

Siva Maneparambil Kailas

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EDUCATION AND COURSEWORK

Georgia Institute of Technology (College of Computing, School of Interactive Computing) August 2023 – Present

- **PhD in Robotics, Research Assistant in School of Interactive Computing STAR Lab, GPA: 4.00/4.00**
- **Robotics Coursework:** Explainable AI, Graduate Artificial Intelligence

Carnegie Mellon University (School of Computer Science, Robotics Institute) August 2021 – August 2023

- **MSc in Robotics, Research Assistant in Robotics Institute AART Lab, GPA: 4.00/4.00**
- **Thesis:** Multi-Robot Information Gathering for Spatiotemporal Environment Modelling
 - **Thesis Committee:** Prof. Katia Sycara, Prof. George Kantor, Shi Ya
- **Robotics Coursework:** Machine Learning (PhD), Deep Learning for Robotics, Statistical Techniques in Robotics, Math Fundamentals for Robotics, Computer Vision, Kinematics, Dynamics, and Control

Arizona State University (CIDSE/SCAI and Barrett, The Honors College) August 2016 – May 2020

- **BSc in Computer Science, Minor in Economics, Minor in Statistics, GPA: 4.00/4.00**
- **Thesis:** CNN-based Pose Initialization with Uncertainty Estimation
 - **Thesis Committee:** Prof. Heni Ben Amor, Dr. Renaud Detry
- **Awards:** President's Award, Arizona Top Scholar, Intel Scholarship, Moeur Award (Highest Academic Standing)
- **Dean's List Award:** Spring 2020, Fall and Spring 2019, Fall and Spring 2018, Fall and Spring 2017, Fall 2016
- **Computer Science Coursework:** Machine Learning, Deep Learning, Artificial Intelligence, Robotics, Operating Systems, Compiler Theory, Computer Organization, Web Development, Data Science, Distributed Computing, Data Structures, Algorithms, Software Engineering, Database Management, Computational Theory
- **Electrical Engineering Coursework:** Random Signal Analysis, Microprocessor Design, University Physics, Electrical Circuits, Signals and Systems, Intel Core Architecture and PCIe
- **Mathematics Coursework:** Probability Theory, Statistics, Linear Algebra, Discrete Mathematics, Differential Equations, Multi-Variate Calculus, Mathematical Structures
- **Economics Coursework:** Econometrics, Financial Economics, Microeconomic Theory, Macroeconomic Theory

RECENT RESEARCH AND WORK EXPERIENCE

STAR Lab (Georgia Institute of Technology): Research Assistant August 2023 – Present

- Developing and evaluating an explainable learning-based MAPF approach for interactive learning with human
- Investigating methods towards generalization in embodied multi-agent learning using Habitat simulator

AART Lab (Carnegie Mellon University): Research Assistant September 2021 – Present

- Developing multi-agent adaptive sampling and informative path planning algorithms for environment learning
- Developed single-agent informative path planning framework for dynamic information maps using learned MCTS
- Worked on multiagent reinforcement learning (RL) approach for interpretable emergent communication
- Developed human-agent testbed to evaluate multi-agent RL approach for emergent interpretable communication

Air Force Research Lab: Research Assistant June 2022 – Present

- Investigating human-swarm trust when showing benevolent and self-interested behaviors in human-agent teaming
- Developed experimental testbed and various stimuli of each behavior for differing levels of affordances

REACT Lab (Harvard University): Research Assistant June 2019 – September 2021

- Developed multiagent reinforcement learning (RL) POMDP solver with rollout and approximate policy iteration
- Applied our multiagent RL solver to autonomous repair problem and outperformed current multiagent RL solvers
- Conducted simulation studies for collecting data on single-agent RL POMDP solver in sequential repair domain

Interactive Robotics Lab (Arizona State University): Research Assistant September 2018 – September 2021

- Developed satellite with robotic arm for autonomous assembly via learned motion primitives with NASA JPL
- Developed efficient low-power 6D model-based tracking system with sample-efficient optimization for satellite
- Developed ConvNet for single shot 6D pose estimation and predictive uncertainty measure for visual servoing
- Investigating various imitation learning approaches for bimanual robotic manipulation with Intrinsic (Google X)

Amazon.com Inc: Software Development Engineer June 2019 – August 2019 and July 2020 – September 2021

- Designed and developed numerous scalable serverless microservices using Amazon Web Services technologies
- Created full-stack web app for Fulfillment by Amazon project managers to perform internal business operations

Intel Corp: Engineering Intern May 2017 – August 2017 and May 2018 – August 2018

- Created a web server and web app for developers to have real-time access to current internal audit status
- Created Python modules to be used in all scripts developed by Intel Functional Safety organization
- Worked on implementing continuous integration feedback loop for robust automation framework

Translational Ultrasound Research Lab (Mayo Clinic): Research Assistant

January 2018 – June 2019

- Created echocardiographic marker to guide catheter for noninvasive cardiac surgery using ultrasound imaging
- Designed and developed a miniaturized circuit for optimal waveform generation to use in operation room setting

Fulton School of Engineering (Arizona State University): Teaching Assistant

August 2017 – May 2020

- Assisted students in computer science and electrical engineering classes by teaching and reinforcing concepts
- Assisted professor in preparing course material and assessment activities for various engineering courses

SKILLS AND TRAINING

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|---|---|------------------------------|
| • C, C++, C#, Java, Bash,
Python (scikit-learn,
pandas, numpy, scipy) | • MATLAB (Robotics
System Toolbox), Octave | • Amazon Web Services |
| • OpenCV, ViSP, Keras
(TensorFlow), Pytorch
(LibTorch), Eigen, TooN | • Robot Operating System
(ROS), Gazebo | • HTML, CSS, JavaScript |
| | • Assembly (MIPS, x86) | • Angular, React, Typescript |
| | • PSpice, LTSpice, Logisim | • Node.js, PHP, Apache |
| | | • SQL, Oracle DB |
| | | • Ajax, jQuery, Bootstrap |

