**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

* C, C++, C#, Java, Bash, Python (scikit-learn, pandas, numpy, scipy)
* OpenCV, ViSP, Keras (TensorFlow), Pytorch (LibTorch), Eigen, TooN
* MATLAB (Robotics System Toolbox), Octave
* Robot Operating System (ROS), Gazebo
* Assembly (MIPS, x86)
* PSpice, LTSpice, Logisim
* Amazon Web Services
* HTML, CSS, JavaScript
* Angular, React, Typescript
* 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 Neovascualar 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