Aditya Savio Paul

Junior Research Fellow
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University of Tartu
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Personal Profile

Aditya is pursuing his research at Tartu Observatory on the design and development of space missions. His interest is on the mapping and characterizing of dynamic events. A space enthusiast, Aditya is driven towards an explorative approach to develop techno-scientific solutions for exploring the celestial space. His focus areas include mission concepts and operations, dynamic motion, autonomous planning and studying the various forces that nature offers.

Education

2021-2025 **Doctor of Philosophy (PhD) - Physics | Space Sc. & Tech**
University of Tartu, Estonia

2018-2020 **Masters of Science - Robotics and Space Technology (*cum laude*)**
University of Tartu, Estonia

2013-2017 **Bachelor of Technology - Mechatronics Engineering**
University of Petroleum and Energy Studies, India

Professional Experience

Jul 2020-Present **Junior Research Fellow**
Space Mission: Design and Development
Tartu Observatory, Estonia

- Design and development of space missions for close proximity operations
- Mapping dynamic events for terrestrial and extra-terrestrial occurences

Jun 2018-2021 **Orbital Dynamics Engineer**
ESTCube-2 Satellite
Student Satellite Foundation, Estonia

- Orbital analysis for small satellite missions
- Precise in-orbit location and positioning

Jun 2019-Aug 2020 **Graduate Researcher**
Autonomous Motion Planning for Spacecrafts
University of Maryland, USA

- Dynamic motion planning strategies for spacecrafts near small solar system bodies
- Mission Planning for gravity mapping and in-orbit maneuvers

Jun 2017-Jul 2018 **Mechatronics Engineer**
Autonomous Navigation of Unmanned Vehicles
Oxygen to Innovation, India

- Industrial mechatronics pipelining and solutions
- Autonomous waypoint navigation for ground vehicles

Publications

Journal / Articles

- **Multi-agent positioning for optimal dynamic event coverage**;
  A. S. Paul, Afreen, N., 2025, Journal of Intelligent and Robotic Systems: [in review]
  Paper
- **Radiance Field Mapping for Small Body Surface Morphologies**;
  A. S. Paul, Pajusalu, M., 2024, IEEE Transactions on Field Robotics[in review]
  Paper
- **Simultaneous motion replanning and gravity model refinement near small solar system bodies**; **A. S. Paul**, Michael Otte, 2023, Journal of Aerospace Information Systems
  Paper
- **Environment Scene Representation for Dynamic Event Cognition: Towards mapping and characterizing transient events in planetary bodies**; **A. S. Paul**, Europlanet Science Congress 2024, Berlin, Germany, 2024
  Paper
- **Radiance Morphological Mapping for Small Body Surface Investigations**; **A. S. Paul**, Europlanet Science; Paul A.S; Congress 2024, Berlin, Germany, 2024
  Paper
- **Large Scale Mobility on the Moon by Transferring Terrestrial Autonomy Capabilities;** Dr. Mihkel Pajusalu, Quazi Saimoon Islam, Hans Teras, Karin Kruuse, Rando Avarmaa, **Aditya Savio Paul**, Dr. Aire Olesk, Dr. Kristel Mikkor, Silver Latt,Janek Press, Dr. Mart Noorma; International Astronautical Congress (IAC), Sept 2022.
  Paper
- **Towards endogenous mapping of small solar system bodies during multi-agent rendezvous; Aditya Savio Paul** International Astronautical Congress (IAC), 2021
  Abstract
- **Design approach to quantify inter-ground station distances by doppler-based ranging experiment for small satellite missions; Aditya Savio Paul**, Naghma Afreen, International Astronautical Congress (IAC), 2021
  Abstract
- **Coulomb drag propulsion experiments of ESTCube-2 and FORESAIL-1**, I. Iakubivskyi, P. Janhunen, J. Praks, **A. S. Paul**,V. Allik, et al. , Acta Astronautica 2020.
  Paper

Conference Proceedings

- **Advancing Small Body Sciences: Dynamic Mapping and Characterization**
  Tartu Observatory Science Conference, March 2025
- **Morphological Scene Representations - Exploring Small Solar System Bodies**;
  Aditya Savio Paul Planets, Exoplanets and Habitability 2024, Physical Research Laboratory, India
- **Mapping and characterization of small solar system bodies over simulation-defined multi-spacecraft trajectory models**; **Aditya Savio Paul** Flight Software Workshop 2023, JPL | CalTech, USA
  Talk
- **Tartu Observatory Space Bunker as a Comet Fly-By Analogue Environment; Aditya Savio Paul**, Dr. Mihkel Pajusalu; Finnish Satellite Workshop 2023, University of Aalto, Finland
  Poster

- **Optical Periscopic Imager for Comets (OPIC) Instrument for the Planned Comet Interceptor Mission.** Iakubivskyi, I.; Pajusalu, M.; Kivastik, J.; Teras, H.; Nikolajev, A; **Paul, A. S.**; Bhat, U. A.; Slavinskis, A. (2021). 35th Annual AIAA/USU Small Satellite Conference, Utah State University, Logan, UT, USA. 9/08/2021: SmallSat 2021;
  Poster
- **Autonomous motion planning for spacecrafts near small solar system bodies: simultaneously refining the gravitational field model and re-planning gravity dependent maneuvers; Aditya Savio Paul**, Michael Otte. International Astronautical Congress (IAC) 2020.
  Paper
- **Kino-dynamic algorithms for satellite maneuvering around small bodies of interest**; Finnish Space Workshop, Aalto University, Finland, Jan 2020.
  Poster

