Thomas R Groechel

Contact Information

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Research Interests

Computational Modeling for Human-Machine Interaction, Virtual and Augmented Reality, Socially Assistive Robotics

Education

University of Southern California, Los Angeles, CA *July 2018 - Present*
- Ph.D. Computer Science: *Expected May 2023*
- Masters Computer Science: *Completed Aug 2020*
- Research Advisor: Professor Maja J. Matarić

University of Michigan, Ann Arbor, MI *Sep 2014 - May 2018*
- B.S.E. Computer Science: *Completed May 2018*
- Undergraduate Research Advisor: Professor Odest C. Jenkins

Experience

Ph.D. Researcher, USC Interaction Lab, Los Angeles, CA *July 2018 - Present*
- Created mixed reality robot tutor aiming to teach K-12 students coding through modeling student kinesthetic learning processes
- Developed and deployed telepresence robots in schools for home-bound students
- Supported month-long in-home deployments of robot tutor for students with Autism Spectrum Disorder

UG Researcher, UofM 4Progress Lab, Ann Arbor, MI *May 2016 - May 2018*
- Developed 2D SLAM algorithm using Iterative Closest Point visualization
- Implemented Stochastic Gradient Descent for loop closure based on *Fast Iterative Alignment of Pose Graphs with Poor Initial Estimates* (Olson et al.) using the Fetch

Staff Development Czar and TA, UofM, Ann Arbor, MI *Sep 2016 - May 2018*
- Created Staff Development program for teaching staff of 30 graduate and undergraduate TAs to improve teaching skills of new and returning staff members
- Structured 35-student lab session to review and teach concepts in a specialized alternative to traditional lecture, tailoring for active learning
- Produced class-specific help and tip videos to give students an extra resource to common issues in a newer format

Robotics Software Intern at TRACLabs, Houston, TX *Summer 2017*
- Adapted local mapping and navigation to move TRACBot, a mobile-manipulator, to maneuver dynamically through obstacles such as doors and people in order to reach/use items in Affordance Template library
- Refitted and rebuilt action server nodes into custom system to perform dynamic re-planning based on real time observations

Student Research Mentoring

Current Students
- Chloe Kuo — Merit Research Fellow, USC Computer Science
- Julia Cordero — Merit Research Fellow, USC Computer Science
- Roddur Dasgupta — USC Computer Science
- Haemin Lee — USC Computer Science
- Kartik Mahajan — Merit Research Fellow, USC Computer Science
- Radhika Agrawal — Merit Research Fellow, USC Computer Science
- Nisha Chatwani — Merit Research Fellow, USC Computer Science
- Adam Wathieu — Georgetown University Computer Science

- İpek Göktan — Viterbi Fellow, USC SHINE Program, USC Computer Science
- Karen Ly — Merit Research Fellow, USC Computer Science

Previous Students

- Annika Modi — USC SHINE Program, High School Student
- Jacob Zhi — USC SHINE Program, High School Student
- Roxanna Pakkar — Merit Research Fellow, USC Electrical Engineering
- Zhonghao Shi — USC Computer Science
- Mena Hassan — USC SHINE Program, High School Student
- Adnan Karim — SURE Student, University of Calgary Computer Science
- Ryan Stevenson — USC Computer Science Games
- Ashley Perez — USC SHINE Program, High School Student
- Bryan Pyo — USC SHINE Program, High School Student

Contributions to Grant Proposals

NSF NRI 2.0 - Communicate, Share, Adapt: A Mixed Reality Framework for Facilitating Robot Integration and Customization

- Contributed significant ideas and content to proposal based upon ongoing Ph.D. work in Mixed Reality SAR
- Research grant awarded in fall 2019

K-12 Educational Outreach

Microsoft TEALS Teaching Volunteer
Los Angeles Center for Enriched Studies, Los Angeles, CA — *July 2019 - Jan 2020*

USC Robotics Academy Judge
University of Southern California, Los Angeles, CA — *Dec 2018/19, Apr 2019*

Robotics Family Night
Monterey Hills Elementary, Los Angeles, CA — *May 2019, Nov 2019*

The Help Group STEM^3 Academy Visit
STEM^3 Academy, Los Angeles, CA — *June 2019*

VEX Robotics Team Leader
Clifford Street Elementary, Los Angeles, CA — *Oct 2018 - Feb 2019*

Honors and Awards

USC CSCI Best Research Assistant — *May 2020*
USC Viterbi Undergraduate Research Mentoring Award — *May 2020*
USC Robotics George Bekey Service Award — *May 2019*

Peer-Reviewed Publications

[1] **Thomas R. Groechel**, Roxanna Pakkar, Roddur Dasgupta, Chloe Kuo, Haemin Lee, Julia Cordero, Kartik Mahajan, and Maja J. Matarić "Kinesthetic Curiosity: Towards Personalized Embodied Learning with a Robot Tutor Teaching Programming in Mixed Reality", To appear in *International Symposium on Experimental Robotics (ISER)*, 2020.

