Website **GitHub** **Linked**in
Phone: 858-319-6386
Email: sidey@ucsd.edu

SIDDHARTH DEY

EDUCATION

University of California San Diego *Sep' 2022 – Ongoing*
Master of Science, Electrical and Computer Engineering CGPA: 3.9/4.0

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 [Link]

RESEARCH EXPERIENCE

Motion Prediction Models *Jun 2023 – Sep 2023*
Employer: Rivian, Role: Machine Learning Engineering Intern
➢ Conducted in-depth analysis of trajectory prediction models using the Waymo Open motion dataset (WOMD)
➢ Analyzed and experimented with the LSTM-based Multipath++ and transformer-based Wayformer models
➢ Engaged in fine-tuning the ONNX computational graph and implementing Post-training quantization (PTQ)

Learning-based Task Recommendation System *Oct 2022 – Mar 2023*
Guide: Prof. Sujit D., Mobile Systems Design Lab
➢ Training a Transformer-Encoder model in PyTorch to evaluate the repetitions in a physical therapy exercise video
➢ Using MLflow to track the parameters and metrics of the different experiments and store the artifacts in AWS S3

Underwater Glider Design using Variable Buoyancy *Jun 2021 – Apr 2022*
Guide: Prof. Asokan T., Robotics Laboratory, IIT Madras [Paper]
➢ Published a paper titled "Towards Mission-Specific Characterization of the Diving Performance of an Underwater Glider" in the IEEE Oceans Conference & Exposition, 2022 [Link]
➢ Worked on Multi-objective Optimization of wing parameters using Genetic Algorithm and K-means clustering

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 Proper Orthogonal and Dynamic Mode Decomposition on the velocity data points to examine the flow's coherent structures and extract spatiotemporal information

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

Course Projects & Academic Work *Oct 2022 – Present*
➢ Pose Estimation: Implemented 6D Pose Estimation using Iterative Closest Point (ICP) algorithm and training a PointNet network after extracting the objects' mask using U-Net for semantic segmentation

- Particle Filter SLAM: Used the Particle Filter algorithm for a differential-drive wheeled robot with LiDAR and inertial sensors to generate its trajectory and the occupancy grid map of the environment
- CUDA accelerated Q-learning: Trained multiple agents in parallel threads to update a shared Q-Table with CUDA, achieving successful navigation of a 2D grid environment while avoiding obstacles
- Depth Diffusion: Trained a Conditional Latent-Diffusion model (LDM) for monocular depth estimation on the NYU dataset using Vector Quantized Variational Autoencoder (VQ-VAE) to learn the latent space
- Introduction to Digital Design (Teaching Assistant): Held Discussion sessions and designed question papers

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+ participating 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

- **UCSD Graduate Courses**: Deep Learning for 3D data, GPU programming, Statistical Learning A, Sensing and Estimation Robotics, Deep Generative Models, Intro to Visual Learning, Digital Image Processing*
- **Undergraduate 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

TECHNICAL SKILLS

- **Domain Skills**: Computer Vision, Robotics, Deep Learning, Dynamics and Control
- **Programming**: Python, C/C++, MATLAB
- **Python Libraries:** PyTorch, Keras, scikit-learn, MLflow, OpenCV, ROS, JAX, CUDA, NumPy, pandas
- **Software/Tools**: Visual Studio, Git, AWS, Arduino, ONNX, LaTeX, SolidWorks, ANSYS, OpenFoam