Shreyansh Shethia

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Education

- **Purdue University, West Lafayette** — USA
  Master of Science in Aeronautics and Astronautics; CGPA: 3.89/4.0 — *Aug 2019 – May 2021*
- **Indian Institute of Technology, Kharagpur** — Kharagpur, India
  Bachelor of Technology in Aerospace Engineering; CGPA: 8.55/10.0 — *July 2015 – May 2019*

Internships

- **Navigation of LEO Satellite using IRNSS** — Center of Astronomy, IIT Indore
  Guide : Prof. Hari Hablani, Center of Astronomy, IIT Indore — *May 2018 - July 2018*
  - Developed RK-4 simulator for LEO satellite, including forces from JGM 21X21, Atmospheric drag, Sun and Moon.
  - Performed visibility analysis on the satellite from 6 NavIC Satellites and calculated Geodetic Lat-Long of IPP.
  - Obtained Ionospheric Range Delay using IGVs and produced the pseudoranges for an IRNSS receiver in LEO.
  - Estimated back receiver position using pseudoranges and NavIC positions and obtained the Dilution of Precision.
- **Absolute and Relative Motion Control of LEO Satellites** — CDSG, ISRO, Bangalore
  Guide : Dr Vinod Kumar, Deputy Division Head, CDSG, ISRO — *May 2017 - July 2017*
  - Simulated high fidelity orbital dynamic equations, with Earth's oblateness, for two satellites in Low Earth Orbit.
  - Linearized the orbital equations around target satellite with J-2 force and showed the trajectory of chaser satellite.
  - Compared the trajectory of Chaser from the linearized model with that from Hill-Clohessey-Wiltshere equations.
  - Appropriately tuned Proportional-Derivative Controller to perform rendezvous of Target and Chaser satellites.

Projects and Relevant Experience

- **LiPo Battery Performance with Quadcopters** — Purdue University
  Guide : Prof. I. Hwang, Flight Dynamics & Control Lab, Purdue University — *Aug 2019 - Present*
  - Performed hover tests on Quadcopters in Wind tunnel against different windspeeds and no-wind conditions.
  - Used Pixhawk(PX) 4.0 to log the battery voltage of a 3-Cell LiPo and calculated the battery drainage rate.
- **Final-Year Project, B.Tech** — IIT Kharagpur
  Guide : Prof. M. Sinha, Dept. of Aerospace Engineering, IIT Kharagpur — *Aug 2018 - April 2019*
  - Performed the parametric analysis on collision probability assuming high velocity and small duration encounter.
  - Studied and implemented Polynomial Chaos Theory to propagate uncertainty in the state vector of space objects
  - Developed Matlab codes to calculate the polynomial coefficients using a recursive algorithm.
- **Boeing Student Project 2018-19** — IIT Kharagpur
  Guide : Prof. N.K. Peyada, Dept. of Aerospace Engineering, IIT Kharagpur — *Aug 2018 - Jan 2019*
  - Proposed a conceptual sketch of a Quad-plane and calculated weight estimate and selection of motor and propeller.
  - Used Pixhawk(PX) 4.0 with relative airspeed sensor and GPS, specifically configured for our objective.
  - Acquired the run-time sensor data using Data Telemetry to train a PX4 autopilot for transition mode.
- **Control Team Member, Team AUV(Autonomous Underwater Vehicle)** — IIT Kharagpur
  Guide: Prof. V. Nagarajan, Ocean Engineering and Naval Architecture, IIT Kharagpur — *Feb 2016 to Feb 2018*
  - Performed I2C communication to acquire information of individual battery cell voltages from chip BQ76925.
  - Fabricated an embedded circuit for Kill-Switch which efficiently distributes the power from batteries
  - Developed codes in Python and C++ for Serial communication of Thrusters and Arduino with the motherboard.
- **Boeing Student Project 2017-18** — IIT Kharagpur
  Guide : Prof. N.K. Peyada, Dept. of Aerospace Engineering, IIT Kharagpur — *Aug 2017 - Jan 2018*
  - Estimated the endurance and payload capacity of the Quadplane with the available motor, propeller and battery.
  - Worked on the calibration of pressure sensor, GPS and IMU for PixHawk using Qgroundcontrol.
  - Demonstrated manual manoeuvres for VTOL and Cruise mode as well as transition among these modes.

