SATYAJEET DAS

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EDUCATION

University of Pennsylvania, School of Engineering and Applied Science | Philadelphia, PA **May 2024**
Master of Science in Electrical Engineering & Systems Engineering {***Robotics & Machine Learning***}, **GPA: 3.95/4.00**
Courses: ESE 605: Modern Convex Optimization, ESE 546: Principles of Deep Learning*, CIS 580: Machine Perception, CIS 7000: Introduction to Neural Scene Representation and Neural Rendering, CIS 7000: Vision-Based Robot Learning*, ESE 514: Graph Neural Networks, CIS 545: Big Data Analytics, ESE 500: Linear Systems, ESE 519: Embedded Systems, MEAM 6200: Advanced Robotics*.

Veer Surendra Sai University of Technology (VSSUT) | Burla, India **May 2021**
Bachelor of Technology in Electrical Engineering, **GPA 9.57/10.0**
Ranked 1st in the University, awarded 5 Gold Medals for Best Overall Graduate, Best Electrical Engineering Graduate, and Best All-Rounder.

SKILLS

Programming Language: Python, C++, C, C#, MATLAB, HTML, CSS, JavaScript, SQL.
Software & Frameworks: PyTorch, TensorFlow, JAX, ROS, GAZEBO, CARLA, Scikit-learn, OpenCV, Apache Spark, PyBullet, AWS.
Other Skills & Tools: Robotics, Machine Learning, Deep Learning, Computer Vision, Control Systems, Graph Neural Network, Reinforcement Learning, Data Science, Natural Language Processing, Embedded Systems, Docker & Linux.

RESEARCH PAPERS

Masters Papers:

- "*On the Feasibility of EEG-based Motor Intention Detection for Real-Time Robot Assistive Control*". **{ICRA 2024, IEEE} (UNDER REVIEW)**
- "*Learning Robust Perception based Control Barrier Functions from Safe Expert Demonstrations".* **{IEEE Open Journal of Control Systems} (UNDER REVIEW)**
- "*Real-Time Perception Based Control Barrier Functions for Efficient Robotic Navigation Using Depth Camera".* **(To be Submitted December 2023)**

Undergrad Papers:

- *"An Optimized Fractional Order Cascade Controller for Frequency Regulation of Power System with Renewable Energies and Electric Vehicles".* DOI*: https://doi.org/10.1007/s12667-021-00461-9* **{"Energy Systems", Springer**}
- *"Design of fractional order multistage controller for frequency control improvement of a multi microgrid system using equilibrium optimizer".* **{"Multiscale and Multidisciplinary Modeling, Experiments and Design", Springer}**
- *"Slime mould algorithm based fractional order cascaded controller for frequency control of 2-area AC microgrid". DOI: https://doi.org/*10.1109/APSIT52773.2021.9641192 **{"2021 International Conference in Advances in Power, Signal, and Information Technology (APSIT)", IEEE}**
- *"Shrewd Sine–Cosine Algorithm Based Double Integral Tilt Derivative Controller for Frequency Regulation of Multi Microgrid System".* **{[PCMP-D-22-00057], "Journal of Energy Storage", Springer Open} (UNDER REVIEW)**

Master's Thesis:

Real - Time Dynamic SDF for Robot Interaction & Beyond. (Prof. Nadia Figueroa & George Pappas)

SELECTED PROJECTS

On the Feasibility of EEG-based Motor Intention Detection for Real-Time Robot Assistive Control (Prof. Ruzena Bajcsy & Nadia Figueroa)

- Developed an EEG-based online human intention classifier for robot assistive controls using tangent space covariance matrix projection with SVM classifier, achieving 86.88% accuracy in real-time settings and 70% accuracy in real robot experiments.

Real-Time Perception Based Control Barrier Functions for Efficient Robotic Navigation Using Depth Camera (Prof. Nadia Figueroa)

- Developed a real time Signed Distance Function generator based of neural radiance fields for construction of online perception based CBFs without prior training using a depth camera for efficient and safe robot navigation.

Learning Robust Perception based Control Barrier Functions from Safe Expert Demonstrations (Prof. Nikolai Matni & Lars Lindemann)

- Designed a ResNet based CNN architecture for processing the dashboard camera image data to a perception map, hence producing an innovative Perception-based robust control barrier function using a two-layer DNN.

Multi-Robot Multi -Target Localization and Planning using Graph-Reinforcement Learning (Prof. George Pappas Group)

- Developed a multi-robot & multi-target path planning & localization algorithm using deep q learning combined with Graph Neural Network outperforming the Dec-SB and Random Walker algorithm for efficiently solving the Active information acquisition problem.

Motion Planning for Self-Driving Car

- Developed a functional motion planning stack that avoids both static & dynamic obstacles, track the center line of a lane, & handling stop signs. [Behavioral planning logic, static collision checking, path selection, & velocity profile generation] in CARLA simulation.

Distributed Learning with Graph Neural Networks

- Developed a Graph Neural Network to learn a distributed policy that mimics the optimal centralized controller considering a multi-agent system with N agents tasked with controlling a dynamical process, while ensuring collision and spread avoidance.

NeRF: Neural Radiance Fields

- This project provides one of the most simplified implementations of the famous Neural Radiance Fields paper "NeRF Representing Scenes as Neural Radiance Fields for View Synthesis".

RSNA STR Pulmonary Embolism Detection

- Developed the Pulmonary Embolism Detection model based on CNN (Efficientnet-b0) with a weighted log loss of 0.08 for reducing human delays and errors in detection and treatment of PE from chest CT pulmonary angiography images.

