# Kiran Kumar Lekkala

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*I recently defended my PhD thesis focusing at the intersection of Computer Vision, Machine Learning and Robotics. I've extensively worked with LLMs, VLMs and Multimodal LLMs for Robotics, RAG and Generative AI applications. I'm looking for research opportunities starting in Spring 2025.*

## Education

**University of Southern California**                                                          **Los Angeles, USA**
*PhD., Thomas Lord Department of Computer Science*                              *August 2018 – November 2024*
Advisor: Prof. Laurent Itti

Thesis: *Pretraining Transferable Encoders for Visual Navigation using Unlabeled Datasets*

**Indian Institute of Information Technology**                                                     **SriCity, India**
*BTech (Hons.), Computer Science and Engineering*                                      *August 2013 – May 2017*
Thesis: *Enhancing Visual SLAM systems for Autonomous Quadcopters*

## Interests

**Artificial Intelligence/Machine Learning**: Transformers, GPT, LLMs, VLMs, Retrieval-Augmented Generation (RAG), RLHF, Reinforcement Learning, Lifelong Learning, Continual Learning, Meta Learning, Multi-task Learning, Self-Supervised Representation Learning, Contrastive Learning, Visual Navigation
**Robotics**: Autonomous Driving, Mobile Robots, Simulators, Visual SLAM, State Estimation and Sensor Fusion
**3D Computer Vision**: Graphics, Gaussian Splatting, Text-to-3D Diffusion, 3D-LLMs, NeRFs, 3D Reconstruction
**ML Systems**: Distributed Systems, Distributed RL, Model/Data Parallelism, Edge Computing

## Relevant Experience

**Dolby Laboratories**                                                                                   **Sunnyvale**
*PhD. Research Intern*                                                              *September 2024 – December 2024*
Multi-modal (combination of language, video, audio, multi-view imagery, and 3D) understanding for LLMs

**Klover.AI**                                                                                                **Remote**
*Applied Scientist Intern*                                                              *May 2024 – September 2024*
Worked on an LLM-agent system that uses entropy-driven methods for decision making

**JeVois Inc**                                                                                          **Los Angeles**
*Research Engineer*                                                                      *August 2017 – August 2018*
Implemented a Multi-view ML based perception system on a quad-core ARM Cortex JeVois smart camera

**Google Summer of Code**                                                                               **Remote**
*Student Developer*                                                                         *May 2016 – August 2016*
Created easy-to-use APIs and firmware for Beaglebone Blue in collaboration with Beagleboard.org and UC San Diego

**GeoScience Consulting**                                                                              **Singapore**
*Research Intern*                                                                            *March 2016 – May 2016*
Worked on generating 3D point-cloud of outdoor environments using an Earthmine omnidirectional stereo camera system

## Selected Publications

**Open X-Embodiment: Robotic Learning Datasets and RT-X Models**: *Co-Authored* [Link] [Press Coverage]
*Published* at ICML 2024. *Won the Best Paper award, Also Best Student Paper, Best Manipulation paper finalist.*

**USCILab3D: A Large-scale, Long-term, Semantically Annotated Outdoor Dataset**: *Kiran Lekkala\*, Henghui Bao\*, .., Laurent Itti* [Webpage][Link][Robot dataset] [Press Coverage]
*Published* at NeurIPS 2024. *Presented* at ICML 2024 Workshop on Foundational Models. *Awarded cash prize* at

**Lightweight Learner for Shared Knowledge Lifelong Learning**: *Co-Authored* [Link][Press Coverage]
*Published* in Transactions on Machine Learning Research.

**Ferroelectric FET based Context-Switching FPGA Enabling Dynamic Reconfiguration for Adaptive Deep Learning Machines**: *Co-Authored* [Link]
*Published* at Science Advances.

**Bird's Eye View Based Pretrained World model for Visual Navigation**: *Kiran Lekkala, C. Liu, L. Itti* [Link]
*Published* at ISRR 2024. Also *accepted* at NeurIPS 2023 Robot Learning Workshop.

**Value Explicit Pretraining for Learning Transferable Representations**: *Kiran Lekkala, Henghui Bao, Sumedh Sontakke, Erdem Bıyık, Laurent Itti* [Link]
*Under review* at IEEE Robotics and Automation Letters (RA-L). *Spotlight presentation* at CoRL 2023 Workshop on PRL. Also accepted to CoLLA 2024 Workshop track.

**Real-world Visual Navigation in a Simulator using Scene Generation. A New Benchmark**: *Henghui Bao*, Kiran Lekkala*, .., Laurent Itti* [Webpage]
*In submission. Presented* at CVPR 2024 Workshop on Robotics and Autonomous Driving.

**USC-DCT: A Collection of Diverse Classification Tasks**: *Co-Authored* [Link]
*Published* in MDPI Data.

**Evaluating Pretrained models for Deployable Lifelong Learning**: *Kiran Lekkala*, Eshan Bharghava*, Yunhao Ge, Laurent Itti* [Link]
*Presented* at WACV 2024 Workshop on Pretraining.

**Shaped Policy search for Evolutionary strategies using waypoints**: *Kiran Lekkala, Laurent Itti* [Link]
*Published* in ICRA 2021.

**Attentive Feature Reuse for Multi Task Meta learning**: *Kiran Lekkala, Laurent Itti* [Link]
*Presented (Spotlight Oral)* at EML Workshop at ICLR 2021.

**Simultaneous Aerial Vehicle Localization and Human Tracking**: *Kiran Lekkala, VK Mittal* [Link]
*Published* in TENCON 2016 .

**Accurate and Augmented Navigation for Quadrocopter based on Multi-Sensor Fusion**: *K. Lekkala, VK Mittal*
*Published* in INDICON 2016 . [Link]

Notable Projects and PrePrints

**RAG for relating videos and text**: Developed a Retrieval Augmented Generation (RAG) system for relating content within a video (transcription using OpenAI Whisper) and books to generate appropriate responses to user queries.

**Low-Cost Autonomous Mapping system for 3D-LLM based Scene Understanding**: Developed an LLM-based system for queries related to 3D spatial and semantic information from multi-view images.

Miscellaneous

**Mentored**, **Managed** and **Lead** multiple teams of 36 BS and MS students during my PhD [Mentee list].
**Reviewer** for ICLR, NeurIPS, CoRL, RAL, ICRA, IROS, ICANN

## Awards and Achievements

**USC Annenberg Fellowship**: Four-year graduate fellowship awarded to 10% of incoming PhD. students.
**Dean's Award for Research contribution**: Award for outstanding Undergraduate research.
**Dean's List of Academic Excellence**: Award for achieving academic distinction for 4 semesters
**ACM-ICPC**: Honorable Mention in ACM-ICPC 2014 Asia Region.

## Technical Skills

**ML Frameworks/Environments**: Pytorch, JAX, Hugging Face, Accelerate, DeepSpeed, Ray, RLlib, LlamaIndex, MPI, Tensorflow, Keras, TFLite, AWS Sagemaker, Kubernetes, Azure ML, Caffe, MXNet, Scikit, NLTK
**Programming Languages**: C, C++, C#, Python, UNIX Bash, Java, JavaScript, PHP, Ruby
**Vision and Graphics**: MATLAB, Simulink, OpenCV, Unreal Engine, WebGL, PCL, CUDA, OpenGL
**Robotics**: IsaacSim, IsaacGym, ROS, Gazebo, MRPT, ARM Boards, AutoCAD, Fusion360