



# FRESHER'S HANDBOOK



DEPARTMENT OF AEROSPACE ENGINEERING

BATCH 2022 - 2023



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# 1. About Department

Established in 1966-67 as the Department of Aeronautical Engineering, the department was renamed the Department of Aerospace Engineering in 1992. The department runs strong undergraduate and graduate programs in aerospace engineering, and carries out research in several areas of aeronautical and aerospace sciences.

The Aerospace Department, IIT Bombay seeks to establish traditions which will foster creativity and growth of excellence. The Department cherishes the hope that its graduates will be the leaders of tomorrow. Their education is patterned with this in view. Besides making available facilities for higher education, training and research in various fields of engineering and technology, the Institute contributes to the industrial development and economic growth of the country by preparing a cadre of engineers and scientists, who provide both man power and support R&D work for industries.

The department maintains close links with the aerospace and defense industry and undertakes sponsored research, consultancy, and continuing education programs in diverse areas. The faculty has contributed towards national programs like the LCA, IGMDP, GSLV, in various capacities, with spin-off benefits to other fields such as bio-medical engineering. The department has a wide range of experimental facilities such as subsonic and supersonic wind tunnels, water tunnel, stability tunnel, LDV and hot wires, analog and hydraulic simulation rigs, rotor dynamics and engine test rigs, Instron for structural testing, Autoclave for composites fabrication, instrumented drop weight impact test apparatus, and an aero-modelling lab, besides extensive computational facilities with excellent network connectivity.

The department aims to provide students with a cordial atmosphere and an opportunity to acquire a multi-disciplinary perspective to engineering problems. The department runs academic programs for the degrees of Bachelor of Technology (B.Tech), Master of Technology (M.Tech), Dual Degree (B.Tech and M.Tech) and Doctor of Philosophy (Ph.D.). Four broad area of specialization are offered: Aerodynamics, Dynamics & Control, Propulsion, Structures.



## 2. Welcome Message from Head of the Department

Dear Students,

Congratulations for getting selected in the prestigious Department of Aerospace Engineering, IIT Bombay for your higher studies. On behalf of the department, I extend a hearty welcome in the Aerospace Engineering Department, IIT Bombay. Our department is among the top Aerospace Engineering Departments in the country as well as across the world. This recognition has come out of the joint efforts of students, faculty, staff, and alumni over the past 50 years. The Department is actively involved in basic and applied research and high quality technical advisory support through various R&D projects to multiple aerospace companies and organizations in the country. We hope the exposure to these activities during your studies will prepare you to contribute to the nation after you graduate from the institute. To serve this purpose, we aim to provide you the best possible facilities and an excellent learning environment during your stay in the institute. Prof. Vineeth Nair and Prof. Rohit Gupta will be your Faculty Advisors who will advise you on all academic matters. You may receive an email from them soon in this regard. You will also hear from your senior students who may provide their perspective on the Masters programme, coursework etc. I would advise you to contact your Faculty Advisors and senior students without hesitation to resolve your queries.

On behalf of the entire department, I once again extend you all a hearty welcome and wish you the best for your studies.



**Sudarshan Kumar**  
**Institute Chair Professor & Head of the Department**  
Department of Aerospace Engineering  
IIT Bombay  
Powai, Mumbai 400076  
Phone: +91-22-2576-7100, 7101, 7102



### 3. Welcome note from Faculty Advisors

Dear Students,

It is a pleasure to welcome all of you to the Aerospace Engineering Department of IIT Bombay. Congratulations!

In the IIT system, each batch of student is assigned to one or two 'faculty advisors'. The two of us are going to serve in this capacity for your batch. Our role is to guide your progress through the academic program over the next two years. This not only involves advising you on courses and projects to take up, but also counselling you in your times of difficulty.

A parallel system of mentoring is maintained by your seniors of the previous batch, which is equally helpful. These senior students are also dedicated to guiding you through all sorts of issues that you may face in your first year. After that, of course, you must take up the baton. We strongly advise you to discuss issues of concern with your mentors. Please also do not hesitate to contact us at [vineeth@aero.iitb.ac.in](mailto:vineeth@aero.iitb.ac.in) (Vineeth Nair) and [rohit@aero.iitb.ac.in](mailto:rohit@aero.iitb.ac.in) (Rohit Gupta). For this mentoring system to work, your responsibility lies in first utilizing it and subsequently contributing to it.

