Bharat Tak
Aerospace Engineering
Indian Institute of Technology, Bombay

08001017
B.Tech.
Male
DOB: 26/09/1991

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2011	8.62
Intermediate/+2	Board of Intermediate Education, AP	Atomic Energy Junior College, Hyderabad	2008	89.80
Matriculation	CBSE	Atomic Energy Central School-2, Hyd	2006	94.60

SCHOLASTIC ACHIEVEMENTS

- Ranked 843 among 300,000 students in Joint Entrance Examination for admissions to the IITs, 2008
- Ranked 1081 among over 500,000 students in the All India Engineering Entrance Examination, 2008
- Awarded the **Certificate of Merit** (top 0.1 % in Hindi) and school rank 1 in CBSE 10th Board Exam
- Secured the 'Best Outgoing Student Award' in 10th standard in a batch of over 100 students

INTERNSHIP

General Electric (GE) India, Bangalore: May'11- July'11
Aircraft engine anti-icing system design and analysis

- Employed LEWICE, a recently acquired anti-icing research tool developed by **NASA,** for preliminary anti-icing system design study of aircraft engines
- Theorized the internal working of the software from a rigorous **sensitivity analysis** of its output
- Interacted with **NASA developer** and the software owner(American kestrel) for their expert advice on adapting LEWICE to the allotted anti-icing design problem
- Updated **GE Global Anti-icing Team** with project status through bi-weekly teleconference presentations

ACADEMIC PROJECTS

Simulation and analysis of Flapping Wing Aerodynamics   Jan'11- Present
B.Tech project, Prof. Prabhu Ramachandran

- Involved in a study of the **unsteady aerodynamic phenomena** characteristic of low Reynolds-number flow pertaining to insect flight; study can revolutionize the future of **micro air vehicles**
- Simulated simplified models of flapping airfoils on the Vortex Method solver VEBTIFS and attempted to characterize the aerodynamic phenomena with the flapping kinematics based on the simulations
- Experimenting with **new airfoil configurations** for high lift that attempt to reproduce aerodynamic effects like Leading Edge Vortex(LEV) and Wake Capture similar to that of flapping wings in insect flight
- Collaborated in documenting the software VEBTIFS to be put up online for the open source community

Particle methods of fluid flow simulation   July'10- Nov'10
Elective course project, Prof. Prabhu Ramachandran

- Implemented a full-fledged 2-D viscous incompressible flow solver capable of simulating flow under complex moving geometries using **Vortex Methods**; demonstrated Von Karman vortex shedding
- Coded a solver to predict the trajectories of vortex blobs in the presence of boundaries; implemented vortex panel-method to enforce *no penetration* & *no slip* boundary condition
- Employed the '**Fast Multipole Method** (FMM)' for efficient tracking of large number of mutually affecting particles(order of 10^4 to 10^5); implemented Random Walk Method (RVM) for viscous diffusion
- Simulated the 1-D shock tube problem using **Smoothed Particle Hydrodynamics** (SPH) methodology
- Developed the code on LINUX platform and coded in an Object Oriented Fashion in *python*

Computing of High-speed flows, Course project   Jan'11- April'11
Elective course project, Prof. Krishnendu Sinha

- Coded a FORTRAN subroutine for **Flux vector splitting** using upwind scheme and modified Steger-warming method for **Finite Volume analysis** of 2D inviscid compressible flow

Supersonic Commercial Transport Aircraft (SCT)   May'11- Present
Aircraft Design, Team Project
- Conceptual **design study** of an economically viable supersonic commercial transport aircraft
- Customer and airworthiness requirement capture, concept feasibility study, initial sizing and layout design, component mass, performance and cost estimation were done as a part of the conceptual design

Position Control System Design   July'10- Nov'10
Control System Laboratory, Team Project
- Designed a **PID controller** for the precision positioning of a coupled rigid-elastic body system that exhibits low frequency-high amplitude vibrations as seen in solar panels of orbiting satellites
- Designed the control loop and obtained optimal parameter values on **SIMULINK**; demonstrated the physical performance of the controller on the Laboratory apparatus

Compressor Blade Design   July'11- Present
Aerodynamics of Compressor and Turbines, Team Project
- Designed the rotor/stator blade shapes of an axial flow compressor for given pressure ratio and mass flux
- Iterated over the design with a CFD tool to optimally meet the design requirements

Genetic Algorithm Implementation   Jan'11- April'11
Engineering Design Optimization, Individual Project
- Implemented meta-heuristic optimization program using 'Genetic Algorithm' in *python* that progressively optimizes the selection process of a Cricket team from a given pool of players

Hostel Room Configuration and Layout   July'09- Nov'09
Engineering Design, Team Project
- Collaborated with a team to design the furnishings of a given room for **efficient utilization** of space
- Applied concepts like stakeholder identification, requirement capture, Quality Function Deployment (QFD) and Pugh's matrix; shortlisted concept designs and presented the final Room-Configuration

─────────── EXTRA CURRICULLAR ACTIVITIES ───────────

Aeromodelling
- Won **1st prize** in the competition '*Up In The Air*' at Apogee 2011, the technical festival of **BITS Pilani**
- Led a team of 3 to build a model aircraft and piloted it in minimum time through the specified Arena
- Gave a **presentation** on Aeromodelling as a part of **Tech-Week** celebrations at IIT-Bombay
- **Built** scaled models of 3 aircrafts, **P-40**, **F-15** and **Piper Cub**; F-15 model was displayed in the Aerospace Department stall at **Techfest 2010**, the annual technical festival of IIT-Bombay

Mentor
- Mentoring 8 undergraduate students providing **academic & non-academic guidance** in their stay at IIT-B
- Mediating between faculty advisors and their respective batches; providing feedback & recommendations

─────────── TECHNICAL PROFICIENCIES ───────────

- ***Coding Tools*:** Python, C, C++, MATLAB
- ***Operating Systems & Other Applications*:** Linux, Windows, MS Office- Excel, Word, Power Point

─────────── RELEVANT COURSES AND INTERESTS ───────────

***Design*:** Aircraft Design, Engineering Design Optimization, Introduction to engineering Design
***Mechanics*:** Flight Mechanics, Space Flight Mechanics, Classical Mechanics(*phy.*), Quantum Mechanics(*phy.*)
***Aerodynamics*:** Particle Methods, Computing High speed Flows, Aerodynamics of Compressors and Turbine
***Controls*:** State Space Methods for flight vehicles, Control Theory, Applied Mechatronics, Control System lab