Anirudha Ramesh

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Education

Carnegie Mellon University
Masters in Robotics, ***CGPA : 4.1/4.0*** *September 2021 - August 2023 (tentative)*

International Institute of Information Technology, Hyderabad (IIIT-H)
Bachelor of Technology (Honors) in Computer Science, ***CGPA : 9.32/10.0*** *Aug 2017 - May 2021*

- *Dean's List-1 : Top 5% of class (2018-19,2019-20, 2020-2021)*
- *Semester GPA 10/10 : (Fall 2019-20, Spring 2019-20, Spring 2020-2021)*
- *Dean's Research Award - In recognition of research contribution (2019-20)*
- *Dean's Merit List : Top 20% of class (2017-18)*

Experience

Auton Lab / NREC October 2021 – August 2023
Graduate Researcher *Pittsburgh, Pennsylvania*

- Work on multi-spectral vision in off-road, night time scenes with emphasis on minimal supervision and deploy-ability on real robotic systems. From a research perspective, look at domain adaptability and performance under shifting domains.

Robotics Research Center May 2019 – July 2021
Undergraduate Researcher *Hyderabad, India*

- Worked with Prof. Madhava Krishna on monocular multi body SLAM in dynamic scenes relating to autonomous cars as an honors student.
- Submitted and Published at IV-2020, IV-2021, VISAPP-2021.

Adobe Research January 2021 – July 2021
Research Intern *Noida, India*

- Research Intern at Adobe's Media and Data Science Research (MDSR) Lab. Worked primarily on few-shot segmentation, representation learning, and automatic image compositing. Published in NeurIPS 2021 Datasets and Benchmarks Track.

RICE.AI July 2019 – Jan 2021
Co-founder *Hyderabad, India*

- A B2B SaaS company that aims to make access of high quality, difficult to find datasets easy for both researchers, and companies.
- Won 'Start-Up Aid', a T-Hub, Hyderabad and CIE, IIIT-H backed competition aiming to assist growth of start-ups.

Publications

What Ails One-Shot Image Segmentation: A Data Perspective

- Submitted and Published at NeurIPS 2021 Track Datasets and Benchmarks. Link to *Paper*

BirdSLAM: Monocular Multibody SLAM in Bird's-Eye View

- Submitted and Accepted at VISAPP-2021. Link to *Paper*.

Multi-Object Monocular SLAM For Dynamic Environments

- Submitted and Published at IEEE-Intelligent Vehicle (IV) Symposium 2020. Link to *Paper*, *Video*.

Probabilistic Collision Avoidance For Multiple Robots: A Closed Form PDF Approach

- Submitted and Published at IEEE-Intelligent Vehicle (IV) Symposium 2021. Link to *Paper*

Projects

Multi-Object Monocular SLAM for Dynamic Environments, and BirdSLAM | *Python, Matlab, C++, g2o*
- Created a pipeline for Mutlibody SLAM in a dynamic road setting in relation to autonomous cars.
- Achieved State-Of-The-Art results in tracking the moving Ego vehicle and other vehicles in the scene into a uniform global metric scale.

Few Shot Segmentation | *Python (Pytorch)*
- Worked with the Adobe MDSR team on discovering and solving biases in existing solutions for Few Shot Segmentation. Published at NeurIPS 2021 track Datasets and Benchmarks.

Learning to Detect by Learning to Predict | *Python (Pytorch)*
- Human interactions with the environment are mainly powered by our prowess in prediction, and prediction often precedes detection. Using this intuition, we develop a system which improves detection by infusing the ability to predict within the system. *Link*

Automatic Image Compositing | *Python (Pytorch)*
- Worked with the Adobe MDSR team on setting up a project which aims to automatically place a given object in a given image appropriately using deep neural networks.

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

Computational Photography Mini-Projects : Implemented algorithms, and designed capture for the following
- Image Development Pipeline, HDR Capture and Merging, Gradient Domain Processing for image enhancement.
- Lightfield rendering, depth from focus, confocal stereo, capturing and refocusing your own unstructured lightfield, photometric stereo, and 3D Reconstruction using Structured Light
- Motion Magnification, Motion Mode Extraction, and virtualization of physical objects based on these modes, which allows deformation on application of forces. *Link*

XTREME TIC-TAC-TOE BOT | *Python*
- An expert Xtreme Tic-Tac-Toe Bot which uses Min-Max Iterative Deepening Search with Alpha-Beta Pruning, Hashing for speed, and a smart cut-off heuristic amongst other features.

Miscellaneous CV Projects
- **SLIDE MATCHING :** A tool to match frames projected on a screen with the appropriate slides of the true presentation using various vision techniques like feature matching and minimizing covariance. Finally attained results with around 95% accuracy for given test sets.
- **3D AIRCRAFT SIMULATOR :** An OpenGL based 3D Aircraft Simulator.
- **6 DoF VR system :** Vision Based VR system built requiring low system processing requirements with mobile-unity integration.

Hackathons
- Detection of Mosquito Breeding Pools : Neural Network Based solution to accurately identify mosquito breeding spots using image input from drones.
- Question Generator : A solution to generate the best Fill-in-the-Blanks questions possible given an article, or textbook chapter. Extractive summarization, tf-idf, text-rank used amongst other techniques. Secured a podium finish ahead of 250+ participants.

Selected Coursework

Graduate Course: Computer Vision, Visual Learning and Recognition, Computational Photography, Robustness and Adaptivity in Shifting Environments, Mathematics for Robotics, Robotics Business.

Undergraduate Courses : Statistical Methods in AI, Optimization Methods, Artificial Intelligence, Graphics, Mobile Robotics, Data Structures and Algorithms, Operating Systems, Compilers, Database Systems, Probability, Discrete Math and Group Theory, Linear Algebra.

Teaching Assistant: Automata Theory. Helped design and teach Advanced Graphics, AR, and VR.

Technical Skills

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