

KARKALA SHASHANK HEGDE

@ khegde@usc.edu |  LinkedIn |  GitHub |  Website |  Scholar
Ph.D. Student with an interest in AI, Reinforcement Learning, and Deep Learning

PROGRAMMING SKILLS

Languages:

Python (Tensorflow, PyBullet, Mujoco, Gym, PyTorch, Pandas, Numpy, Flask, Scikit-learn, Scipy, ROSpy),

MATLAB (Statistics and Machine Learning, Deep Learning, Signal Processing Toolboxes),

C++ (OpenAL, OpenCV)

EDUCATION

University of Southern California

PhD in Electrical and Computer Engineering (AI & Robotics); GPA: 3.94/4

Minor Degree in Computer Science; Advisor: Gaurav Sukhatme

Los Angeles, USA

2021 – Present

University of Southern California

MS in Electrical and Computer Engineering (Machine Learning); GPA: 3.94/4

Los Angeles, USA

2019 – 2021

National Institute of Technology Karnataka

BTech in Electrical and Electronics Engineering (Signal Processing); GPA: 8.17/10

Thesis GPA: 9.5/10; Advisor: Krishnan CMC

Surathkal, India

2013 – 2017

RESEARCH EXPERIENCE

Research assistant -PhD

Robotic Embedded Systems Laboratory^{[\[link\]](#)}, USC

Los Angeles, USA

Sept 2020 - present

- Training intelligent visual controllers for Manipulation: I built a data collection pipeline for the Franka Emika Panda robot using ROS, libfranka and a 6D spacemouse for teleoperation; trained and deployed a diffusion policy based vision controller.
- Used CLIP language encoder with Latent Diffusion Models and Graph Hypernetworks for generative modeling in behavior space for robotic control.
- Develop and train sample efficient distributed learning methods for language-conditioned robotic control on SLURM.
- Create high-performing small Neural Networks on AWS EC2 instances for quadrotor flight control.
- Experiment with audio-based communication between agents with multi-agent reinforcement learning for game AI

Research assistant - MS

Stochastic Systems & Learning Lab^{[\[link\]](#)}, Dynamic Robotics & Control Lab^{[\[link\]](#)}

Los Angeles, USA

Nov 2019 - May 2021

- Build scale-able Reinforcement Learning policies using function approximators with lesser trainable parameters.
- Study and Apply state-of-the-art Imitation Learning techniques to self-driving vehicles and experiment on Hyper realistic simulations such as CARLA.
- Simulate and control a quadruped mini cheetah robot on Pybullet and Gazebo using stochastic control with policy gradient-based agents. Test the RL controller on the actual robot after integration with ROS.
- Experiment on different action spaces such as impedance, torque, and force control, and use hybrid learning methods with model predictive control to help faster learning. Use RLLib for distributed learning.

WORK EXPERIENCE

NVIDIA

Seattle, USA

Applied Research Scientist Intern

May 2025 – Aug 2025

- Trained a large-scale LLAMA transformer for self-driving vehicles using world model based imitation learning, reducing front collisions and improving policy safety.
- Developed generative models to produce BEV visualizations, revealing latent policy representations.

NVIDIA

Seattle, USA

Deep Learning Scientist Intern

May 2024 - Dec 2024

- Trained a video diffusion model to generate RGB frames and BEVs for self-driving vehicle scenarios.
- Utilized automatic mixed precision to bring down project costs by 30%.

SalesDNA

Los Angeles, USA

Data Scientist Intern

May 2021 – August 2021, Full-time

- Built data pipelines for collection, cleaning, and real-time Markov decision process modeling of sales processes.
- Built model-free reinforcement learning algorithms to build AI strategies on this sales simulation.

Fidelity Investments: Asset Management Technology

Bangalore, India

Data Scientist

July 2017 – July 2019, Full-time

- Built a simulator using real trading data and trained an RL agent for portfolio construction in equity trading.
- Worked with the Equity Trading team to develop backend services with Java spring-boot, Python Flask, SQL, and Splunk.