Seminar/Talks

- **Observations in the right direction - Making sure nothing is left out**
  Dept of Space Technology, Tartu Observatory, May 2024
- **Explorations into Exoplanetary Research**
  Dept of Stellar Physics, Tartu Observatory, May 2024
- **On the multi-agent monte-carlo convergence for gravimetric distance approximation of pristine targets**
  Finnish Satellite Workshop, Aalto University, Finland, Jan 2023
- **Trajectory design : missions to small solar system bodies**
  Space Technology Seminar, Tartu Observatory Oct 2022
- **Exploring long-period planetary objects**
  Space Technology Seminar, Tartu Observatory May 2022
- **Development of a space environment facility - Motivation and Requisites**
  Space Technology Seminar, Tartu Observatory Dec 2021
- **Multi-agent rendezvous with small solar system bodies**
  Space Technology Seminar, Tartu Observatory June 2021
- **Towards mapping and characterizing small solar system bodies**
  Finnish Satellite Workshop, Aalto University, Finland, Aug 2021
- **Safe motion algorithms for robot and humans alike**
  In Robotics and Computer Engineering - University of Tartu, 2018
- **Development of space missions - the cansat way**
  In Robotics and Computer Engineering - University of Tartu, 2018

Supervision

- **Optimal Agent Positioning for Dynamic Event Monitoring and Analysis;**
  Naghma Afreen. MSc. Robotics and Computer Eng., University of Tartu, June 2024
- **Comet cooking and flyby simulations;**
  Estonian senior secondary project Tartu Observatory, University of Tartu, 2023-2024
- **Transient event modelling and analysis;**
  Tartu Observatory Space Mission Simulation Facility 2022-2024

Invited Talks

- **Science of the New Ages - Discourse on India's Strategies for Space Exploration**
  Seth Anandram Jaipuria School, Kanpur, India (Feb 2024) PressRelease
- **Advancing robotics and space technology towards extra-terrestrial exploration**
  Alumni Talks, Jan 2023, University of Tartu
- **Towards multi-agent exploration of small solar system bodies**
  Maryland Robotics Center Research Symposium, University of Maryland,May 2022
- **Advances in space technology**
  University of Petroleum and Energy Studies, India, Aug 2020
- **Advent of space robotics and opportunities for research and development**
  University of Petroleum and Energy Studies, India, Feb 2020
- **Importance of high school education for the learning essentials towards space tech**
  Seth Anandram Jaipuria School, India, Feb 2019

Academic Projects

Sept 2019-Jan 2020 **Mechatronics engineer**
University of Tartu, Estonia
- Conceptualising IoT for remote operations
- Data acquisition and analysis from sensor subsystems

Jun 2015-Jun 2017 **Team Leader | Payload Engineer**
Cansat Program, USA
- Prototyping Mars re-entry payload for atmospheric measurements
- Development of control systems for guided re-entry
- Attained Global Rank #1 at Cansat Launch Program, USA

Jun 2016-Jun 2017 **Development of Mars Rover - Rocker Bogie Mechanism**
Bachelor's Thesis, India
- Prototyping the rocker-bogie mechanism on-board the Mars rover
- Analysis of structural integrity for planetary motion

Jun 2016-Jun 2017 **Payload and Control Engineer**
Experimental Sounding Rocket Association, USA
- Development of a stratospheric-range sounding rocket
- Design of Violent payload deployment for decent control strategies

Industrial Association

2018 **IoT Solutions(course moderator)**
Honda
Connected Devices and IoT infrastructure

2016 **Reliability Engineer(R&D)**
Mahindra Swaraj, India
Mechanical Reliability and Failure Analysis

2016 **CNC Engineer**
Hindustan Aeronautics Limited (HAL), India
Development of airfoil wing for IJT aircraft

2015 **Robotics Engineer**
FANUC Robotics, India
Control system design of a 6-DOF industrial robotic arm

2015 **Automation Engineer**
RoboCon, India
Designing aero-assisted autonomous vehicle

Scholarships Attained

- Charles Villmann Scholarship - Space Technology
  Tartu Observatory(2019)
- Jaan Einasto Scholarship - Space Technology
  University of Tartu Foundation(2019)
- Dora Plus Scholarship - Master's of Science
  University of Tartu(2018-2020)

Awards and Accolades

Academic

2022 **Winner - 3 Minute Thesis Competition**
University of Tartu

Miscellanoeus

2022, 2023 **Cricket - Best Fielder Award**
Estonian Cricket Association (ECA)

2022 **Certification - Level 2 Cricket Umpire**
English Cricket Board (ECB)

2023 **Certification - Level 1 Cricket Coach**
International Cricket Council (ICC)

Positions of Responsibility

- Early Career Officer, Estonia
  Europlanet Society (2024-Present)
- Event Manager
  International Student Ambassador - University of Tartu (2019-2021)
- Team Leader
  International Cansat Program, USA (2016-2018)

Core Competencies

- Space Mission Design and Development
  - Orbital Dynamics, Trajectory Planning, Environment Representation
  - NAIF, SPICE
- **Programming Languages / Tools**
  - Python, MATLAB, LaTeX
  - ROS, CNC
- **Software Development Suites**
  - Git, Anaconda
  - Jira, Confluence, Bitbucket
- **Certification**
  - CAD Engineer - Dassault Systèmes
  - Tele-Operated Robotic Arm Operator - FANUC Robotics

Extra Curricula and Hobbies

- Cricket, Soccer, Running, Cycling
  - Cricket: National Team, Estonia
  - Soccer: State Level, India
- Creative Writing, Painting
- Languages Known
  - Hindi Mother Tongue
  - English Proficient
  - Estonian Beginner
  - Latvian Beginner