Looking forward to interacting with you all in person in the near future.

Regards,

Vineeth Nair and Rohit Gupta



**Prof. Vineeth Nair**



**Prof. Rohit Gupta**

## 4. Welcome message from ISCP

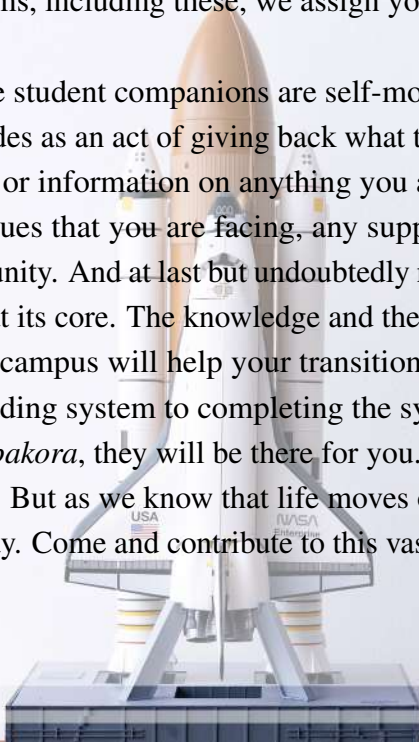
Dear new entrants,

Heartfelt congratulations for embarking on one of life's most memorable journeys - the journey of learning at IIT. On the behalf of our prestigious institute of IIT Bombay, team ISCP welcomes you aboard.

Give a pat on your shoulder for having achieved this feat. Your dedication, hard work and perseverance brought you here, and we know that your experience will lead you towards great opportunities. We can guarantee that your time here on this colossal campus will be exciting and knowledgeable. A degree will just be a small portion of what you will be leaving this institute with. You will also leave with beautiful memories of late-night conversations, interesting wing cultures, and crazy birthday parties (oh you are going to miss those!!). You will have the opportunity to mingle in various clubs and so cities where individuals strive to become experts in their fields and devote endless hours. As a result, there will be many chances to learn inside and outside the classroom. So entering this new universe in itself presents both exhilaration and potential difficulties. This is where we will help you by providing the tips you need to handle these difficulties and enjoy your time at IIT Bombay.

Now, you should be thinking what on earth is this ISCP? Institute Student Companion Programme (ISCP) is a student body with the primary objective of building a relationship of trust and comfort between the on-roll students and the incoming students of the PG programmes. We are here to help you get familiar with the ways of IITB, guide you through your ups and downs and make sure that each voice is heard. You will become part of a culture where people want to perfect their craft and thus work day in and day out. Various events are organised by the cultural, technical, and sports clubs in the institute throughout the year. Managing these along with lectures might seem daunting at first, and hence, to help you with a world of problems, including these, we assign you a **student companion**.

The student companions are self-motivated volunteers who will genuinely want to help you in low and high tides as an act of giving back what they received from the programme. You can rely on the team for any advice or information on anything you are venturing out into, whether it be academics or extracurriculars, any issues that you are facing, any support or requirements that you want to raise as a part of the student community. And at last but undoubtedly not least just for regular interaction because that is all the programme holds at its core. The knowledge and the experience that our student companions have gained with their stay on the campus will help your transition become smooth. From campus tours to classroom lectures, from the grading system to completing the syllabus, from the profile to placements, from *Schezwan Frankie* to *curry-pakora*, they will be there for you. We are sure that the last couple of years have been rough for many of you. But as we know that life moves on. So, make sure that you make the best out of your journey at IIT Bombay. Come and contribute to this vast store of knowledge and help it become more vibrant and colourful.



The campus of IIT Bombay awaits your presence; see you there.

**Institute Student Companion Programme (2022-23), IIT Bombay**

Email : [iscp2022.23@gmail.com](mailto:iscp2022.23@gmail.com)



**Abhishek Raman**  
Overall Coordinator

Civil Engineering Department  
Webmail : [213040033@iitb.ac.in](mailto:213040033@iitb.ac.in)  
Gmail : [ramanabhi3503@gmail.com](mailto:ramanabhi3503@gmail.com)  
Contact : (+91) 8789676472



**Prabhat**  
Overall Coordinator

Physics Department  
Webmail : [215120018@iitb.ac.in](mailto:215120018@iitb.ac.in)  
Gmail : [prabhat.70707@gmail.com](mailto:prabhat.70707@gmail.com)  
Contact : (+91) 9899946039



