

Sri Aditya Deevi

 sriadityadeevi.com |  [linkedin.com/in/sri-aditya-deevi](https://www.linkedin.com/in/sri-aditya-deevi) |  dsriadity999@gmail.com |  +91 9515228444

EDUCATION

California Institute of Technology

M.S. Electrical Engineering

(Sept '22 - Jul '23)

CGPA: **4.3/4.3**

Indian Institute of Space Science and Technology

B.Tech Electronics & Communication Engineering

(Aug '18 - Jun '22)

CGPA: **9.60/10**, Batch Rank: **1st**/140

PUBLICATIONS

Deevi, Sri Aditya, et al. "RGB-X Object Detection via Scene-Specific Fusion Modules". Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision. 2024.

- Addressed the challenge of enabling autonomous vehicles to visually understand their surroundings in all weather conditions by developing effective multimodal deep sensor fusion methods for object detection, guided by Dr. Soon-Jo Chung and Dr. Lu Gan.
- Developed an efficient RGB-X fusion network that fuses pretrained single-modal models using lightweight, scene-specific convolutional attention-based fusion modules. It achieved superior performance over existing object detection methods on various benchmark RGB-thermal and RGB-gated datasets.
- The proposed approach yielded comparable results with 75% less coregistered training data, reducing fusion training time and dependence on hard-to-obtain multimodal, co-registered datasets.

Deevi, Sri Aditya, and Deepak Mishra. "Expeditious object pose estimation for autonomous robotic grasping." International Conference on Computer Vision and Image Processing. Cham: Springer Nature Switzerland, 2022.

- Spearheaded the research for improving object Pose Estimation techniques using Deep Learning for Autonomous Robotic Grasping in cluttered scenes under the guidance of Dr. Deepak Mishra.
- Designed and analysed a series of convolutional neural network-based pose estimation models without post-refinement stages, for efficiently estimating the 6D pose of an object, using only a single RGB image. The best performing model achieved high Average Distance (ADD) metric scores greater than 93% for most of the real-life objects tested in the benchmark LINEMOD dataset.
- Implemented and demonstrated an end-to-end object Pose Estimation pipeline using Unity and ROS Noetic. The developed pose estimation models were deployed in a simulated pick-and-place task utilizing a UR3 robotic arm.

Deevi, Sri Aditya, and B. S. Manoj. "Data Summarization in Internet of Things." SN Computer Science 3.4 (2022): 304.

- Conducted a comprehensive review of data summarization techniques in Internet of Things (IoT), categorizing them into Low-level and High-level abstraction methods to enhance understanding and integration in large IoT networks.
- Highlighted the benefits of data summarization in IoT, including reduced processing time, computation, data storage, transmission requirements, energy consumption, and user workload, while identifying open challenges for future research.

Deevi, Sri Aditya, et al. "HeartNetEC: a deep representation learning approach for ECG beat classification." Biomedical Engineering Letters 11 (2021): 69-84.

- Developed HeartNetEC, a sophisticated deep representation learning approach for ECG beat classification, incorporating a denoising block and a beat classification block to significantly reduce cardiologists' analysis time and effort.
- Designed effective deep learning architectures for both denoising and beat classification stages, achieving an outstanding overall F1 Score of 99.53% on PhysioNet's MIT-BIH Arrhythmia Database, outperforming other state-of-the-art methods.

- Validated the robustness of HeartNetEC through additional tasks, ablation studies, and noise analysis, demonstrating its reliable performance across different datasets and noise levels, making it a highly reliable solution for ECG heartbeat classification.

RESEARCH INTERNSHIPS

Atmospheric Parameter Forecasting for Optical Channel Characterization *(Aug '23 - Nov '23)*

Guide: Dr. Sabino Piazzolla, **Jet Propulsion Laboratory (JPL)**, Caltech, Pasadena

- Conducted research as an intern in the Optical Communication Systems group, to forecast key atmospheric parameters useful for characterizing the optical channel at JPL weather station facilities.
- Spearheaded the design and implementation of highly effective neural network architectures to predict relevant parameters, resulting in significant improvements in sequence-to-sequence forecasting and nowcasting accuracy, achieving up to 25% reduction in prediction errors.
- The developed methods were evaluated extensively using graphical plots, numerical metrics, and Shapley value explanations. The best performing models were successfully deployed for Live Forecasting at the weather stations.