Awards and Achievements

- **Silver Medal, 2019** *IIT Kharagpur*
  - Secured Silver Medal for highest GPA among B.Tech(Hons) 2019, Department of Aerospace, IIT Kharagpur.
- **Best B.Tech Project Award, 2019** *IIT Kharagpur*
  - Awarded the best B.Tech Project among the B.Tech(Hons) students, Department of Aerospace, IIT Kharagpur.
- **Boeing Scholarship 2018-2019** *IIT Kharagpur*
  - Awarded Boeing Scholarship for the academic session 2018-2019, amongst the 4 recipients out of 52 students.
- **Boeing Scholarship 2017-2018** *IIT Kharagpur*
  - Awarded Boeing Scholarship for the academic session 2017-2018, among the two recipients out of 52 students.
- **IIT-JEE Advanced 2015**
  - Secured All India Rank 3,002(98 %ile) in IIT-JEE Advanced, securing place in India's most reputed Institute.
- **Indian National Mathematics Olympiad 2014** *Kendriya Vidyalaya (SAC)*
  - Represented KVS (Kendriya Vidyalaya Sangathan) in Indian National Mathematics Olympiad (INMO) 2014.

Competitions and Other Projects

- **Laws of Motion, Boeing Aeromodelling Competition 2019** *IIT Kharagpur, Jan. 2019*
  - Conceptually designed and constructed a radio controlled(RC) plane, using Balsa Wood for structure frame.
  - Embedded electronics for a 3-way motion control which included forward thrust, ailerons and elevators
  - The plane performed acrobatic maneuvers and achieved a glide time of 1 min 4 seconds.
- **National Aerospace Conceptual Design Competition (NACDeC)** *IIT Kharagpur, Aug 2018*
  - Presented an aircraft design for a multipurpose amphibious aircraft suited for Surveillance and Passenger missions.
  - Performed the initial weight estimation, range and payload trade study and proposed a lighter hull design.
  - Represented IIT Kharagpur in the nation-wide inter-college NACDeC Finals, 2017-18, as a part of 5-member team.
- **Inter-Hall Product Design 2017-18** *IIT Kharagpur, Feb. 2018*
  - Conceptualized an innovative product FASAL to detect viability of sowing seeds and soil nutrient content.
  - Lead a team of 20 students to design FASAL and won Bronze in Inter Hall Product Design 2017-18.
  - Conducted thorough research on the necessity, feasibility and conceptual design of the product.
- **Inter-Hall Hardware Modeling 2016-17** *IIT Kharagpur, April 2017*
  - Designed and fabricated SKALA, a stair-climbing device to help paraplegic people commute in different scenarios.
  - Fabricated the embedded circuit, using user's brain signals, voice signals and touch input to control actuators.
  - SKALA secured Gold in Inter Hall Hardware Modelling Competition and secured Silver in Inter IIT Tech Meet.
- **Inter-Hall Product Design 2016-17** *IIT Kharagpur, Feb. 2017*
  - Conceptualized an easy-to-use device PARAKH to detect counterfeit medicine using NIR spectroscopy.
  - Worked on the design of medicine identification unit comprising of cameras, DC motor and LCD display.

Skills and Expertise

- **Languages**: C (Beginner), C++ (Intermediate), Python(Intermediate), HTML,LaTeX
- **Softwares**: MATLAB, Simulink, ROS, Solidworks, Ansys Fluent, MS Office, Premier Pro, Arduino IDE

Relevant Courses

Principles of Dynamics
Space Dynamics
Aircraft Stability and Control
Intelligent Controls
Machine Learning (Coursera)
Systems Analysis and Synthesis
Mechanics of Flight
Automatic Control of Aircraft
Introduction to Flight Vehicle Control
Statistical Methods