SIDDHARTH DEY

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EDUCATION

University of California San Diego *Sep' 2022 – Ongoing*
Master of Science, Electrical and Computer Engineering

Indian Institute of Technology Madras *Jul' 2018 – Jul' 2022*
Bachelor of Technology (Honours), Mechanical Engineering *CGPA: 9.18/10.0*

PUBLICATIONS

Siddharth D., Ridhi P., Nagamanikandan G., Thiyagarajan R., Asokan T. (2022) "Towards Mission-Specific characterization of the Diving Performance of an Underwater Glider". In: OCEANS 2022

RESEARCH EXPERIENCE

Underwater Glider Design using Variable Buoyancy *Jun' 2021 – Apr' 2022*
Guide: Prof. Asokan T., Robotics Laboratory, IIT Madras [Paper]

- Integrated an actuated metallic bellow, enveloping the entire fuselage of the glider, to change the volume of the overall system and generate residual buoyant force, allowing dive cycles up to 40 m
- Utilized Longerons and Formers in the glider's fuselage and ensured optimal Factor of Safety with ANSYS
- Improved the range and depth of the mission by optimizing the wing parameters based on the Multi-objective Genetic Algorithm; the paper has been submitted for Oceans Conference & Exposition, 2022

Modal Decomposition Analysis of Ventilated Jet Flow *Jun' 2021 – Jun' 2022*
Guide: Prof. Kameswararao A., Fluid Systems Laboratory, IIT Madras [Thesis]

- Simulated the turbulent characteristics of a ventilated jet flow for varying inlet velocity ratios in OpenFoam
- Employed Reduced-Order Models including POD[1] and DMD[2] on the velocity data points to examine the flow's coherent structures, with validation cases on synthetically generated mixed spatiotemporal signal
- Modeling the turbulent inflow characteristics of a jet flow by developing a Low Order Dynamical System from the POD modes

Localization of Anomalous Objects on Road *Dec' 2020 – Mar' 2021*
Employer: Toyota Connected India (TCIN), Role: Computer Vision Intern

- Investigated and reproduced solutions for localizing and mapping the GPS coordinates of small obstacles by integrating deep learning models of instance segmentation and depth map estimation
- Created an occupancy grid map with the help of a Variational Encoder-Decoder Model by training the neural network on images from the nuScenes dataset
- Generated the Bird's Eye View (BEV) using Inverse Perspective Mapping (IPM) of the frontal scene

PROJECTS

Semi-active Suspension and Vacuum Tube for Hyperloop Pod *Jan' 2020 – Jul' 2021*
Avishkar Hyperloop; European Hyperloop Week, 2021 Competition [Report]

- Spearheaded a team of 11 engineers as the Mechanical Group Lead of Stability and Structure
- Implemented Fuzzy Logic-based closed-loop control with variable magnetorheological dampers and lasers to generate real-time feedback for semi-active suspension
- Designed a 500m long vacuum tube to reduce air drag and serve as the platform for the pod's propulsion
- Won 'Most Scalable Design' award and placed among the top five teams in mechanical and full pod divisions

1) POD: Proper Orthogonal Decomposition; 2) DMD: Dynamic Mode Decomposition; *: Ongoing

Autonomous Staircase Climbing Bot, Robotics Challenge *Jul' 2020 – Jan' 2021*

Flipkart Grid 2.0, National Hackathon [Video]

- Devised the bot based on a lead-screw mechanism to carry a payload of 3-5kgs robustly in unknown terrains
- Trained YoloV5 to generate 2D bounding boxes for staircase detection and demonstrated a PID-based speed controller in Gazebo with ultrasonic sensors plugin to avoid obstacles
- Awarded the 'Most Innovative Approach' in the National Finale out of 6000+ participated teams

Survey of Deep RL Algorithms for drone navigation *Apr' 2020 – Apr' 2021*

Project Smartcopter

- Developed an indoor drone capable of navigating in a GPS-denied environment
- Trained the drone to plan a collision-free path in minimal time with Reinforcement Learning algorithms including Deep Q Network (DQN) and Actor-Critic in Gazebo
- Processed the point clouds generated by depth cameras as input with Graph Convolutional Networks (GCN) to generate the Q-values, reducing collision frequency by 15% compared to directly running CNN on depth-maps

Data Lake Analyst Intern *Jun' 2019 – Jul' 2019*

Fixnix, Chennai

- Data Mining of highly unstructured regulatory risk data to analyze regulatory violations and help increase data accessibility
- Performed web crawling using Beautiful Soup and Selenium to scrape online data and stored them in MongoDB which served as a local database
- Structured the scraped data using Named Entity Recognition (NER) for AI-driven text analysis with the help of NLP based libraries including Spacy and nltk

SCHOLASTIC ACHIEVEMENTS

- Secured All India Rank 1186 in Engineering Entrance JEE Advanced Exam, 2018 out of 150,000 candidates
- Secured All India Rank 1917 in Engineering Entrance JEE Mains Exam, 2018 out of 1.5 million candidates

COURSE WORK

- **Robotics Courses**: Introduction to Robotics; Mechanics and Control of Serial Robots*; Dynamics and Control of Spacecraft*; Measurements, Instrumentation, and Control
- **Online Courses (Coursera)**: Deep Learning Specialization, Reinforcement Learning Specialization, Robotics: Computational Motion Planning
- **Mathematics Courses**: Applied Linear Algebra; Probability, Statistics, and Stochastic Processes
- **Graduate Engineering Courses**: Process Optimization; Design and Optimization of Energy Systems*

TECHNICAL SKILLS

- **Domain Skills**: Dynamics and Control, Computer Vision, NLP, CAD, Machine Learning, Turbulence Modeling
- **Programming Languages and Frameworks**: Python, C++, Tensorflow-Keras, Pytorch, ROS, Linux
- **Software**: MATLAB, Simulink, Mathematica, ANSYS, Adams, Solidworks, OpenFoam, LaTeX, Gazebo

EXTRACURRICULAR ACTIVITIES

- **Winner** – 'Cricbot' Interhostel competition, developed an autonomous bot to play cricket using computer vision
- **CVI coordinator**: Worked on conducting Computer Vision and Machine Learning online sessions for students
- **Sports**: Played Ultimate Frisbee as part of the National Sports Organization program in my freshman yearssS

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