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Current Address

F211, GH1,
IIT Kanpur,
Kalyanpur, Kanpur,
Uttar Pradesh 208016

Work Experience:

Vikram Sarabhai Space Centre, ISRO

Designation: Graduate Apprentice (Aeronautical Engineering)

Duration: November 2020 – January 2021

Worked on Aerodynamic analysis of Crew Escape System (CES), Gaganyaan on ANSYS and PARAS-3D (a computational fluid dynamics software developed by ISRO).

My contributions were:

- **Aerodynamic Analysis of CES:** Generated grids and meshes in PARAS-3D, over the model created in ANSYS. Aerodynamic data was generated for different roll, pitch and yaw orientations and for various grid fin deflections. The data thus obtained was depicted in relevant graphs to examine the aerodynamics loads.
- **Aerodynamic Analysis of TVP and SSLV:** Similar work was carried out on the Test Vehicle Project (TVP) and Small Satellite Launch Vehicle (SSLV). The TVP is a vehicle that will extensively test the CES prior to the actual mission. The results for the SSLV were compared with actual flight simulations conducted at various Mach numbers.
- **Grid Fin FORTRAN code:** Studied a grid fin analysis tool in FORTRAN and converted it into a modular and easy to access MATLAB code. Aerodynamic validations were performed on a variety of grid fin configurations found in literature.

Sankya Systems and Objects Pvt. Ltd.

Designation: Software Engineer

Duration: August 2017 – July 2018 (Intern)

July 2018 – January 2020

Worked on the Advanced Data Products Generation software (ADP) developed by Sankya Systems for the Polarimetry Doppler Weather Radar (DWR) designed and manufactured by Bharat Electronics (BEL) in collaboration with ISRO.

The “Advanced Data Products Generation software” is the first of its kind developed by any company in India as is the Polarimetry Doppler Weather Radar of BEL.

BEL was awarded the “Product of the Year” award by Ministry of Defence in 2017 for the combined product.

My contributions to this software:

- **New Algorithm to extract Phase Difference from noisy background:** Developed a new algorithm for conditioning Phase Difference (a polarimetry radar measurement) that extracts signal out of noisy environment and its derivative (Specific Differential Phase - Kdp) to aid in the accurate estimation of rainfall.
- **Parameter estimation:** Analysed the significance of window size in the estimation of Specific Differential Phase (Kdp) from Phase difference through regression fitting. Implemented a method to use range distance (in Km) Vs (number of range bins) for efficient estimation.
- **Search Area method to compare rain fall:** Designed and developed a ‘Search area’ based method (a new concept) to compare radar estimated rainfall with ground truths namely, rain gauge measurements. The search area is defined based on different error factors. This method has considerably reduced the disparity between the two, across more than 30 rain gauges in Kerala, demonstrated over three seasons of rain, namely heavy, normal and scanty.
- **Rain rate propagation models:** Explored the efficiencies of a Linear and the Logarithmic (NEXRAD) rain rate propagation models in the estimation of rainfall from DWR measurement, and established that the latter is better.
- **Improved consistency:** After the implementation of the above regimes, the rainfall estimated using two different radar return parameters (namely Reflectivity and Specific Differential Phase - Kdp) were seen to be consistent with each other over majority of rain gauges in southern half of Kerala over three seasons.
- **Analysis tools:** Created and incorporated various additional tools to analyse the working of the above mentioned algorithms as well as other DWR measurements. These include multi-plot routine, histogram plotting, conditioned and raw radar measurement plotting etc.
- **Publications:** The results of this analysis were presented at IRAD 2019, Pune. All the above works were documented and submitted to BEL and ISRO for review.
- **Reviews:** Performed various analyses to satisfactorily answer the queries raised by ISRO at different stages of development.

Currently, all these developments, reviewed and approved by BEL and ISRO are incorporated for the next version of the ADP software.

Education:

Graduate – Ph.D. (PMRF candidate)

Name of the course: Direct Ph.D. (2020)
Branch: Aerospace Engineering
Specialization: Flight Mechanics and Control
Research Area: Control of Satellite for Rendezvous and Docking using Hybrid Actuators
Name of the Institute: Indian Institute of Technology, Kanpur

Semester	Subjects	SPI
1	Space Dynamics, Flight Stability and Control, Autonomous Unmanned Aerial Systems, Nonlinear Systems	10.0
2	Mathematics, Optimal Space Flight Control, Automatic Control	10.0
3	Autonomous Navigation, Robot Manipulators: Dynamics and Control	8.0

Conference Publications:

- **Singularity-Free Hybrid Control for Autonomous Berthing of Two Spacecrafts**
Tanya Krishna Kumar, Sudhansu Sahu, Dr. Dipak Kumar Giri
73rd International Astronautical Congress (IAC-2022), Paris, France
- **A Comparison Study on the Feasibility of Two Low Sloshing Configurations for Small Satellite Magnetic Fluid Actuation**
Priyank Dubey, Kumardip Basak, Arya Das, Tanya Krishna Kumar, Dr. Dipak Kumar Giri
73rd International Astronautical Congress (IAC-2022), Paris, France

Teaching Experience:

- Teaching Assistant (July 2022 - Present), Aircraft Stability and Control, NPTEL
- MATLAB Tutor, (August 2022 - Present), Chemical Engineering Department, CSJM, Kanpur

Undergraduate Course

Name of the course: B.Tech (2013-2017)
Subjects Offered: Aerospace Engineering
Name of the University: Alliance University, Bangalore
Name of the Institution: Alliance College of Engineering and Design

