Prakhar Gupta | Curriculum Vitae

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Interested in robust and reliable embedded system software development for space systems

Current Employment

- **U.R. Rao Satellite Centre, ISRO** — **Bengaluru**
  OnBoard Software Scientist/Engineer 'SD' — *July 2016–Present*
  Responsible for Software Design, Development, Testing and Maintenance for On-Board Computers in various satellites. Provide mission support during checkout, launch and post-launch activities.

Notable Projects

- **Spade Docking Experiment (SpadeX)** *'Orbit Propagator and Data Validation Software'*
  SpadeX is ISRO's test bed to test various rendezvous and docking technologies. Designed and developed Orbit propagator modules. This module provides chaser and target inertial states. The states are continuously corrected with SPS (Satellite Position System) data and relative sensors. Proposed, designed and developed an adaptive data validation software that can validate the sensors raw input and can automatically adjust to sensor noise characteristics.
- **Vikram Lander (Chandrayaan-2):** *'Sensor Processing, and Navigation Software'*
  Vikram Lander was India's ambitious mission to attempt soft landing on the moon. Designed and developed sensor interface and FDI modules to all sensors On-Board the Vikram Lander, Inertial Navigation Software and Absolute Navigation Filter. Along with this, developed various hardware layer drivers and data collection modules. Participated and provided support in various field test. Real time debugging skills and system level understanding proved invaluable to success of these tests. Presented various analysis to test review committee and was applauded for thorough analysis. Inputs from these analysis led to significant improvements in trajectory design and descent strategy. Member of failure analysis committee, and was first one to zero-in to the root-cause of flight anomaly. Member of various committee for future lunar missions
- **Chandrayaan-3:** *'Sensor Processing, and Navigation Software'*
  Chandrayaan-3 lander is the successor of the Chandrayaan-2 lander, with various improvements. Responsible for Sensor Processing and Navigation Modules. Designed Laser Doppler Velocity Interface and Processing Module along with its Fault Detection and Isolation Module. Carried out changes in the Navigation Filter module to make it faster and robust to faults. Also, restructured validation module for Sensors and Navigation Filter state machine to provide better protection from wild samples and prevent corruption of navigation states. Carried out the software testing in the testbed and analysed helicopter test results that simulated the lander trajectory.
- **UNNATI (UNispace Nanosatellite Assembly and Training by ISRO)** *'Lecturer'*
  Unnati is a capacity building programme on Nanosatellites development through a combination of theoretical coursework and hands-on training on Assembly, Integration and Testing (AIT). Delivered lecture on OnBoard Computer Software to 30 delegates from 17 countries.
- **RISAT-1A** *'Software Integrator'*
  RISATs are series of Indian Radar Satellites. Entrusted with the challenging responsibility of Software Integrator and Maintainer which requires understanding of software in its breadth and depth along with people-skills to manage meetings, timeline and various obstacles faced in Software Development Life Cycle. Member of design-review committee and responsible for various software modules
- **Indian Nano Satellite** *'Software Integrator and Driver Development'*
  INS(Indian Nano Satellite) were 3U cubesats designed as technology demonstrator. It involved new hardware and code was made from scratch. Designed all hardware level drivers which includes various sensors, actuators and TMTC modules. Established efficient and fast development environment and a bare-shell Onboard to assist in debugging.

Education

Academic Qualifications

- **Indian Institute of Space Science and Technology** — **Trivandrum, India**
  Bachelor of Technology, Avionics , Cumulative GPA: 8.55 — *2012–2016*
  Department Rank: 7/51

Notable Projects

- **Undergraduate Thesis** *'Context Aware Intelligent Information Mashup for Smart Home'*

Designed and tested two algorithms for Smart Home activity detection. The two algorithms, Edit-Distance based and LSTM (Long Short Term Memory) were designed for online data learning and prediction of activities. The efficiency of the algorithm was demonstrated on the real world smart homes dataset.

- **Internship** *'Sensor Network Packet Routine Algorithm'*

  Designed a low-power self organizing and load balancing sensor data routing algorithm and demonstrated the algorithm efficiency using simulation and actual implementation on sensor motes in TinyOS software

- **Virtual Reality and Controls Project** *'High-Speed Object Detection Algorithm and Application to Gaming and Real World Controls'*

  Designed a algorithm to detect multiple color coded cards at high speed using video camera. Achieved a 30 frame per second speed in a raspberry pi 700 Mhz processor. This program was then used to interface and provide input to a virtual reality game. Demonstrated the capability to manipulate real world objects by driving a toy car with hand gestures using nothing but a portable raspberry pi. Used this high speed object detection in a DC Motor position control using a PID controller

Technical and Personal skills

- **Programming Languages:** Proficient in: C, C++, Ada, Sparc-Assembly, Perl, Bash, Awk, Sed, Python, Latex

Interests and extra-curricular activity

- Convener and Organizer of IIST Physics Club, and IIST Astronomy Club during the academic year 2014-2015.
- Organizer of technical events in college fest, Conscientia 2015
- Selected in Basketball college house team and played in various college-level competitions. Other interest include deep interest in reading psychology