Anomaly Detection in Satellite Telemetry Data

(May '20 - Aug '20)

Guides: Sharvari Gundawar & Nitish Kumar, Scientists, **U.R. Rao Satellite Centre, ISRO**, Bengaluru

- Contributed to the “Integrated System Health Management for Power Systems (ISHM)” project, focusing on Phase-II: Fault Detection, by developing advanced anomaly detection techniques.
- Developed a robust Anomaly Detection system, integrating an LSTM-based Nominal Behavior Modelling block and a Non-parametric Dynamic Error Thresholding block, to identify potential anomalies in satellite telemetry data.
- Tested the designed anomaly detection pipeline on two datasets of Power Systems parameters in Satellite Telemetry Data, demonstrating its effectiveness and showcasing its applicability to space subsystems.

WORK EXPERIENCE

Scientist/Engineer ‘SC’ @ Mission Simulation Group

(Apr '24 - Present)

U.R. Rao Satellite Centre, ISRO, Bengaluru

SCHOLASTIC ACHIEVEMENTS

- Achieved a perfect 4.3 CGPA while earning a Master of Science in Electrical Engineering from the California Institute of Technology (Caltech).
- Awarded Innovative Student Projects Award 2022 and inducted as a student member by Indian National Academy of Engineering (INAE) for my undergraduate thesis titled “Autonomous Robotic Grasping”.
- Received Institute Gold Medal of Academic Excellence (Undergraduate) from Indian Institute of Space Science and Technology.
- Secured the highly competitive Dr. Satish Dhawan Fellowship from the Department of Space, Government of India, earning a fully funded opportunity to pursue a Masters program at the prestigious California Institute of Technology.
- Received the Department of Space (DoS) Semester Fee Financial Assistance and Book Grant for Academic Excellence for all semesters during undergraduate studies.
- Ranked in the top 4.5% in IIT-JEE, 2018.
- Scored the highest marks in my institution and the third-highest overall in the TS Intermediate Examination.
- 5 times winner of annual proficiency prize for best academic performance in school, 2011-2016.

UNDERGRADUATE THESIS PROJECT

Autonomous Robotic Grasping

(Jan '22 - May '22)

Guide: Dr. Deepak Mishra, Indian Institute of Space Science and Technology, Thiruvananthapuram

- Devised effective solutions for two challenging intelligent robotics tasks, namely “Grasping Various Objects in Diverse Environments” and “Dynamic Grasping of Moving Objects”. Developed various Deep Reinforcement Learning techniques for the first task and Deep Learning techniques for the second task, to train UR5 and Panda robotic arms in simulation scenes.
- In Task I, using an advanced DNN architecture O-AHRNet designed for feature extraction, the agent was able to achieve more than 87% success rate for grasping novel objects in random scenes. Integrating an LSTM model into the dynamic grasping pipeline, the average success rate obtained for grasping dynamic objects in sinusoidal motion was more than 75%, in case of Task II.
- Created a real world robotic setup for pick and place using a Kinova Jaco Gen2 robotic arm.

KEY ACADEMIC PROJECTS

Non-Holonomic Mobile Robots: RRT with Dynamic Replanning and Obstacle Mapping

Courses: Robotics II (Planning and Navigation) & Mobile Robots

(Feb '23 - Jun '23)

- A RRT motion planner for non-holonomic wheeled systems was implemented, utilizing CSC (Curve-Straight Line-Curve) notion of distance, and a post-processing function was incorporated to enhance the smoothness of the produced path.
- The planner efficiently and effectively plans through a map avoiding obstacles in various situations such as narrow garages, parallel parking, and narrow streets.
- This algorithm was also tested on a real mobile robot (Raspberry Pi based) equipped with ROS. Additional functionalities such as Global Localization using Particle Filter, Path Tracking with PID, and Dynamic Replanning after mapping new obstacles are incorporated so that the robot can drive like a car autonomously while locally localizing itself.