Semester	Subjects	Percentage
1	Engineering Mathematics, Basics of Mechanical Engineering, Foundations of Computing, Engineering Physics, Basics of Civil Engineering, Environmental Engineering	86.3
2	Engineering Mathematics, Basics of Electrical Engineering, Engineering Chemistry, Basics of Electronics Engineering, Technical English, Engineering Graphics	86.9
3	Engineering Mathematics, Introduction to Aeronautics, Fluid	79.9

	Mechanics, Engineering Mechanics, Aerospace Engineering Materials, Thermodynamics, Machine Drawing	
4	Engineering Mathematics, Introduction to Space Technology, Aerodynamics, Theory of Mechanics, Strength of Materials, Heat and Mass Transfer	86.8
5	Flight Dynamics, Space Mechanics, Aerodynamics, Experimental Methods, Aircraft Structures, Propulsion	88.5
6	Space Flight Stability and Control, Finite Element Analysis, Vibrations, Aircraft Structures, Propulsion, Theory of Elasticity, Digital Signal Processing, Professional Ethics and Constitution of India, Modelling and Simulation Lab, Finite Element Analysis Lab	89.7
7	Space Navigation and Guidance, Control Engineering, Spacecraft Design, Aerospace Avionics, Aero Elasticity, Intellectual Property Law	90.4
8	Entrepreneurship Management, Aerospace Technical Seminar, Industry Internship Programme, Project	82.8

12th Grade

Name of the Exam: ISC
Name of the Board: CISCE
Name of the Institution: Ryan International School, Bangalore.
Subjects Offered: Mathematics, Physics, Chemistry, Computer, English
Marks Obtained: 79.4%
Year of Passing: 2013

10th Grade

Name of the Exam: ICSE
Name of the Board: CISCE
Name of the Institution: Ryan International School, Bangalore.
Subjects Offered: Mathematics, Physics, Chemistry, Computer, Biology,
History/Civics, Geography, English, Hindi, Environmental
Science
Marks Obtained: 88%
Year of Passing: 2011

Academic Projects undertaken:

- 1. Preliminary Orbit Determination - at ISRO Satellite Centre (URRSC), Bangalore**
 - GPS satellite position determination from ephemeris file
 - Satellite propagation from obtained position, incorporating various perturbations
 - Computation of range between given ground station and visible GPS satellites
 - Satellite Position Estimation using Range
 - Refining the position estimates using Least Squares method

2. **Orbital Determination using MATLAB**

- Velocity determination from three position vectors – Gibb’s Method
- Determination of orbital elements
- Visualization of orbital elements and locating the spacecraft position

3. **Wind Tunnel Calibration and Computation of Pressure and Lift Coefficients of different Airfoils and different angles of attack.**

4. **NxNxN Rubik’s cube simulator** that generates random scrambles to test various algorithms on and to visualize the animation of the output.

Courses/Workshops Attended:

1. **NASA SPACE CHALLENGE:** Underwent a week long training at Kennedy Space Centre, interacting with NASA astronauts, exploring the launching / landing facilities for space shuttles, shuttle manufacturing sites, making robots. The highlight of the program was designing satellite payload with instruments like GPS, Video camera and altimeter. The objective was to launch it to the height of 1,00,000 feet above the earth’s surface to see the Earth’s curvature. The launch was planned from Cape Canaveral.
2. **ROBOTICS WORKSHOP:** Attended two days Robotics workshop of ROBO-ZEST 2014 (in association with Aakaar’14 IIT Bombay). Thereafter participated in the competition held at IIT Bombay.
3. **MEDIA/COMMUNICATIONS - EDITORIAL TRAINING:** As a member of the school editorial board, underwent training from the **Times of India group**-compiling, editing and producing a day’s Student Edition of Times of India.
4. **MEDIA/COMMUNICATIONS - FPC(Film Production Course)** conducted by Iceplex Mumbai
It is a course consisting of hands on training in the fields of Camera operations, Scripting, Audio/Video recording, Production Management, Casting and Video editing.
5. **MEDIA/COMMUNICATIONS - BBN(Beyond Breaking News)** course in T.V. News journalism conducted by Iceplex Mumbai
This course includes training in the fields of News editing, Reporting, Video editing, Camera operations, News production and News Casting.
Students who complete the BBN course qualify as YJs - Young Jourknows who can be seen on Topper TV and Ryan TV in a programme called Young Jourknows. This path-breaking show takes the viewers beyond Breaking News, bringing them news of the people, for the people, but by the Youth!

6. **MEDIA/COMMUNICATIONS - FILM MAKING WORKSHOP:** Was part of the production team of the film, **Green Dog**, premiered at the **Bangalore International Children's Film Festival**.
7. Attended a workshop on **Computational Fluid Dynamics** organized by **Jetwings Technology** Bangalore.(13/09/2015)
8. **AEROZONE** – Organized by the Department of Aerospace Engineering, Alliance College of Engineering & Design
 - Active member of the Organising Committee for the event.
 - Secured 3rd place in the **Land to Land Hydro-Rocket Missile Drop**.
 - Participated in the **Glider Design, Make & Fly** event.
9. Participated in the **Flight Testing Exercise** conducted by the Flight Laboratory , **IIT Kanpur**.(27/01/2016)
10. Took an online certification exam on **Computational Fluid Dynamics** conducted by **NPTEL**. (24/04/2016)

Skill set:

Computer Knowledge:	JAVA, C, MATLAB, C++, PYTHON, R, XML, HDF-5, FORTRAN, Processing
Engineering Software:	AutoCAD, ANSYS
Languages known:	English, Hindi, Malayalam, Tamil