SNEHAL SINGH TOMAR

Second Year Masters Student,
Dept. of Electrical Engineering, IIT Madras

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Education

- **Indian Institute of Technology Madras** — Chennai, India
  M.S. (by Research) in EE, Advisor: Prof. A.N. Rajagopalan; CGPA: 9.0/10.0 — *September, 2020 - Present*
- **Manipal Institute of Technology** — Manipal, India
  B.Tech. in ECE, Minor in Signal Processing; CGPA: 8.42/10.0 — *2016 - 2020*

Research Focus

Image Processing, Computer Vision, Deep Learning, Self-Supervised Learning, Generative Models, Interpretability of Deep Models, Computer Vision for Augmented Reality (AR)

Publications

- (*Under review at NeurIPS 2022*) **Snehal Singh Tomar** and A.N. Rajagopalan. "Latents2Semantics: An Interpretable Generative Autoencoder for Localized Style Manipulation of Real Face Images"
- **Snehal Singh Tomar** and A.N. Rajagopalan. "Latents2Segments: Disentangling the Latent Space of Generative Models for Semantic Segmentation of Face Images", IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshop on Computer Vision for Augmented and Virtual Reality, New Orleans, LA, 2022
- **Tomar S.S.**, Narendra V.G. (2019) Python-Based Fuzzy Classifier for Cashew Kernels. In: Bansal J., Das K., Nagar A., Deep K., Ojha A. (eds) Soft Computing for Problem Solving. Advances in Intelligent Systems and Computing, vol 816. Springer, Singapore. (**Best Paper Award** at the 7^{th} International Conference on Soft Computing for Problem Solving(2017) held at IIT Bhubaneswar)

Research Experience

- **Indian Institute of Technology Madras** — Prof. A.N. Rajagopalan
  M.S. (by Research) Thesis — *June, 2021 - Present*
  - Investigated and developed deep generative models for style attribute manipulation of real images which can be leveraged by AR applications
  - Actively involved in the establishment of the proposed Centre of Excellence on Computer Vision for Augmented and Virtual Reality under the Institution of Eminence scheme by Govt. of India
- **Indian Institute of Technology Delhi** — Prof. Shubhendu Bhasin
  B.Tech. Project and Undergraduate Internships in Robotics and Control Systems — *2017 - 2020*
  - **B.Tech. Project (Spring, 2020)**: *Implementation of Torque-Based Position Control for Trajectory Tracing by a Five DOF Robotic Manipulator*
    Tele-Operated the ROBOTIS Open Manipulator-X in position control mode using its ROS packages, Developed a Torque-Based Position Controller for the Open Manipulator, Simulated and tested the controller in Gazebo
  - **Research Project (Summer, 2019)**: *Torque Transformer for Position Controlled Robotic Joints*
    Worked towards deployment of Torque Control on Robotic Joints which were governed by position-controlled servo motors, using a torque-position transformer approach.
  - **Internship Project (Summer, 2018)**: *Target Detection in Aerial Video Feed Using Deep Convolutional Neural Networks*
    Trained the YOLO (You Only Look Once) object detection pipeline on the *Stanford Drone Dataset* and analyzed improvements in its performance upon augmenting the training data with geometric image transforms.
  - **Internship Project (Winter, 2017)**: *Error Characterization of Opti-Track Motion Capture System*
    Studied an IR camera based Motion Capture System, characterized the error in position of the objects tracked by it, and Proposed an optimal IR camera set-up for a dedicated motion capture laboratory

Teaching

Served as a TA for the following courses at IIT Madras:

- EE5175 (Image Signal Processing) offered by Prof. A.N. Rajagopalan in Spring, 2022
- EE6132 (Deep Learning for Imaging) offered by Prof. A.N. Rajagopalan in Fall, 2021
- EE5180 (Introduction to Machine Learning) offered by Prof. Avhishek Chatterjee in Spring, 2021

Proficiencies & Skills

- **Programming Languages**: Python, C++, HTML/CSS
- **Deep Learning Frameworks**: Pytorch, Tensorflow
- **Tools and Libraries**: MATLAB, Swift(Xcode), OpenCV, Scikit-Fuzzy

Relevant Graduate Coursework

Fundamentals of Deep Learning, Image Signal Processing, Computational Photography, Digital Signal Processing, Linear Algebra, Probability foundations for Electrical Engineers

Scholastic Higlights

- Awarded Half Time Research Assistantship (HTRA) as funding support for pursuing graduate studies in India by Ministry of Edcuation, Govt. of India
- Graduate Aptitude Test in Engineering (ECE) *2020*| score: 608/1000
- GRE General Test Score:- Quantitative and Verbal Ability: 320/340 | Analytical Writing: 3.5/6
- Awarded Research Incentive and Certificate of Appreciation in October, 2018 by Manipal Academy of Higher Education (MAHE) for producing award winning research work
- Obtained a percentile score of 98.62 among 1.3 million Indian High School Students in the IIT JEE (Advanced), 2016
- Cleared National Talent Search Examination (Stage-I), conducted by National Council of Educational Research and Training(NCERT) from Uttar Pradesh state in 2011.

Selected Undergraduate Projects

Served as a member, Sensing and Automation division(*February, 2017 to March, 2019*) of **Project MANAS** (www.projectmanas.in). Project Manas is the official AI Robotics Student Team of Manipal Academy of Higher Education(MAHE), Manipal. The team's key focus is development of a Autonomous car and is a part of the *Mahindra Rise Prize Challenge*, which is India's first Autonomous Car Competion.

Wireless Communication Architecture for an Autonomous robot Project MANAS
Antenna Theory, Embedded Systems *January, 2018 - March,2018*

- Worked on development of a wireless communication system comprising of microcontrollers, RFmodules and antennae for communication between a computing system and an autonomous robot.
- This was a part of Project Manas' entry to International Ground Vehicle Challenge (IGVC)-2018 held at Michigan, USA; where the team stood second in the Inter-Operability Challenge and ninth overall.

Fuzzy Controller for an Autonomous Car Project MANAS
Soft Computing, Control Theory *August, 2017 - October,2017*

- Developed a standalone fuzzy throttle v/s break controller on the lines of a traditional Mamdani Controller and linked it with ROS framework for control of an autonomous electric vehicle.
- The controller performed well on planes, inclines and turns during tests.