[2] Kartik Mahajan, **Thomas R. Groechel**, Roxanna Pakkar, Julia Cordero, Haemin Lee, Maja J. Matarić "Adapting Usability Metrics for a Socially Assistive, Kinesthetic, Mixed Reality Robot Tutoring Environment", To appear in *Proceedings of 2020 International Conference on Social Robotics (ICSR '20)*, Colorado, USA, Nov 2020.

[3] Naomi T. Fitter, Luke M. Rush, Elizabeth Cha, **Thomas R. Groechel**, Maja J. Matarić, and Leila Takayama "Closeness is Key over Long Distances: Effects of Interpersonal Closeness on Telepresence Experience", In *Proceedings of 2020 ACM/IEEE International Conference on Human Robot Interaction (HRI '20)*, Cambridge, UK, Mar 2020.

[4] Tom Williams, Daniel Szafir, Tathagata Chakraborti, Ong Soh Khim, Eric Rosen, Serena Booth, **Thomas R. Groechel**, "Virtual, Augmented, and Mixed Reality for Human-Robot Interaction (VAM-HRI)", In *Companion of the 2020 ACM/IEEE International Conference on Human-Robot Interaction (Companion-HRI '20)*, Cambridge, UK, Mar 2020.

[5] Matthew Rueben, **Thomas R. Groechel**, Yulun Zhang, Gisele Ragusa, Maja J. Matarić "Increasing Telepresence Robot Operator Awareness of Speaking Volume Appropriateness: Initial Model Development", In *Companion of the 2020 ACM/IEEE International Conference on Human-Robot Interaction (Companion-HRI '20)*, Cambridge, UK, Mar 2020.

[6] **Thomas R. Groechel**, Zhonghao Shi, Roxanna Pakkar, and Maja J. Matarić "Using Socially Expressive Mixed Reality Arms for Enhancing Low-Expressivity Robots", In *2019 IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN '19)*, New Delhi, India, Oct 2019.
Robotics Society of Japan and Korean Robotics Society Distinguished Interdisciplinary Research Award Finalist (3 nominated out of 206)

Talks, Demos, and Presentations

Planning A Successful Summer Research Experience
USC Summer Research Program Talks via Zoom *1 June 2020*

Live Mixed Reality Demo and How it Applies to Socially Assistive Robotics
USC Remote Robotics Open House via Zoom *19 May 2020*

Communicate, Share, Adapt: A Mixed Reality Framework for Facilitation Robot Integration and Customization Poster Presentation
NSF NRI 2.0 PI Meeting, Arlington, VA *27 Feb 2020*

Human-Robot Interaction & Socially Assistive Robots
Laguna Woods Village, Laguna Woods, CA *19 Feb 2020*

USC Robotics Visions & Voices: Emotionally Intelligent Robots Demo
University of Southern California, Los Angeles, CA *24 Oct 2019*

SAR Through Augmented Reality Extensions Demo and Discussion
Public Affairs Council, Laguna Beach, CA *8-9 Jan 2019*

Professional Service

Workshop Organizer
- "The Third International Workshop on Virtual, Augmented, and Mixed Reality for Human-Robot Interaction (VAM-HRI)", In *2020 ACM/IEEE International Conference on Human Robot Interaction (HRI '20)*

Reviewer
- International Conference on Social Robotics 2020
- Applied Sciences 2020
- Virtual, Augmented, and Mixed Reality for Human-Robot Interaction Workshop at HRI 2020
- Science Robotics 2018

Women in US Academic Research in Robotics Website *July 2019 - Present*
- Designed and implemented, under Prof. Matarić's supervision, an actively curated and monitored list of current women in US academic robotics research
- Link: `us-women-in-robotics-research.github.io`

Certification

USC Center for Excellence in Teaching's Future Faculty Teaching Institute
USC, Los Angeles, CA *Jan 2020 - May 2020*