DIVESH SONI

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LinkedIn — Google Scholar

SUMMARY

Ph.D. researcher and aerospace engineer with 7+ years of experience spanning ISRO, NASA JPL, and Caltech. Specialized in deployable and flexible space structures, multi-body dynamics, and actuator–structure interaction. Strong background in simulation-to-test correlation, prototyping with Arduino and synchronous tracking with DC motors. Seeking R&D roles in space systems, robotics, and mechanism design.

EDUCATION

California Institute of Technology (Caltech) Pasadena, CA
M.S. in Space Engineering 2022
GPA: 4.1 /4.2

Indian Institute of Space Science and Technology (IIST) Trivandrum, India
B.Tech in Aerospace Engineering 2016
GPA: 9.05 / 10.00 — Department Rank: 2

RESEARCH EXPERIENCE

Graduate Student – Space Structures Laboratory 2022 – Expected May 2026
California Institute of Technology Pasadena, CA

- Devised theoretical framework for attitude dynamics of extremely large spacecraft for Caltech Space Solar Power Project
  - Designed a novel momentum exchange device embedded within the deployment mechanism for reducing payload mass and volume (patent submitted)
  - Established a model to accommodate actuator coupling dynamics with flexible spacecraft
- Built an experimental 3 DOF set up for conducting agile slew maneuvers
  - Designed and fabricated Pyramid Control Moment Gyroscope prototype to perform attitude changes of the assembly
  - Produced flexible structure design for studying deformations during slew
  - Developed passive gravity compensation system to mimic space-conditions
  - Explored and implemented control schemes like PID, feedforward + PID , sliding mode for DC motor trajectory tracking
  - Derived and implemented attitude control law for 3-axis stabilization and trajectory tracking in attitude of flexible structure attached to CMG
  - Demonstrated agile slew maneuvers with vibration suppression in the flexible structure using input shaping
- Currently investigating data driven model identification and control of large flexible spacecraft for intelligent and agile slew maneuvers

PROFESSIONAL EXPERIENCE

Scientist – Spacecraft Mechanisms Group 2016 – 2021
Indian Space Research Organization (ISRO) Bangalore, India

- Performed structural analysis of spacecraft solar arrays and large reflector systems
- Modeled pulley-based closed control loops (CCLs) enabling synchronized deployment of foldable appendages.
- Built failure models and performed Design of Experiments (DOE) studies for spacecraft docking to identify safe capture envelopes.
- Supported mission operations by analyzing on-orbit telemetry for mechanical appendages across multiple GEO and LEO missions

Summer Intern – Jet Propulsion Laboratory (NASA) Summer 2015
Pasadena, CA

- Developed an active vibration control model for an externally excited mechanical system using Macro Fiber Composite (MFC) actuators.
- Identified system parameters and control laws using reduced-order (SDOF) modeling techniques.
- Performed experimental validation using piezoelectric sensors and laser vibrometry.
- Conducted thermal characterization of MFC actuators using mid-wave infrared imaging under varying voltage and frequency inputs.

TECHNICAL SKILLS

Programming: Python, MATLAB, C++
Simulation & Analysis: Abaqus, Simulink, MSC Nastran, ADAMS
Dynamics & Controls: Multi-body dynamics with flexible structures, actuator–structure coupling, Design of Experiments
Tools: Altium Designer, OptiTrack, Platform IO, LaTeX, Microsoft Office

PUBLICATIONS

- Soni, D., Gdoutos, E., Pellegrino, S., "Experiments with a Momentum Exchange Actuator for Ultralight Flexible Spacecraft," SciTech, AIAA Scitech 2026 Forum, 2026.
- Soni, D., Issac, K., et al., "Design and Analysis of Mesh-Based Deployable Reflectors," ARMS, 2016.
- Rai, V. S., Soni, D., "Dynamic Simulation Studies for On-Orbit Spacecraft Docking," ARMS, 2018.

TEACHING EXPERIENCE

Teaching assistant at Caltech for graduate level courses

- Ae103a Aerospace Control Systems, Fall 2023-2024
- Ae105b Space Engineering, Spring 2024-2025

LEADERSHIP & SERVICE

- Volunteered at laboratory outreach tours for Southern California Science Olympiad students at Caltech.
- Mentoring first-year Caltech undergraduate for practicing research
- Core designer for IIST Aerospace Club magazine; organized hands-on aerospace workshops.