Anirudha Ramesh

aramesh3@andrew.cmu.edu | https://github.com/AnirudhaRamesh | https://anirudharamesh.github.io/ | +1 412-330-7554

EDUCATION

Carnegie Mellon University Pittsburgh, PA
Masters in Robotics, CGPA : 4.12/4.0 *September 2021 - August 2023 (tentative)*
- Select Courses : Machine Learning (PhD), Computer Vision, Deep Learning, Computational Photography, Mathematics for Robotics & Optimization, Embodied AI, Visual Learning & Recognition

International Institute of Information Technology (IIIT-H) Hyderabad, India
Bachelor of Technology (Honors) in Computer Science, CGPA : 9.32/10.0 *Aug 2017 - May 2021*
- **Dean's Research Award - In recognition of outstanding research contribution.**
- Select Courses : Statistical Methods in AI, Optimization Methods, Graphics, Mobile Robotics, Data Structures & Algorithms, Operating Systems ; Automata Theory (TA), Advanced Graphics, AR, & VR (Helped design as a TA).

EXPERIENCE

Auton Lab/NREC, Carnegie Mellon University October 2021 – August 2023 (Pittsburgh, PA)
Graduate Researcher - Advisors: Jeff Schneider, Christoph Mertz *Pytorch, Tensorflow, ROS, Python, C++*
- Designed and deployed a first of a kind perception system capable of functioning off-road 24/7, utilizing multi-spectral inputs. Lead effort in extending object detection and semantic segmentation to function beyond day-time, and collaborate with others for system design and integration.
- Transform Perception Systems (CNN and Transformer based) trained in structured, well-lit environments to work in unstructured environments with variable lighting by developing novel algorithms for domain adaptation (DA) and generalization. Introduced a new framework for DA, and showcased it on semantic segmentation, outperforming existing methods by **+40% mIoU** in unsupervised, and **+25-35% mIoU** in semi-supervised scenarios. **Select efforts under-review at NeurIPS 2023**.

Adobe January 2021 – July 2021 (Noida, India)
Research Intern - Media and Data Science Research (MDSR) Lab *Python, Pytorch*
- Discovered and solved biases in existing solutions, and in the structuring of prominent datasets for Few Shot Segmentation (FSS). Solving for these biases adds to the performance of all tested underlying networks by $\sim 5\%$ mIoU. **Published findings in NeurIPS 2021 (Datasets and Benchmarks) and Adobe Tech Summit 2021** along with a new dataset (TOSS) for nuanced evaluation of FSS. Link to *Paper*.

Robotics Research Center, IIIT-H May 2019 – July 2021 (Hyderabad, India)
Undergraduate Researcher - Advisor : Madhava Krishna *Python, Matlab, C++, g2o*
- Designed computer vision and monocular multibody SLAM systems in dynamic scenes relating to autonomous on-road navigation. Achieved state-of-the-art results in tracking the moving Ego-vehicle and other vehicles in the scene, as well as formulated a novel mechanism to bring everything to a uniform global metric scale. Achieved 3x smaller absolute tracking error over the former leading method. **Published works accepted in IEEE IV 2020** (*Paper*, *Video*), **IV 2021**(*Paper*), and **VISAPP 2021**(*Paper*).
- Mentored new lab inductees in vision, deep learning, and optimization in research projects, and summer school.

PROJECTS

Learning to Detect by Learning to Predict | *Python (Pytorch)*
- Inspired by the theory of predictive coding, we develop a system which improves detection by infusing the ability to predict. Our novel pretraining consistently beats standard pretraining in average recall, particularly for small objects, by upto 2% on the COCO dataset, and shows promising results in improving current SoTA solutions. *Link*.

Robotic Vision And Mobile Robotics Mini-Projects | *Python, Matlab*
- Implemented visual odometry on KITTI-Odometry, Dense Stereo Reconstruction, Motion Estimation using PnP, and Extended Kalman Filter to combine motion and observation models to get better robot localization.

Computational Photography Projects : Implemented algorithms, and designed capture for
- Image Development Pipeline, HDR Capture and Merging, Gradient Domain Processing for enhancement, Lightfield Rendering, Depth from Focus, Confocal Stereo, Capturing Unstructured Lightfields, Photometric Stereo etc.
- Motion Magnification, Motion Mode Extraction, and virtualization of physical objects based on these modes, which allows deformation on application of forces. *Link*.

TECHNICAL SKILLS

Languages: Python, C/C++, Matlab, Golang, SQL
ML and Optimization: Pytorch, tensorflow, g2o, ceres, OpenCV