Anand Uday Gokhale

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Education

*: As of November 2020

Indian Institute of Technology Madras, Chennai, India — *July 2017 - May 2022*

- Bachelors and Masters in Technology in Electrical Engineering — CGPA : 8.95/10*
- Specialization in Control Systems — CGPA in control system related courses : 9.64/10*

Professional Experience

Stanford Cognitive and Systems Neuroscience Laboratory, Stanford Medicine — *Aug 2020 - Present*

- Guide : Prof. Vinod Menon
- Developing simulation based models for brain dynamics, and implementing learning methods on brain data

University of California San Diego and University of Minnesota Twin Cities — *May 2021 - Oct 2021*

- Summer Intern, Guides : Prof. Behrouz Touri, Prof. Soheil Mohajer
- Developing Distributed optimization methods resilient to noisy and quantized networks

Dynamics and Control Lab, IIT Madras — *Aug 2020 - Present*

- Undergraduate Researcher, Guide: Prof. Ramkrishna Pasumarthy
- Developing theories for network controllabity, and attempting to model brain dynamics

Internship In Automated Driving Team, Mercedes Benz R&D India — *May -July 2019*

- Intern, Lane Fusion Team
- Designed novel algorithms for safety systems in ADAS enabled cars, robust to various disturbances in multiple sensors
- Patent Published, titled : System and Method for Regulation of Horn of a Vehicle

Internship In Computer Vision team, Detect Technologies — *Dec 2018 - Jan 2019*

- Designed Computer Vision algorithms for the drone software stack
- Developed realtime algorithms for monocular 3d reconsruction, Panaromic Image stitching and livestreaming video feed

Research Experience

Master's Thesis : A study on Brain networks — *August 2020 - Present*

- Guide : Prof. Ramkrishna Pasumarthy, IIT Madras, in collaboration with Prof. Vinod Menon, Stanford Medicine
- Developed and identified algorithms to optimize controllability metrics for target controllability
- Studied nonlinear network models, such as the Wilson Cowan model, and developed theories for their controllability
- Developed Deep learning models to predict autism and gender based on fMRI data
- Developed methods to identify the regions of the brain, and the connections within the brain which explain the output of the model

Distributed optimization under noisy/lossy communication — *August 2020 - Present*

- Guides : Prof. Behrouz Touri, UC San Diego, Prof. Soheil Mohajer, University of Minnesota Twin Cities
- Worked on a two time scale gradient descent approach for distributed optimization for time varying networks with noisy and quantized channels.
- Identified and derived sufficient conditions for almost sure convergence to the optimal solution for the distributed optimization problem under lossy/noisy channels

Online distributed optimization with Adversaries — *May - Sep 2021*

- Guide : Prof. Rachel Kalaimani, IIT Madras
- Developed an algorithm for Distributed Online optimization against Byzantine Adversaries
- Defined a notion of regret for an online optimization problem in an adversarial setting

Publications

- **A Gokhale**, MV Srighakollapu, RK Kalaimani and R Pasumarthy, "Optimizing controllability metrics for target controllability", Indian Control Conference, 2021, [Accepted]
- S Sahoo, **A Gokhale**, and RK Kalaimani, "Distributed Online Optimization with Byzantine Adversarial Agents", American Control Conference, 2022, [Submitted], Preprint available on arxiv
- Patent Published : **A.Gokhale**, P. Ramalingaiah, "System and Method for regulation of Horn of a vehicle"

Relevant Projects

Developing Freespace estimation model for Indian Road using unlabelled data [Report] *Oct - Nov 2019*

- Built a self supervised neural network to identify freespace for ADAS systems on unlabelled data
- Implemented and trained AdapNet, Multimodal Semantic segmentation network on unlabelled data from the Indian Driving Dataset using an existing network trained using KITTI Dataset

Course Project; Geometry & Photometry-based Computer Vision [Report] *Apr - Aug 2020*

- Implemented Realtime sparse stereo odometry using python, by estimating motion between consecutive frames
- Benchmarked this approach against S-PTAM and Stereo DSO using Kitti Odometry Dataset, and identified limitations of proposed algorithm

Development of a Compiler for a Systolic Accelerator [Report] *Jan - Jun 2020*

- Guide : Prof. Pratyush Kumar, RISE Lab, IIT Madras
- Developed Compiler for in house developed Systolic Accelerator as a peripheral to Shakti Processor
- Developed Autotuning algorithms for optimal runtime of Deep Learning Models on a custom systolic accelerator

Eye in the Sky, Inter IIT Tech Meet-2018 [Report] *Dec 2018*

- Developed Deep Learning models for segmentation of satellite images for 8 classes using a small dataset of only 14 images.
- Implemented class-wise U-net based architectures and employed hard mining for under-represented classes.
- Implemented Classical Computer Vision based solution for classes with high variance.
- Represented IIT Madras and placed fourth at Inter IIT Tech Meet 2018, among 20 IITs

Technical Skillset

- Computer Languages : Python, MATLAB, C, C++
- Libraries : Tensorflow, Pytorch, OpenCV, numpy, cvx

Relevant Coursework

G: Graduate Level Courses

- Networked Control Systems^G
- Linear Dynamical Systems^G
- Convex Optimization^G
- Systems Engineering for Deep Learning^G
- Distributed Optimization for Control^G
- Optimal Control^G
- Geometry,Photometry for Computer Vision^G
- Deep learning for Imaging^G
- Stochastic Control^G
- Applied Linear Algebra^G
- Probability Foundations
- Computer Organization

Position of Responsibility

Teaching Assistant, Department of Electrical Engineering, IIT Madras *Jul 2021 - Nov 2021*

- Teaching assistant for Graduate level core course on Linear Dynamical Systems
- Conducted classes, Created Assignments and Question Papers

Teaching Assistant, NPTEL, Ministry of Human Resources and Development, Govt. of India *Jul 2021 - Nov 2021*

- Teaching assistant for Linear Systems Theory course conducted online
- Curated online content including Assignments and Question Papers

Head- Computer Vision and Intelligence Group, Centre for Innovation, IIT Madras *Apr 2019-Feb 2020*

- Undertook and mentored several projects in pattern recognition, autonomous mapping and navigation,reinforcement agents, etc.
- Conducted sessions and workshops for a 200+ audience on topics involving machine learning and artificial intelligence

Peer Reviewer for IEEE conferences

- Indian Control Conference 2021
- European Control Conference 2022

Scholastic Achievements

- Secured **AIR 1716** (Top 0.8%ile) in JEE Advanced 2017 (out of about **220,000+ candidates**)
- Secured **AIR 3724** (Top 0.3%ile) in JEE Mains 2017 (out of about **1,200,000 candidates**)
- Awarded **KVPY Scholarship** (top **1%** out of 10,000 applicants) and **offered fellowship** in 2017

Extra Curricular Activities

- Senior Diploma in Hindustani Classical music for playing a keyboard/piano.
- Selected for NSO-Soccer at IIT Madras, and trained with institute soccer team for a year.