

Visak Kumar

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Research scientist focused on applying machine learning to robotic systems — end-to-end driving policies, multimodal sequence models, reinforcement learning, and sim-to-real deployment of learned controllers on physical hardware.

Education

- Georgia Institute of Technology** Atlanta, GA
• *Ph.D. Robotics* August. 2016 - Sept 2021
Advisors : Dr. Karen Liu and Dr. Sehoon Ha
- University of Washington** Seattle, WA
• *MS Mechanical Engineering* Sep. 2014 - Jun. 2016
Advisors : Dr. Vikash Kumar and Dr. Emo Todorov

Experience

- Sr. Research Scientist** Palo Alto, CA
• *ML Behavior team, Woven by Toyota* May. 2022 - Present
 - Designed, trained, and deployed end-to-end machine learning (ML) models for autonomous driving.
 - Developed machine learning models for vehicle motion prediction.
 - Designed a large-scale distributed evaluation framework for end-to-end driving policies, enabling rapid, data-driven iteration and model selection.
 - Led the design and implementation of large-scale distributed data curation workflows for ML prediction models, improving operational efficiency and downstream model performance.
 - Developed and deployed post-training quantization for efficient on-vehicle inference of large neural policies on edge compute.
- Research Scientist** Los Altos, CA
• *Toyota Research Institute* Oct. 2021 - May 2022
 - Group Distributionally Robust Reinforcement Learning with Hierarchical Latent Variables:** developed a novel RL algorithm for learning robust driving policies in multi-task, multi-agent settings under uncertainty over agent behaviors. Published at **AISTATS 2023**.
- Graduate Research Assistant** Atlanta, GA
• *Interactive Computing, Georgia Institute of Technology* August. 2016 - September 2021
 - Error-Aware Policy Learning:** zero-shot generalization of learned control policies to partially-observed target environments (**RSS 2021**).
 - Sim-to-Real for Biped Locomotion:** domain-adaptation algorithm transferring locomotion policies trained in simulation to the Darwin-OP2 humanoid robot in the real world (**IROS 2019**).
 - Fall Prevention via Assistive Exoskeleton:** learned control policy that prevents falls under external perturbations during walking (**ICRA 2020**).
 - Relay Neural Networks:** algorithm that composes a directed graph of local control policies to solve complex long-horizon robotic tasks (**CoRL 2018**).
 - Unified Control Policy for Safe Falling:** deep RL with a mixture of actor-critic experts for safe-falling behaviors on humanoid robots (**IROS 2017**).
- Research Intern** Redmond, WA
• *NVIDIA Research* May 2020 - August 2021
 - Visuo-Tactile Multi-Fingered Grasping:** contextual RL algorithm for learning grasping policies on multi-fingered robots using vision and touch as multimodal contextual inputs (**NeurIPS workshop 2020**).

- **Joint-Space Control for Robot Manipulators:** curriculum-learning-based control policy achieving sub-1 cm end-effector position error on a robot arm (**IROS 2021**).

Pittsburgh,PA

- **Lab Associate**
Disney Research

May.2017 - August.2017

- Developed a curriculum learning algorithm to improve Model Based humanoid balance controller using Deep Reinforcement learning and Adaptive Sampling.

Seattle,WA

- **Research Assistant**
CSE Dept, UW

Dec. 2015 - June. 2016

- System Identification and Model Predictive control of pneumatic cylinder actuators for Adroit Hand.

Publications

- **Kumar, V.**, S, Ha., Liu, C.K., "Learning a unified control policy for Safe Falling",IEEE/RSJ IROS,2017. [Link to paper](#)
- **Kumar, V.**, S Ha, K Yamane, "Improving Model-Based Humanoid Balance Controllers using Reinforcement Learning and Adaptive Sampling", **ICRA 2018**. [Link to paper](#)
- **Kumar, V.**, S, Ha., Liu, C.K., "Expanding Motor Skills using Relay Networks", **CORL, 2018**, Zurich Switzerland. [Link to paper](#)
- Yu, W., **Kumar, V.**, Turk, G.,Liu, C.K., "Sim-2-Real transfer of Biped-locomotion", **IROS, 2019**, Macao China. [Link to paper](#)
- **Kumar, V.**,Ha, S., Sawicki, G.,Liu, C.K., "Learning a Control Policy for Fall-Prevention using an Assistive Device", **ICRA 2020**. [Link to paper](#)
- **Kumar, V.**, Hermans, T., Fox, D., Birchfield, S. and Tremblay, J. "Contextual Reinforcement Learning of Visuo-Tactile Multi-Fingered Grasping Policies.", **NeurIPS workshop 2020**. [Link to paper](#)
- **Kumar, V.**, S, Ha., Liu, C.K. "Error-aware Policy Learning : Zero Shot Generalization for Partially Observed Dynamical Environments", **Robotics : Science and Systems 2021**. [Link to paper](#)
- **Kumar, V.**, Hoeller, D.,Sundaralingam ,B., Tremblay J, Birchfield, S. "Joint Space Control via Deep Reinforcement Learning", Accepted, IROS 2021. [Link to paper](#)
- Xu, Mengdi,**Kumar, V.**, Chao, F. , Lee, K., et al "Group Distributionally Robust Reinforcement Learning with Hierarchical Latent Variables", Proceedings of the 26th International Conference on Artificial Intelligence and Statistics (AISTATS) 2023, Valencia, Spain.

Skills

Deep Learning: Tensorflow, Pytorch

Physics Simulators: MuJoCo,DART, PyDART, Bullet, PyBullet, Physx, Flex

Languages: C++ , Python