Self Untangling Robotic Snake Arm with Dynamic Obstacle Avoidance

(Nov '22 - Dec '22)

Course: Robotics I (Robot Kinematics and Dynamics)

- Implemented effective methods for a robotic snake arm to perform tasks such as obstacle avoidance, touching a random target with the correct gripper orientation and untangle itself, if initially entangled in a knot.
- For this problem, we are considered a simulated environment in ROS2, where there are obstacles falling vertically.

Efficient Self-Supervised Neural Architecture Search

(Oct '21 - Dec '21)

Course: Deep Learning for Computational Data Science

- Goal was to develop memory, compute, and time efficient neural architecture search algorithms to address the high resource demands of traditional handcrafted neural architectures.
- Conducted experiments in both fully supervised and self-supervised settings, utilizing a combined loss function of supervised cross-entropy and self-supervision loss to guide the search for optimal architectures.
- Analyzed performance on CIFAR-10, demonstrating that the proposed methodology effectively balances time and accuracy, achieving results close to state-of-the-art benchmarks.

Scene Text Recognition

(Mar '21 - May '21)

Course: Machine Learning for Signal Processing

- Developed effective algorithms for recognizing text in various scenes, addressing both regular and irregular text recognition challenges using deep learning models.
- Implemented and experimented with multiple deep learning architectures, presenting four end-to-end models for text recognition across diverse image types.
- Provided critical analytical insights to understand the models' performance, uncovering interesting aspects and suggesting potential extensions for further improvement.

TECHNICAL SKILLS

Programming: Python, MATLAB, C++, C, SPICE, Verilog

Software Packages: PyTorch, OpenCV, Kornia, Stable Baselines, Captum

Frameworks: ROS, LaTeX, Git, Blender, Unity3D, Docker, Wireshark

RELEVANT COURSEWORK

Graduate:- Large Language and Vision Models • Mobile Robots • Statistical Inference • Robotics I (Robot Kinematics and Dynamics) • Robotics II (Planning and Navigation) • Machine Learning and Data Mining • Stochastic and Adaptive Signal Processing

Undergraduate:- Machine Learning for Signal Processing • Navigation Systems and Sensors • Deep Learning for Computational Data Science • Advanced Sensors and Interface Electronics • Satellite and Optical Communication • Information Theory and Coding

WORKSHOPS AND CERTIFICATIONS

- Participated in the AGI Leap Summit organized by SuperAGI and presented my paper, “RGB-X Object Detection via Scene-Specific Fusion Modules,” in the AI Applications and Survey track (2024).
- Received certification on “Integrated Design of Space Vehicles” by successfully completing the course offered by Dr. B. N. Suresh, Chancellor, IIST (2022).
- Completed an XAI (Explainable AI) Bootcamp hosted by Robert Bosch Centre for Data Science and Artificial Intelligence, IIT Madras (2021).
- Attended an International Summit on Data Science and AI organized by Robert Bosch Centre for Data Science and Artificial Intelligence, IIT Madras (2020).
- Earned training certification in robust Embedded Systems Design at EdGate Technologies Pvt. Ltd, Bengaluru (2020).

CO-CURRICULAR ACTIVITIES

- Actively participated in Annual Cultural Fest Dhanak and Annual Technical Fest Conscientia at IIST (2019).
- Attained first Place in Annual Inter house Sports Meet for Table Tennis at IIST (2019).
- Awarded a Certificate of Merit and Gold Medal in the 17th National Science Olympiad (NSO) organized by the Science Olympiad Foundation (SOF) for achieving the best school-level performance (2015).
- Received training in Lawn Tennis from 2010 to 2013 and participated in several tournaments during that period.