MICKY

RESEARCH INTERESTS

I am passionate about learning advanced stage aircraft design and designing aircraft engine nozzles, compressors, turbines, air intake and rocket nozzles. I am also interested in high performance scientific computing.

EDUCATION

Indian Institute Of Technology, Aerospace Engineering Department *July 2014 - Present*
Final Year, Bachelor of Technology. Pursuing Honors in Aerospace Engineering. **CGPA** : 7.24/10

PUBLICATIONS

Micky, Mukhopadhyay S., Dr Rajkumar S.Pant, *"Conceptual Sizing of Long Range Transport Aircraft"*, Proc. of the 24th AIDAA International Conference (2017), Italy. Paper here.

INTERNSHIPS

General Electric *Summer 2017*
NURBS Surface Generation & Crack Detection Using CNN

- Developed a code in MATLAB and OCTAVE for generating NURBS surface from Point Cloud of scanned components.
- Detected cracks using Convolutional Neural Networks from MXNet package in R in aircraft engine components.

Google Summer Of Code *Summer 2017*
Parallelizing "KSOLVE" Solver In MOOSE

- Developed an understanding of MOOSE software and explored the possible ways to parallelize the "KSOLVE" solver.
- Used Open MP in MOOSE "KSOLVE" solver and parallelized it using NVIDIA Cuda. Details here.

National Center Of Excellence In Technology For Internal Security *Summer 2016*
Controlling The Mobility of A Tele-Operated Rover

- Controlled the position of two flippers of the bot precisely by closed loop feedback control using PID algorithm.
- The bot had a DSMD (Deep Search Metal Detector) attached in front of it. Using the rotation of DSMD and velocity of the bot a simulation was done in MATLAB to know the area that the DSMD covers. Forward sweep and the rotation rate of DSMD were optimized so as to cover the maximum area.

RESEARCH PROJECTS

Flame Instabilities In Micro-Combustors *July 2017 - Present*
Undergraduate Thesis | Guide: Prof. Sudarshan Kumar

- Conducted experiments in micro - combustors using high speed cameras to gather the image data of the flames.
- Analysing the data obtained to understand the flame instabilities like X-Flame and Pulsating Flames.

Conceptual Sizing Of A Long Range Transport Aircraft *Jan'17 - April'17*
Supervised Learning Project | Guide: Professor Rajkumar S. Pant

- Completed the conceptual sizing of Boeing 787-8 aircraft that includes modules like constraint analysis, aerodynamic coefficient estimation, weight breakdown,range payload diagram and direct operating cost.
- Modularized the process using PYTHON so that it can be extended to other long range transport aircrafts.

Inverse Airfoil Design Using XFOIL *Jan'17-April'17*
Supervised Learning Project | Guide: Professor A.M. Pradeep

- Given a target pressure distribution, an airfoil is generated that gives required pressure distribution.
- XFOIL is used as the solver and its output is fed into the algorithm for changing the airfoil shape and then a new airfoil is generated and the process is repeated till convergence. This process was developed in Python. Code here.

Mars Rover Team, IIT Bombay *July'15 - July'17*
Working towards designing and fabrication of a tele-operated planetary rover

- Controlled the mobility of the rover by controlling its six wheels using Arduino Mega and Motor Drivers.
- Controlled the motion of the robotic arm consisting of two actuators and a gripper.

COURSE PROJECTS

City Air Ambulance *Autumn 2017*

Guides: Prof. G.R Shevare, Prof R.K Pant & Prof A. Chatterjee | AE429: Aircraft Design Lab

· Designed a novel Tilt-rotor ambulance for transporting a person in life threatening conditions to a nearby hospital. The range of the aircraft is 20km and can cover it in less than 6 minutes. Details here.

Compressor Designing And Fabrication *Spring 2017*

Guide: Prof. Bhaskar Roy | AE458: Turbomachines

· Designed a centrifugal compressor which consists of 24 radial vanes and a diffuser. The design pressure ratio was 1.03. It was 3D Printed using PA12 material and an efficiency of 50% was achieved.

Design And Fabrication of Savonius Wind Turbine *Spring 2017*

Guide: Prof. Bhaskar Roy | AE458: Turbomachines

· A savonius wind turbine consisting of two cup shaped blades was designed and manufactured using 3D printing. An efficiency of 10% was obtained at 1500 rpm and a wind speed of 10m/s.

Supersonic Serpentine Intake Design *Autumn 2016*

Guide: Prof. Bhaskar Roy | AE658: Design of Powerplants For Aircrafts

· A supersonic serpentine intake for a Mach=2 MRCA(BPR < 1.0) was designed. MRCA F22 Raptor was taken as a reference and a double wedged intake with 3 shocks anchored at one point was designed.

Propeller Design For A Low Speed Aircraft *Autumn 2016*

Guide: Prof. Bhaskar Roy | AE658: Design of Powerplants For Aircrafts

· A three bladed propeller was designed for an aircraft consisting of 4 passengers, flight speed of 300 Kmph and the service ceiling of 5000 m. The designed propeller had 10 sections of different airfoils.

Designing Powerplant Configuration *Autumn 2016*

Guide: Prof. Bhaskar Roy | AE658: Design of Powerplants For Aircrafts

· Designed a power plant configuration for a light combat aircraft. The aircraft would engage in combat at 5000m altitude and do reconnaissance at 15 km altitude. MQ9 Reaper was taken as a reference aircraft.

Optimization For Finding The Best Gift *Autumn 2016*

Guide: Prof. R.P.Shimpi | AE310: Engineering Design Optimization

· The idea is to maximize the satisfaction level of a person by giving a custom made gift(creating a gift from a given number of different items) under budget constraints. For this simple genetic algorithm was used.

Parallelization Using Various Tools *Spring 2016*

Guide: Asst. Prof. S. Gopalakrishnan | ME766: High Performance Scientific Computing

· The Power Method Algorithm for finding the greatest eigenvalue was parallelized using Open MP and CUDA.

ACHIEVEMENTS AND AWARDS

Accepted as a Google Summer of Code Student to contribute for open source software MOOSE *2017*

Awarded the prestigious KVPY fellowship & attended the Vijyoshi Camp 2013 held at IISC *2012*

Cleared PRE-RMO (Regional Mathematics Olympiad) in the Punjab region *2012*

Awarded the prestigious National Talent Search Examination Scholarship by NCERT *2009*

TECHNICAL SKILLS

Programming Languages	Python, C++, MATLAB, Cuda, OpenMP & MPI
Python Packages	Matplotlib, NumPy, Jupyter, Plotly & Skimage
Software & Tools	OpenVSP, SolidWorks, Ansys, XFOIL, Eagle, R, HTML, LaTeX, Excel, Vim & Git

POSITIONS OF RESPONSIBILITY

Web Manager *July'16 - May'17*

Aerospace Engineering Association (AEA) | Aerospace Engineering Department

· Designed a website for Aerospace Engg. Association and handled the updation Of Aerospace Department's main website. Organized and managed a department trip of 120+ people to Tikona Fort and a Fresher's 2016 orientation.

Mentor At RC Plane Competition *September 2015*

Aeromodelling Club IIT Bombay

· Mentored 12 students in the RC Plane event & managed the event along with the managers for its smooth execution.

EXTRA CURRICULAR

Selected for the 50th Inter IIT Football Camp in IIT Bombay *December'14*

Part of IIT Bombay football team in Mumbai District Football Association (MDFA) *September'14*

Successfully completed Basic Mountaineering Course organized by ABVIMAS, Manali *May'15-June'15*