Anand Pratap Singh

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Objective

To undertake graduate studies in the field of Computational Fluid Dynamics

Education

Dual Degree Program *Expected date of graduation Aug 2013*

Indian Institute of Technology Bombay, Mumbai

Master of Technology in Aerospace Engineering

Bachelor of Technology in Aerospace Engineering with **Minor** in Electrical Engg.

8.7/10 CPI

Key Academic Projects

Magnetically Dominated Bow Shock Flows, Ideal MHD[1] *May 2012 - present*

Guide: Prof. Avijit Chatterjee ***Masters Thesis***

- Involved understanding the intricacies of bow shock MHD flows compared to their euler counterparts
- Developed a Godunov scheme-based Ideal MHD solver in C++ for structured grids using higher order ENO and WENO flux reconstructions and validated against available benchmarks
- Future work involves obtaining numerical solution for bow shock flows and investigation new phenomena

Python Based SPH Solver *May 2010 to Dec 2010*

Guide: Prof. Prabhu Ramachandran ***Supervised Learning***

- Studied the fundamentals of Smoothed Particle Hydrodynamics method used for flow simulations
- Developed test cases like Shock Tube Problem and various Dam-Break Problems for an in-house python based SPH solver[2]
- Tested various boundary conditions used in SPH which were later included in the pysph framework

Departure Processes Modelling *May 2011 - July 2011*

Guide: Prof. K. Sudhakar ***Summer Project***

- Work involved statistical modelling of departure process for an airport using available past data
- An existing model was programmed in python to predict delays incurred on taxiways for Boston Airport, which can further be used to increase efficiency of the current system

Kinematic Relative Positioning of Ground Vehicles using GPS *December 2009*

Guide: Prof. H. Arya ***Winter Project***

- Studied the method of double differencing for precise estimation of relative position for ground vehicles
- Implemented the method using two Novatel GPS modules interfaced with a PC and a MATLAB program for realtime acquisition and data processing

Other Projects *2008 - present*

Course Projects

- Developed 2D Reimann solver in C to solve for channel flow with a bump
- Developed 1D MHD solver in python to solve Shock Tube problems
- Implemented Klobuchar Model in MATLAB to predict delay in GPS Signal due to ionospheric effect

[1] Magnetohydrodynamics, present status at Masters Thesis

[2] pysph, Framework for Smoothed Particle Hydrodynamics in Python, [report]

Relevant Courses

- Numerical Methods for Conservation Laws, Computational Fluid Dynamics, Computational Methods for High Speed Flows, Computational Methods in Thermal and Fluid Engineering, Gas Dynamics
- Differential Equations 1 and 2, Introduction to Numerical Analysis, Calculus, Linear Algebra

Professional Experience

Teaching Assistant

Aerodynamics, UG Course *Fall 2012* **Aerodynamics of Aerospace Vehicles, PG Course** *Fall 2012*

- Both the courses deal with basics of Aerodynamics, Airfoil Theory, Potential Flow, Compressibility, Supersonic and Hypersonics Flows
- Conducted tutorials and doubt solving sessions for the students
- Conducted tests, viva voce and assisted the instructor in evaluation of examinations

Inventory Management Software[3] *Freelance Project, Summer 2012*

- Developed a web based inventory management software for medical shops catering to the specific need of a client
- Highly intuitive frontend interface with minimal human interaction and rich back-end with statistical tools to predict sales and requirements

Skills

Technologies: C, C++, Python, LaTeX, GIT, HTML, JavaScript, CSS, Shell Scripting
Packages: Matlab, Scilab, Maxima, Sage, GasTurb, RDS **OS**: Windows, Linux, UNIX

Awards and Achievements

- Ranked 5th in the department, consistently in top 5 students ['08-'12]
- Remote controlled plane racing competition: Ranked 3rd in Zephyr 2009 among 15 teams ['09]
- Achieved a rank of 1360 in IITJEE out of more than 300,000 students who took the test ['08]
- Awarded Certificate of Merit for being among the top 0.1 % of successful candidates in Mathematics in Secondary Examination ['06]

Leadership Activities

Mentor, Department Academic Mentorship Program, IIT Bombay *Mar 2012 - present*

- Mentoring 4 junior undergraduate students; providing necessary academic guidance and helping them during their stay at IIT Bombay
- Liaising between faculty advisors and respective batches to provide feedback and recommendations

General Secretary, Department of Aerospace Engineering, IIT Bombay *Mar 2011 - Mar 2012*

- 1 of 15 student members of the Student Affairs Council, the highest level student-related decision and policy making body in the institute
- Coordinated and completed a curriculum review through discussions with faculty and students

Overall Coordinator, Aerospace Engineering Association, IIT Bombay *Mar 2011 - Mar 2012*

- Led a 3-tier team of 60 students to organize Zephyr[4], the annual aviation summit, currently the largest department festival of IIT Bombay with a budget of over INR 5 lacs

Convener, Aeromodelling Club, IIT Bombay *Mar 2009 - Mar 2010*
Class Representative, Aerospace Engineering class of 2013, IIT Bombay *Mar 2009 - Mar 2011*

[3] Web Based Inventory Management Software using Python [link]
[4] Zephyr, Annual aviation festival of IIT Bombay