Aditya **Prakash**

Senior Undergraduate
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Research Interests

Space Robotics, Control System, Optimal Control, Path Planning, Obstacle Avoidance, Space Dynamics, Human Robot Interaction, Reinforcement Learning, Deep Learning

Education

Indian Institute of Technology Kanpur
B.Tech, Aerospace Engineering
2019–2023(Expected) **9.15/10.0**

BNS DAV Public School, Giridih
CBSE - XII
2019 **97.6%**

BNS DAV Public School, Giridih
CBSE - X
2017 **10.0/10.0**

Research Works

Aditya Prakash, Dipak Kumar Giri, "Control Design for transfer of payload between reusable rocket and lower end of the Skyhook", **73rd International Aeronautical Congress** (IAC), Paris, France, 18-22 September 2022

Nitika Jaggi, **Aditya Prakash**, Gaurav Kumar, Priyank Dubey, Dipak Kumar Giri, "MagLev based 3-DOF experimental Platform for Autonomous Spacecraft Rendezvous and Docking", **73rd International Aeronautical Congress** (IAC), Paris, France, 18-22 September 2022

Aditya Prakash, Dipak Kumar Giri, Shashi Ranjan Kumar, "Dynamic velocity error based trajectory tracking for space robotic manipulator", in **Aerospace Science and Technology**, Vol. 126, 2022, pp. 107650

Research Experience

Student Researcher
Space Dynamics and Flight Control Laboratory, IIT Kanpur — January'22 - Present

- Worked in a team of 5 members to design and develop MagLev based 3-DOF experimental platform for testing autonomous spacecraft rendezvous and docking
- Performed numerical simulation to test various MagLev design. Our final design could lift 12 kg using fours sets of 8 magnets arranged in Halbach array arrangement.
- Designed the structure of the platform, the actuators and electronics with the software needed involvement for performing real time simulation on the platform.

Research Intern
HCI Lab, UNB — May'22 - July'22

- Designed mathematical model to predict the user intent while grasping an object and developed shared autonomy control to assist the user during robot telemanipulation
- Implemented the control algorithm on a Kinova Robotic arm using **ROS** and **Python**
- Design a user study for the designed control algorithm to understand user's preference between autonomy and authority.

Research Intern
SURGE, IIT Kanpur — May'21 - July'21

- Reformulated the control objective for space robotic manipulator trajectory tracking and proposed Dynamic Velocity Error.
- Designed controller based on dynamic velocity error using the existing control designs which is as simple as PD and as robust as Adaptive controllers.
- Performed numerical simulations using **MATLAB** and **Python** to prove the efficiency of the proposed design for 2-link planar space robotic manipulator.

Awards

Academic Excellence Award — IIT Kanpur, 2022
Honda Young Engineers and Scientists' Award — Honda Motors Co., 2021

Technical Skills

Programming Languages: C++, MATLAB, JavaScript, Python, C
Libraries: Numpy, Tensorflow, PyTorch, OpenCV
Web: React, Node.js, MongoDB, Flask, Canvas
Utilities: Git, LaTeX, LabView, ROS, Simulink, Seimens NX, AutoCAD, Ansys

Key Projects

Facial Emotion Recognition Github
Brain and Cognitive Society, IIT Kanpur July'20

- Implemented CNN classifier and trained it on FER2013 dataset and got an accuracy of 97%.
- Designed model for emotion recognition in video using CNN-RNN and C3D hybrid networks
- Extracted and preprocessed human faces (using OpenCV haar-cascade) from camera stream

Decoding relation b/w voxels & pixels Github
Prof. Gordon Berman [Neuromatch] July'20

- Worked in a team of 4 members to decode semantic features from ROIs of the visual cortex
- Extracted semantic features using last layers of different classifier DNN, Resnet50 & VGG16
- Tried dimensionality reduction and clustering techniques to find clusters in voxel responses

PETcat (vision) Github
Robotics Club, IIT Kanpur Apr'20

- Worked in a team to develop vision modules of a user-friendly cat bot for facial and gesture recognition and assisting in finding common objects around in the surrounding
- Implemented model to detect complex objects using Haar cascade and performed Gesture Recognition using OpenCV using **C++** and **ROS**

Projects Mentored

Analysing Steinmetz Dataset Document
Brain and Cognitive Society, IITK May'21 - July'21
Number of Students: 5

Relevant Courses

Mathematics and Algorithms
Fundamental of Computing Data Structures and Algorithms Linear Algebra & Real Analysis

Aerospace Courses ** Outstanding Performance (A*) | * Excellent Performance (A)

Dynamics*	Flight Mechanics*	Aircraft Control Systems**
Fluid Mechanics	Thermodynamics*	Incompressible & Compressible Aerodynamics*
Mechanics of Solids*	Aerospace structures*	Experiments in Aerospace Engineering-I
Space Dynamics*	Airbreathing Propulsion**	Optimal Space Flight Control*

Machine Learning (Online Courses)
Deep Learning Specialization Natural Language Processing Reinforcement Learning

University Services

Academics and Career Council, IITK
Senior Academic Mentor July'22 - Present

- Conducted workshops and provided counselling to junior students regarding academics, courses and future career choices.

Counselling Service, IITK
Student Guide and Academic Mentor Nov'20 - Jan'22

- Guided first-year students in their academic related problems and remained their first point of contact in case of any help needed.

Brain And Cognitive Society, IITK
Secretary July'20 - July'21

- Organized introductory lectures and workshops for students interested in Computational Neuroscience

Shiksha Sopan (NGO)
Teaching Volunteer April'19 - April'21

- Taught Mathematics and Science to high school students and helped conduct experiments.