Athip Raj

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EDUCATION

University of Arizona, Ph.D. Aerospace Engineering, Electronics and Computer Engineering, GPA 3.82, 2026
University of Michigan Ann Arbor, M.Eng. Space Engineering, GPA 3.67, 2017
National Institute of Technology Trichy, India, B.Tech. Mechanical Engineering, GPA 3.2, 2016

PROFESSIONAL EXPERIENCE

Lead Systems Engineer, SpaceTREx Lab, University of Arizona and NASA MIRO Program, Tucson, AZ | Feb 2021 - Present

- Engineered a novel modular satellite docking system that increased misalignment tolerance by 10x over existing industry standards through **96 rapid design-build-test cycles**.
- Managed a multidisciplinary team of 35 undergraduate and graduate researchers and DoD Skillbridge interns to develop autonomous navigation software, achieving sub-centimeter accuracy across **500+ hardware-validated runs**.
- **Secured $200,000 in federal funding** for modular satellite platforms in Cislunar space domain awareness and managed a $30,000 budget to commission a 400 sq. ft. zero-lux robotics test facility.
- Programmed 6-DoF spacecraft physics and camera sensor simulations in Python to generate **500,000+ training data points** for neural network validation.
- Secured **7 provisional patents** and authored **44 peer-reviewed publications**. Won the **$25,000 NASA Space Tech Catalyst Award** for STEM mentorship and honored by the IAU with the naming of Asteroid (333632) “Athipathi”.

Space Systems Engineer, Agnikul Cosmos, Chennai, India | Oct 2018 – Sep 2019

- Authored **400+ pages of PDR-grade systems engineering requirements and deliverables**, serving as instruction-level guidance for launch vehicle development from concept through Preliminary Design Review.
- Developed MS Excel and Python tools for CONOPS modeling, architecture trade studies, requirements verification and validation (V&V) tracking, integrated into internal workflows.
- Developed **launch vehicle system and subsystem-level ICDs** and led technical handoffs between internal teams and external stakeholders.
- Led the end-to-end design and hot-fire testing of India’s first additively manufactured 3kN semi-cryogenic liquid rocket engine. Commissioned the primary Thrust Stand Test Facility and established V&V protocols for DMLS manufactured flight hardware. **Identified as “Key Employee”** by leadership.

PROJECTS

Motorized 3-DOF Gyro Testbed

- Designed and fabricated a motorized gyro for small satellite sensor validation using 3D-printed components and internal wire routing to allow 360° of movement about 3 axes.
- Integrated BLDC motors and control software to simulate rotation profiles for hardware-in-the-loop testing.
- Calibrated the rotation and rotation rates of the gyro using IMU and accelerometer sensor fusion real-time feedback.

Deployable Small Satellite Telescope

- Invented a Schmidt Cassegrain Telescope (SCT) deployment mechanism based on tensegrity that stores a 20cm x 20cm x 50cm telescope in a 20cm x 20cm x 10cm stowed package (5x reduction in stowage volume)
- Commissioned and maintained a 10’ x 6’ x 8’ **ISO Class 6 clean room facility** for the assembly and optical alignment of the deployable telescope payload.

SKILLS

- **Systems**: MBSE, Requirements Decomposition, Risk Analysis, FMECA, Verification & Validation, IRDs/ICDs, DOORS
- **Analysis**: GNC, ADCS, Mission Analysis, Structural FEA, Monte Carlo, Grid Search, 6-DOF Simulation, Digital Twin
- **Software**: Python, MATLAB/Simulink, LabVIEW, C++, TensorFlow and Keras, ROS 2, NumPy, SciPy, Pandas, PyTorch
- **Tools**: SolidWorks, AutoCAD, Fusion 360, Autodesk Inventor, Siemens NX, CATIA V5, CREO, STK, Ansys Workbench, Thermal Desktop, Cura, Blender, Adobe Creative Cloud Suite, Git/GitHub, MS Office Suite, Tableau