**Dipankar Kuli**  
Overall Coordinator

Earth Sciences Department  
Webmail : [215060006@iitb.ac.in](mailto:215060006@iitb.ac.in)  
Gmail : [dipankarkuli98@gmail.com](mailto:dipankarkuli98@gmail.com)  
Contact : (+91) 8638272899



**Ananda Charan Khatua**  
Cabinet Member

Earth Sciences Department  
Webmail : [215060023@iitb.ac.in](mailto:215060023@iitb.ac.in)  
Gmail : [charanananda55@gmail.com](mailto:charanananda55@gmail.com)  
Contact : (+91) 6370574104



**Ashish Kumar Gautam**  
Cabinet Member

Earth Sciences Department  
Webmail : [215060015@iitb.ac.in](mailto:215060015@iitb.ac.in)  
Gmail : [ashishkgautam2001@gmail.com](mailto:ashishkgautam2001@gmail.com)  
Contact : (+91) 7607369675





## 5. Welcome message from PGAC

Welcome Freshers!

We all have gone through a lot in these past couple of years, so firstly congratulations to all of you for securing admission in one of the prestigious institutes in the country. IIT Bombay provides best exposure to its students in all the aspects, both academically as well as non academically. The skills you develop here, the interactions you have with people here will stay with you throughout your life. The post graduation demands something additional compared to the under graduation, more time, more effort, more determination and a ton of dedication. For meeting these primary requirements, often we find ourselves in a daunting situation. In order to make your stay at IIT Bombay convenient, the institute has established the PGAC (Post Graduate Academic Council). Any technical necessity, any placement related assistance, any research queries or any academic grievances, you can always reach out to us. Each department has their own AURAA (Academic Unit Representative of Academic Affairs), whom you can approach directly in case you find any difficulties. Wishing you all a really convenient and productive IIT journey!

Regards,



**Mohit Meena**

**Institute Secretary, Academic Affairs (Masters)**

Email: [imr@iitb.ac.in](mailto:imr@iitb.ac.in)

Contact no. : 8006080474



## 6. Welcome note from Alumni

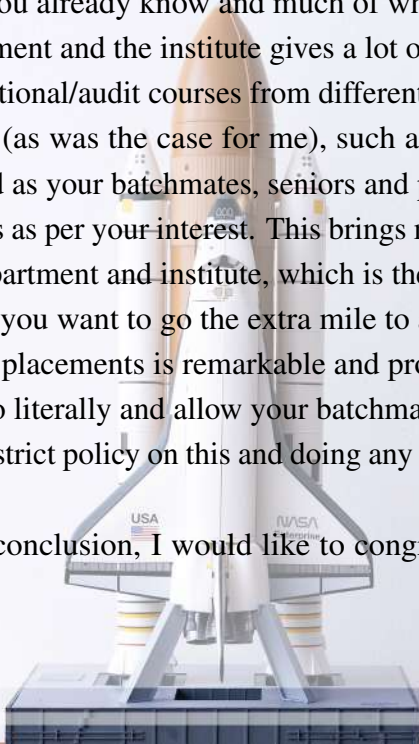
Hello All,

At the very outset, I would like to welcome you all to the Aerospace Department at IIT Bombay. I congratulate all of you for the hard work and dedication put in to clear examinations or selection interviews to become a part of one of the best institutions in the country for technical education. Becoming a part of IIT Bombay is a dream for most engineering aspirants and now that you can proudly call yourselves students of the institute, take a moment to let the realisation sink in and give yourselves a pat on the back for fulfilling the dream. Let us now get a glimpse of what you can expect to experience over the next two years you spend here.

The campus is in itself one of the first things you will experience and it is highly recommended you explore it during the period between your orientation and beginning of your classes (I do hope classes are offline now). There is the Infy Corridor, Boat House, old and new SACs, Sameer Hill (can get quite slippery during the monsoon though) and so many other places to explore in the campus. Besides these, the hostel canteens and eateries on campus are a must visit not only for birthdays and celebrations but also on days when the mess food is just not “happening” enough. Participating in various sporting events or cultural events as part of PG Cult are some of the best ways to not only get to know people but showcase your talents (or maybe even discover a hidden one). Needless to say, none of these experiences are as fulfilling if they are experienced alone, so make sure to take your mates along on these excursions. At the end of the day, when you are packing your bags for the last time after having submitted your M.Tech thesis it is probably the friends you make in these two years whom you will miss the most of all.