PUBLICATIONS AND POSTERS

- **Kailas, S., Luo, W., & Sycara, K. (2023).** Multi-robot Adaptive Sampling for Supervised Spatiotemporal Forecasting. EPIA Conference on Artificial Intelligence 2023.
- **Bhattacharya, S., Kailas, S., Badyal, S., Gil, S., & Bertsekas, D. (2023).** Multiagent Reinforcement Learning: Rollout and Policy Iteration for POMDP with Application to Multi-Robot Problems. IEEE Transactions on Robotics (IEEE TRO).
- **Kailas, S. (2023).** Multi-Robot Information Gathering for Spatiotemporal Environment Modelling.
- **Karten, S., Kailas, S., & Sycara, K. (2023).** Emergent Compositional Concept Communication through Mutual Information in Multi-Agent Teams. International Conference on Autonomous Agents and Multiagent Systems (AAMAS) 2023.
- **Karten, S., Tucker, M., Kailas, S., & Sycara, K. (2023).** Towards True Lossless Sparse Communication in Multi-Agent Systems, IEEE International Conference on Robotics and Automation (ICRA) 2023.
- **Jong, A., Yu, M., Dhrafani, D., Kailas, S., Moon, B., Sycara, K., & Scherer, S. (2023).** WIT-UAS: A Wildland-fire Infrared Thermal Dataset to Detect Crew Assets from Aerial Views. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2023.
- **Capiola, A., Lyons, J. B., Harris, K. N., aldin Hamdan, I., Kailas, S., & Sycara, K. (2023).** “Do what you say?” The combined effects of framed social intent and autonomous agent behavior on the trust process. Computers in Human Behavior, 149, 107966.
- **Karten, S., Tucker, M., Kailas, S., & Sycara, K. (2022).** Towards True Lossless Sparse Communication in Multi-Agent Systems. Conference on Neural Information Processing Systems (NeurIPS) Deep RL Workshop 2022.
- **Karten, S., Tucker, M., Li, H., Kailas, S., Lewis, M., & Sycara, K. (2022).** Interpretable Learned Emergent Communication for Human-Agent Teams. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop on Human Theory of Machines and Machine Theory of Mind for Human-Agent Teams 2022.
- **Jong, A., Moon, B., Kailas, S., Yuan, J., Sycara, K., & Scherer, S. (2022).** Learned Informed Monte Carlo Tree Search for Informative Path Planning on Dynamic Time-varying Information. IEEE International Conference on Robotics and Automation (ICRA) 2023. (Submitted)
- **Karten, S., Tucker, M., Li, H., Kailas, S., Lewis, M., & Sycara, K. (2022).** Interpretable Learned Emergent Communication for Human-Agent Teams. IEEE Transactions on Cognitive and Developmental Systems (IEEE TCDS).
- **Bhattacharya, S., Kailas, S., Badyal, S., Gil, S., & Bertsekas, D. (2020).** Multiagent Rollout and Policy Iteration for POMDP with Application to Multi-Robot Repair Problems. Conference on Robot Learning (CoRL) 2020.
- **Sonawani, S., Kailas, S., Detry, R., Alimo, R., Backus, S., McCormick, R., Mukherjee, R., Wehage, K. & Amor, H.B. (2020).** Robotic In-Space Assembly with Arm-Augmented Cubesats. International Conference on Robotics and Automation (ICRA) Opportunities and Challenges in Space Robotics 2020. (Best Poster Award)
- **Kailas, S. M. (2020).** Convolutional Neural Network for Pose Initialization with Uncertainty Estimation.

- Sonawani, S., **Kailas, S.**, Ben Amor, H., & Detry, R. (2019). Autonomous In-Space Assembly with Arm-Augmented Cubesats. JPL Research Poster Conference 2019. (SURP-ASU)
- Belohlavek, M., **Kailas, S.**, Vaitkus, V., Kumar, V., Fatemi, M., & Katayama, M. (2019). Portable System for Intracardiac Injection Catheter Navigation with a Novel Use of Doppler Echocardiography. Echo Hawaii.
- Dakhane, A., Tweedley, S., **Kailas, S.**, Marzke, R., & Neithalath, N. (2017). Mechanical and microstructural characterization of alkali sulfate activated high volume fly ash binders. *Materials & Design*, 122, 236-246.
- Dakhane, A., Das, S., **Kailas, S.**, & Neithalath, N. (2016). Elucidating the Crack Resistance of Alkali-Activated Slag Mortars Using Coupled Fracture Tests and Image Correlation. *Journal of the American Ceramic Society*, 99(1), 273-280.
- **Kailas, S.**, Gu, J., & Zenhausern, F. (2015). Developing a Vertical Flow Immunoassay for Monitoring VEGF Level in the Aqueous Humor for Neovascular Eye Diseases. TGen Intern Symposium.

ADDITIONAL PROJECTS

- Implemented various approaches for computer vision tasks including scene classification and object tracking
- Implemented forward and inverse kinematic solvers for WAM robotic arm with control and dynamics simulation
- Implemented multiple numerical solvers for path planning, optimization, and point cloud surface detection
- Implemented online learning algorithms for stochastic and adversarial multi-armed bandit scenarios
- Developed big data pipeline to analyze metagenomic data to determine functional networks via network analysis
- Developed software for colorimetric image analysis of biological assay to determine positive or negative result
- Developed software to predict tensile strength of the material using Digital Image Correlation with MATLAB
- Developed deep neural net to predict customer loyalty from customer-merchant data from Elo credit card dataset