Fidelity Investments: Asset Management Technology

Bangalore, India

Summer intern as Software Developer

May 2016 – July 2016, Full-time

- Worked with the fixed-income research team to build a complete end-to-end application using .NET and Excel VBA. Gained experience in the Microsoft Windows Presentation framework for building hard clients.

PUBLICATIONS

Lanka, A., **Hegde, S.**, & Brun, T. A. (2025). Optimizing continuous-time quantum error correction for arbitrary noise. arXiv preprint arXiv:2506.21707.

Hegde, S., Das, S., Salhotra, G., & Sukhatme, G. S. Latent Weight Diffusion: Generating reactive policies instead of trajectories. arXiv preprint arXiv:2410.14040 (**NeurIPS 2025 Embodied World Models for Decision Making Workshop**)(**RSS 2025 Resource constrained robotics workshop**)

Popov, A., Degirmenci, A., Wehr, D., **Hegde, S.**, ... & Smolyanskiy, N. Mitigating Covariate Shift in Imitation Learning for Autonomous Vehicles Using Latent Space Generative World Models. arXiv preprint arXiv:2409.16663. (**ICRA 2025: Robots in the wild workshop**)

Lanka, A., Prabhu, P., **Hegde, S.** and Brun, T., 2024, March. Active steering into quantum stabilizer codespace with reinforcement learning. In APS March Meeting Abstracts (Vol. 2024, pp. A49-005).

Hegde, S., Huang, Z., & Sukhatme, G. S. (2024, May). Hyperppo: A scalable method for finding small policies for robotic control. In 2024 IEEE International Conference on Robotics and Automation (**oral presentation at ICRA 2024**) (pp. 10821-10828). IEEE. [\[site\]](#)

Hegde, S., Batra, S., Zentner, K. R., & Sukhatme, G. (2023). Generating behaviorally diverse policies with latent diffusion models. Advances in Neural Information Processing Systems, 36, 7541-7554. (**NeurIPS 2023**) [\[site\]](#)

Hegde, S. and Sukhatme, G.S., 2023, May. Efficiently Learning Small Policies for Locomotion and Manipulation. In 2023 IEEE International Conference on Robotics and Automation (**ICRA 2023**) (pp. 5909-5915). IEEE. [\[site\]](#)

G. Salhotra, **S. Hegde**, SS. Batra, P. Englert, GS. Sukhatme (2022) *Guided Learning of Robust Hurdling Policies with Curricular Trajectory Optimization*, Southern California Robotics Symposium [\[site\]](#)

S. Hegde, Kanervisto, A., & Petrenko, A. (2021, August). Agents that listen: High-throughput reinforcement learning with multiple sensory systems. In 2021 IEEE Conference on Games (CoG) (pp. 1-5). IEEE. [\[site\]](#)

Hiteshi Sharma, R. Jain. and **S. Hegde** (2021) *Randomized Policy Learning for Continuous State and Action MDPs* (arxiv) [\[pdf\]](#)

S. Hegde, V. Kumar, and A. Singh. (2018). *Risk aware portfolio construction using deep deterministic policy gradients*. IEEE Symposium Series on Computational Intelligence (SSCI) Bangalore, Nov. 2018. [\[pdf\]](#)

Singh, A., Kumar, V., and **Hegde, S.** (2018). *Reinforcement Learning: A Review in Finance*. Proceedings of Data Science Congress, Mumbai, May 2018. [\[pdf\]](#)

Severes, A., **Hegde, S.**, D'Souza, L. and Hegde, S. (2017). *Use of LED for enhanced lipid production in micro-algae based bio-fuels and predicting growth patterns*. Journal of Photochemistry and Photobiology B: Biology, Elsevier, Volume 170, Pages 235-240. [\[link\]](#)

PROJECTS

Automatic paper tagging: Apply BERT sentence transformer to encode abstracts of hundreds of papers, and then find cosine similarity of the encoding with that of topic definitions to rank and tag them

Autonomous Vehicle Navigation: As a part of the Autonomous Vehicle lab, I worked on navigation, path planning, and simulation of an autonomous car to take part in IGVC 2021. I used Gazebo to build a simulation of the track, and implement path-finding algorithms such as A star.

