# Kiran Kumar Lekkala

University of Southern California

+1(747)-229-8784 • klekkala@usc.edu • klekkala.github.io

## Education

**University of Southern California** — **Los Angeles, USA**
*PhD, Computer Science, GPA – 3.83/4.0* — *Aug 2018 – Till Date*
Advisor: Prof. Laurent Itti

**Indian Institute of Information Technology** — **SriCity, India**
*BTech (Hons.), Computer Science and Engineering, GPA – 8.96/10* — *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. Cliffard 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**: **Sim2Real transfer for Visual Navigation using Motor primitives** 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].
**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 Quadrocopter** accepted in ICCE 2017.

**2016**: **Accurate and Augmented Navigation for Quadrocopter 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

**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, OpenGLES2 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

**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