

# Thomas R. Groechel

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## TECHNICAL

**Languages:** Proficient {C++, C#, Python} Working Knowledge {Javascript, R, Bash}

**Tools:** ROS 2 / ROS, Unity, Docker, Git, Jupyterlab, Pandas, Scikit-learn, Firebase, Mixed Reality Toolkit (MRTK)

## RELEVANT WORK EXPERIENCE

**Robotics Software Engineer PhD Temp**, iRobot, Pasadena, CA & Remote May 2021 - Aug 2021, February 2023-Present

- (C++) Open source [ros2/rclecpp:#2213](#) - ROS 2 asynchronous services for user response deferral within lifecycle nodes
- (C++) Open source [ros2/rclecpp:#2212](#) - Re-architected ROS 2 lifecycle nodes by separating out model-view-controller
- (C++) ROS-ified backend robot actuators with more robust service calls
- (C++) Developed key components for the new robot behaviors framework, reducing multithreaded programming errors
- (C++) Improved behavior framework engine for reduced latency and enhanced sequential and fallback behaviors
- Pitched new behaviors framework to external teams for wider adoption

**Software Developer**, Interaction Lab - University of Southern California, Los Angeles CA July 2018-February 2023

- (C#) Built [MoveToCode](#), a custom visual programming language for embodied autonomous agents
- (Python) Built [RE:BT-Espresso](#), a multi-threaded learning from demonstration pipeline for real-time agent control
- (C#/Python) Built [NRL-SVTE](#), a system for robot capability visualization and user-robot proxemic preference learning
- (Javascript) Built [PoseToCode](#), a real-time system mapping user pose landmarks to coding blocks with a neural network

**Researcher**, Interaction Lab - University of Southern California, Los Angeles CA July 2018-February 2023

- Planned and executed end-to-end research projects including question ideation/background research, system design, technical implementation, system testing, user studies, data analysis, and paper writing
- Managed 26 Undergraduate (UG), Master's (MS), and high school (HS) students first-time research students resulting in 7 total UG/MS first author papers, 7 UG research awards, and 2 UG first-author best-conference paper runner-ups
- Designed, conducted, and analyzed data of user studies across a variety of target populations/clients
- Created both technical and non-technical documentation along with handoff documentation for new and current students
- Co-authored awarded grant proposals (~\$1.55m total) - NSF IIS-1925083, Amazon Research Award, ITE-2236320
- Co-organized VAM-HRI workshop (3 years total with 60-110 attendees, website: <https://vam-hri.github.io/>)
- First authored or co-authored 2 journal, 10 conference, and 9 workshop peer-reviewed papers

**Undergraduate Research Assistant**, Laboratory for Progress, Ann Arbor, MI May 2016 - May 2018

- (C++/Javascript) Developed 2D SLAM algorithm using Iterative Closest Point visualization
- (C++/Javascript) 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 robot

**Robotics Software Intern**, TRACLabs, Houston, TX May 2017 - August 2017

- (C++) 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
- (C++) Rebuilt action server nodes into custom system to perform dynamic re-planning based on real time observations

## HONORS AND AWARDS

**USC Computer Science Best Research Assistant (2x)** May 2020 & May 2022

Awarded to top research assistant out of all of USC Computer Science graduate students

**USC Viterbi Undergraduate Research Mentoring Award (2x)** May 2020 & May 2021

Awarded to top research mentor out of all of USC Viterbi (Engineering) graduate students

## EDUCATION

**University of Southern California** Los Angeles, CA

Ph.D. Computer Science (GPA: 4.0) Advisor: Prof. Maja Matarić July 2018-February 2023

M.S. Computer Science (GPA: 4.0) July 2018-August 2021

**University of Michigan** Ann Arbor, MI

B.S.E. Computer Science (GPA: 3.57) Advisor: Prof. Chad Jenkins August 2014-May 2018