PROFESSIONAL EXPERIENCE

Figueroa Robotics Lab @ Penn - *Summer Research Intern* **-** Machine Learning & Robotics **|** USA **May 2023 – August 2023**

- Developed a novel online EEG – based human intention classifier for robotic assistive control.
- Developed RGB-D camera- based real-time SDFs predictor for reactive obstacle avoidance and safe control.

FirstWork – *Advisor* | USA **Aug 2023 – cont.**

- Part-time Advisor in Artificial Intelligence & Computer Science, committed to fostering projects for the betterment of humanity.

University of Pennsylvania - GRASP Lab – *Graduate Research Assistant* | USA **Nov 2022 – cont.**

- Working in the GRASP (General Robotics, Automation, Sensing and Perception) Lab in projects related to machine learning, data science, computer vision, control systems & robotics under Prof. George Pappas, Nikolai Matni, Ruzena Bajcsy & Nadia Figueroa.

Tata Group (Tata Steel Limited) – *Manager* |India **July 2021 – July 2022**

- Managed (planning, development & support) the level-2 automation team, a team of 17 software developers engaged in the Research & Development of in-house software projects for enhancing the performance & efficiency of the steel plant.
- Managed and planned the annual maintenance & automation projects for the automation team (123 members). In addition, provided technical support during breakdown & new installations related to PLC & Drives. Overall saving of $800,000 for FY'22
- The Key Projects resulted in a monetary saving of $ 85,000 per day and increased the efficiency of systems by 9%.
- Independently worked on the "CONARC-LDC application" and designed a deep learning model for forecasting the hourly electricity requirement resulting in an approximate saving of $ 30,000 per day during energy bidding process.

Indian Institute of Technology, Kharagpur, (IIT-KGP) – *Research Intern* – Data Science & Machine Learning | India **May 2020 – July 2020**

- Developed a forecasting model for the prediction of COVID-19 cases for 81 countries of the world using DNN and LGBM with an accuracy of 97.6% - 99.8%.
- Dispelled the persistent rumors relating to the weather's role in the transmission of infection; examined and elucidated that the weather had little to no role in the spread of COVID-19.

Veer Surendra Sai University of Technology (VSSUT) – *Undergraduate Research Assistant* | India (**2.5 Years**) **Jan 2019 – June 2021**

- Researched in soft computing, machine learning, control system & power system stability under Prof. Sidhartha Panda of VSSUT. Resulted in 4 research papers, with 3 published and 1 under review.

ADDITIONAL EDUCATION / ONLINE CERTIFICATION

SPECIALIZATION

Deep Learning Specialization by *deeplearning.ai* (Coursera) [5 Courses]
Self-Driving Cars Specialization by *University of Toronto* (Coursera) [4 Courses]
Machine Learning Engineering for Production (MLOps) Specialization by *deeplearning.ai*
IBM Data Science Professional Certificate (Coursera) [9 Courses]
Applied Data Science with Python Specialization by *University of Michigan* (Coursera) [5 Courses]
Business Analytics Specialization by *Wharton School of the University of Pennsylvania* (Coursera) [5 Courses]
Python for Everybody Specialization by *University of Michigan* (Coursera) [5 Courses]
Algorithms Specialization by *Stanford University* (Coursera) [4 Courses]

COURSES

Machine Learning by *Stanford University* (Coursera)
Industrial IoT on Google Cloud Platform by *Google Cloud* (Coursera)
Google Cloud Business Professional Accreditation by *Google Cloud*
Introduction to Programming with MATLAB by *Vanderbilt University* (Coursera)

ADDITIONAL POSITION & RESPONSIBILITY

- Graduate Assistant for GSC (PENN)
- Member of Penn Quant Trading Club
- Member of Penn Club
- UPENN Tech Center Assistant
- Student Representative of RUSA for VSSUT
- Student Representative for ARC of VSSUT
- Student Representative for ARC of VSSUT
- Core Member of Robotics Club of VSSUT
- Student Representative for ICC of VSSUT
- Core member of IEEE VSSUT Student Branch

TEACHING EXPERIENCE

- Teaching Assistant for ESE 5000: Linear Systems Theory (University of Pennsylvania)
- Teaching Assistant for Control Systems Engineering - I (Veer Surendra Sai University of Technology)
- Teaching Assistant for Control Systems Engineering - II (Veer Surendra Sai University of Technology)
- Teaching Assistant for Signal & Systems - I (Veer Surendra Sai University of Technology)
- Teaching Assistant for Microprocessor & Microcontroller Theory & Appl (Veer Surendra Sai University of Technology)
- Teaching Assistant for Computer Programming (Veer Surendra Sai University of Technology)
- Teaching Assistant for Object Oriented Programming (Veer Surendra Sai University of Technology)

AWARDS & HONORS

- Dr. Nityananda Patnaik Gold Medal for Best All Rounder Graduate in Engineering
- Prof. Nilakantha Pattnaik Memorial Gold Medal for Best Graduate in Engineering
- Guru Prasad Memorial Gold Medal for Best Engineering Graduate
- Late Prof. J.N. Panda & Late Mrs. R. Panda Gold Medal for Best Electrical Engineering Graduate
- University Gold Medal for Best Graduate in Electrical Engineering
- Summited Siyari Top in the Himalayas at 11,800 feet
- Selected by the Vice Chancellor of VSSUT to represent the university in the RUSA initiative by the Government of India

EXTRACURRICULAR

Cricket, Playing Guitar, Reading Books, Exploring Movies, Travelling, Hiking.