

# Kiran Kumar Lekkala

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## Education

### University of Southern California

PhD, Computer Science, GPA – 3.83/4.0

Advisor: [Prof. Laurent Itti](#)

Los Angeles, USA

Aug 2018 – Till Date

### Indian Institute of Information Technology

BTech (Hons.), Computer Science and Engineering, GPA – 8.96/10

SriCity, India

August 2013 – May 2017

## Interests

**Machine Learning/Artificial Intelligence:** Deep Learning, Reinforcement Learning, Lifelong Learning, Continual Learning, Meta Learning, Representation Learning, Transformers, Distributed computing, Skill and Primitive learning, Hierarchical RL

**Robotics:** Autonomous Driving, Visual Navigation, Manipulation, Sensor Fusion

**Computer Vision:** 3D Reconstruction, SLAM, Visual Odometry

## Awards and achievements

**2018:** USC Annenberg Fellowship award (Top 10% of incoming students)

**2017:** Dean's List of Academic Excellence (Undergraduate)

**2017:** Dean's award for Research contribution (Undergraduate)

**2015:** Secured merit position in [ACM-ICPC](#) 2015 regional level contest

**2014:** Secured merit position in national level E-Yantra Robotics competition.

## Experience

**2018: Graduate Research Assistant:** [ILab](#) directed by [Prof. Laurent Itti](#).

**2017: Student Researcher:** [CGIT](#) directed by Prof. Clifford Neumann.

**2016: Student Developer:** [Beagleboard.org](#) under [Google Summer of Code](#).

## Selected Publications

First-authored.....

**2022: Learning Reusable Skills and Primitives for Lifelong learning: A Survey.** Journal under submission.

**2022: Real-world Visual Navigation in a Simulator: A new Benchmark.** Under submission.

**2022: Evaluating Generalization for Distributed Multi-Task learning** Under submission [[Link](#)].

**2021: Shaped Policy search for Evolutionary strategies using waypoints** published in [ICRA 2021](#) [[Link](#)].

**2021: Sim2Real transfer for Visual Navigation using Motor primitives** Under submission. Part of the work was submitted to [CoRL 2021](#) Blue sky track.

**2020: Attentive Feature Reuse for Multi Task Meta learning** published in EML Workshop at ICLR 2021 [[Arxiv](#)].

2019: **Meta adaptation using Importance weighted Demonstrations** [\[Arxiv\]](#).

2016: **Simultaneous Aerial Vehicle Localization and Human Tracking** published in TENCON 2016 [\[Link\]](#).

2016: **Intelligent Person following Quadcopter** accepted in [ICCE 2017](#).

2016: **Accurate and Augmented Navigation for Quadcopter based on Multi-Sensor Fusion** published in INDICON 2016 [\[Link\]](#).

Co-authored.....

2022: **Shared Experience Lifelong learning** submitted to [ICLR 2023](#). [\[Arxiv\]](#).

2021: **What can we learn from misclassified ImageNet images?** submitted to [NeurIPS 2021](#). [\[Arxiv\]](#).

## Notable projects

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**SheLL for RL:** Currently working on Shared Experience for Lifelong learning funded by [DARPA](#). In Reinforcement learning, sharing the experiences of a trained agent alone cannot help an untrained agent learn from scratch. This shift in the data-generating distribution, i.e., action-distribution shift, often results in a serious lack of convergence which we overcome in this project. [\[Link\]](#).

**Beobotv3:** Built a mobile robot as a hardware platform for autonomous visual navigation and my PhD research, along with a simulated version in [Gazebo](#) for Reinforcement learning applications [\[Link\]](#).

**Robust loss function for U-Nets:** Presence of the outliers amongst the ground-truth output masks, will have a significant effect on training. We use a Beta loss function borrowed from robust statistics to make the U-Net model training susceptible to outliers, and as a result, produces high-quality output.[\[Link\]](#).

**Multi-entity representations:** We study existing works on Entity segmentation, representation, tracking and prediction in videos and hypothesize a new algorithm based on Multi-Entity VAE for improving scene representation. We also formulate how each of these could be connected to better state representation learning [\[Link\]](#).

**Earthmine-Navvis Mapping system:** Worked on a project with a research group from Technical University of Munich, in generating 3D point-cloud of outdoor environments using an Earthmine system (Omnidirectional stereo camera system) using Semi-Global Matching.

**JeVois Embedded camera:** [JeVois](#) is an open-sourced embedded smart-camera module which was developed in our lab by [Prof. Laurent Itti](#). For this project we developed Visual SLAM using Multi-JeVois Camera system.

**Enhancing Visual SLAM systems:** Designed and constructed a Quadcopter for Undergraduate Hons. Project. Developed a full-stack system comprising of EKF based pose-tracker, Scene-flow, Depth-based LSD-SLAM and Obstacle avoidance using potential fields. Extended the CV library to use the NEON accelerations, OpenGL2 shaders and PRU (Programmable Real-time Units) on [Beaglebone black](#).

**API Support for Beaglebone Blue:** Created easy-to-use APIs and firmware for Beaglebone Blue as part of [Google Summer of Code 2016](#). This project was a collaboration of [Beagleboard.org](#) with the University of California, San Diego [\[Github\]](#).

## Technical Skills

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**ML and Distributed Frameworks:** Pytorch, Tensorflow, TFLite, JAX, Hugging Face, Ray, RLLib, MPI

**Programming/Scripting Languages:** C, C++, C#, Python, UNIX Bash, JavaScript, Ruby

**Vision and Graphics:** Matlab, Simulink, OpenCV, Unreal Engine, WebGL, PCL, CUDA, OpenGL

**Robotic and Embedded Environment:** ROS, MRPT, PSoC, Beaglebone Black, ARM Boards