Competitive and Co-operative Multi-Agent Reinforcement Learning [\[pdf\]](#): As a part of my directed research with the Hardware Accelerated Learning group [\[link\]](#), I experiment with various multi-agent reinforcement learning algorithms. The goal of this project is to understand the state-of-the-art RL algorithms that work well in both competitive and cooperative environments.

Torque Transfer [\[code\]](#): Use reinforcement learning and transfer learning to create robust AI agents. The AI agent should generalize to a variety of open-world self-driving simulations. After training an AI for a self-driving car simulation using Imitation learning and reinforcement learning, the learned policy was used as a pre-trained network for an AI agent in another self-driving simulation. The pre-trained model showed faster learning in the new simulation.

Emotion Transfer on speech using spectrogram images [\[code\]](#): Use a conditional Generative Adversarial Neural Network to generate images on spectrograms of speech signals. By using cycle GANs we use style transfer on spectrograms of speech signals to embed emotion in them. The generated spectrogram is reconstructed back to speech using the Griffin-Lim algorithm.

Fashion compatibility prediction [\[code\]](#): Use a Siamese Convolutional Neural Network to classify if two fashion objects are compatible. Then the pair-wise similarity scores are predicted to see if an outfit is compatible. To do this Google Tensorflow 2.0 was used and the models were trained on AWS p3.2xlarge instances (Tesla V100 GPUs)

Spoken Language classifier [\[code\]](#): Implement a Gated Recurrent Unit-based Neural Network to classify the extracted MFCC features from speech audio. A streaming model classifies the language being spoken in real-time. Using this streaming model, we could analyze the probability of miss-classification at every instant of speech.

Prosthetic Voice (Thesis) [\[pdf\]](#): Undergraduate Thesis: sEMG signal controlled speech production aid for speech-challenged individuals using Machine Learning. The signals were collected, filtered, pre-processed, and then fed to a classifier that would predict the hand action performed. The action would then be translated into speech.

Emotion Detection [\[pdf\]](#): I was part of a three-member team that built a Machine Learning-driven emotion detector using variations in speech signals. We built a classifier using MFCC feature extraction and PCA on other features.

TEACHING EXPERIENCE

University of Southern California

Teaching Assistant

Los Angeles, USA

2021 – 2025

- EE641 – Deep Learning Systems
- EE541 – A Computational Introduction to Deep Learning
- CSCI567 – Machine Learning
- CSCI568 – Requirement Engineering

AWARDS & ACHIEVEMENTS

USC Annenberg Fellow: Awarded a Fellowship for my PhD.

Masters Student Honors Program^[link]: Certificate for outstanding academic and research achievements.

The Data Open^[pdf]: Was a finalist in the SoCal round of the Data Open Hackathon organized by Citadel.

Soda bottle classification contest^[link]: Winner of image classification contest hosted by Deep Cognition.

Best Outgoing student in school, ranked in top 1% of All India Engineering exam.

Scholarship, National Level Science Talent Search Examination.

TALKS AND PRESENTATIONS

Invited Speaker at Sears Deep Learning Center Program: Delivered a company-wide talk on SOTA applied Deep Reinforcement Learning. ^[link]

Guest lecture on Generative models for robotics: Presented a talk to a graduate Machine Learning class.

Career guidance talk: Presented to all class 12 students of Mangalore (a small town in Southern India) for career options in machine learning.

SERVICE AND EXTRACURRICULAR

Reviewer: NeurIPS (2025). ICRA (2023, 2025), IROS 2023. CoRL (2024, 2025), ICLR 2025, IEEE RA-L(2023, 2024, 2025)

Organizer: USC robotics seminar, Resource Constraint Robotics at RSS 2025 workshop. **Organizer:** Resource Constraint Robotics at RSS 2025 workshop.

Organizer: Machine Learning workshops at Fidelity Investments.

Secretary: Music club at National Institute of Technology Karnataka.

Band Manager and Lead Guitarist: Carnatic metal fusion band TATVAM.

Volunteer: SPIC MACAY Mangalore chapter.