

# SATYAJEET DAS

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**Portfolio / Website:** <https://satyajeet-das-info.github.io/>

## 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: 3.96/4.00

**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}
- “Learning Robust Perception based Control Barrier Functions from Safe Expert Demonstrations”. {IEEE Open Journal of Control Systems}
- “Real-Time Perception Based Control Barrier Functions for Efficient Robotic Navigation Using Depth Camera”. (To be Submitted March 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**

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**Figuroa 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**

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#### **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**

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- 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**

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- 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**

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- 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**

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