional Services

2020 - 2021 **Committee Member, ASTM Subcommittee E54.09**
Established terminologies for standard test methods and guides for evaluating response robots

2015-2017 **Technical Committee Member, IranOpen RoboCup Competitions**
Co-organized competitions for objective performance evaluations of rescue robot teams

2014-2017 **Group Leader, Advanced Mobile Robotics Lab**
Organized projects and supervised trainee students to design and implement mobile robots

Reviewer

- ROBOMECH Journal
- Journal of Field Robotics
- Journal of Intelligent & Robotic Systems
- International Journal of Advanced Robotic Systems
- IEEE RAS International Conference on Soft Robotics (RoboSoft)
- IEEE International Conference on Intelligent Robots and Systems (IROS)

Industrial Training Courses

2012 Introduction to Hydraulics-H511, FESTO Co., Iran, October 7th -10th.

2012 Modern Industrial Pneumatics-PN111, FESTO Co., Iran, October 21st-24th.

2010 Lathe Machine Operation, Vocational Training Organization, Iran, December 5th.

Skills

Python, PyTorch, TensorFlow, PyBullet, ROS, SPSS, MATLAB, SolidWorks, ABAQUS, MasterCam, LabVIEW, LaTeX

Teaching Experience

Fall 2020, Spring 2021 **Mechanical Engineering Dept., Virginia Tech**
Graduate Student Instructor, Mechanical Design Lab

Fall 2017, Spring 2019 **Mechanical Engineering Dept., Bucknell University**
Graduate Student Instructor, Mechanical Design
Graduate Student Instructor, Manufacturing Processes
Graduate Student Instructor, Renewable Energy Conversion

Campus Involvements

2019 **Engineering Camp Counselor,** Summer Engineering Camp Program, Bucknell University

2018 **International Orientation Assistant**, International Student Orientation, Bucknell University

2018 **Journal Organizing Project Assistant**, Bertrand Library, Bucknell University