Why do I talk about the campus life before Academics or the Department you ask? Well, it is simply because you all have made a conscious choice to join the department based on your research of our esteemed faculty and our excellent academic records over the past many years. There is really not much I can add to what you already know and much of what you don't, your seniors will tell you. All I would say is that the department and the institute gives a lot of scope to explore a variety of fields and courses as part of electives or additional/audit courses from different departments. For those not exposed to this aspect of the IIT system before (as was the case for me), such a large number of choices might seem daunting at first, but be rest assured as your batchmates, seniors and professors will always be there to guide you and help make the right choices as per your interest. This brings me to probably the most important and cherished part of your time in the department and institute, which is the overwhelming sense of family and bonhomie. It truly inspires and makes you want to go the extra mile to achieve that extra bit. The support amongst batchmates, especially during placements is remarkable and probably the hallmark of every batch. Please do not take the previous line too literally and allow your batchmates to plagiarise assignments or answers in exams though. IITB has a very strict policy on this and doing any kind of academic malpractice can lead to very serious consequences.

In conclusion, I would like to congratulate you once more and wish you all the best for this journey.



Writing this message refreshed a lot of memories which had decayed a bit over the last one year since I graduated. Hopefully all of you would also leave the campus with a lot of cherished memories. All the best to each one of you and make yourself, your families and the institute proud.

Regards,



**Probuddho Chatterjee**

Currently working as an Analyst at IQVIA  
(Batch of 2021)

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Hello guys and girls,

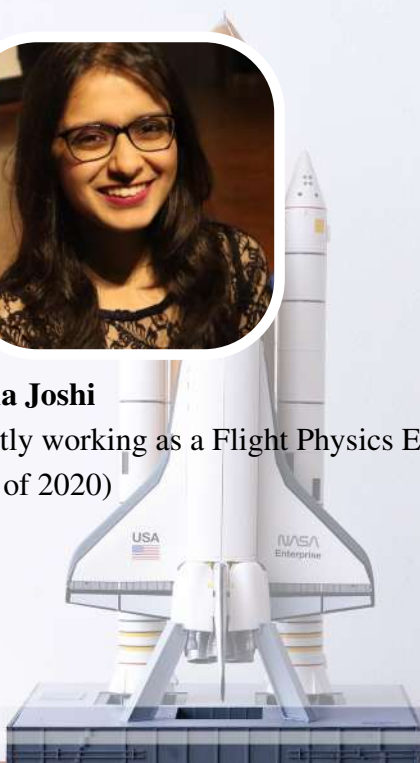
Congratulations! You have got the opportunity to live one of the best two years of your life in this beautiful institute. Aerospace industry in India is blooming, if you are the ones who are truly passionate about this domain, make sure you make full use of the resources, faculty and opportunities you will be given here. Covid is behind us (hopefully) and you all are really lucky to live on campus. Do be active in extra curricular activities, events and keep yourself fit and healthy. The hostel rooms + monsoon weather are wonderful combination to nap but I would recommend stepping out and enjoying the beauty of Mumbai and especially Powai. Make the best of friends, look out for one another, do everything with an honest heart and just enjoy whatever experience life throws at you!

All the best !



**Tanisha Joshi**

Currently working as a Flight Physics Engineer at Airbus  
(Batch of 2020)



## 7. Welcome note from Department Coordinator

Dear juniors,

First of all, a hearty congratulations to all of you for getting into one of the most renowned institutes in India. I take immense pleasure in welcoming you to our new Aerospace family at IIT Bombay. Every stage of your journey here is going to be undoubtedly mind-blowing. Still, it can be a little perplexing at times, and that's when the "Institute Student Companionship Programme (ISCP)" comes into play. It is a student body which helps and guides you on this amazing campus both in academic and non-academic related matters and makes sure that you have a smooth and cherishable journey. So, ensure you reach out to ISCP whenever you require help or support. This handbook has been created to guide you and help you know about the department and IIT-B on the whole. Hence, read it and reach out to us in case of any queries.

The following two years are definitely going to be a life-changing phase. Though the span is small, try to make the best out of it. So, utilize every opportunity that comes your way, as this is a massive milestone in your academic life. And at the same time, enjoy to the fullest and make memories of your life. I am very excited to meet you all soon and wish you all the best for a wonderful start.

Warm regards,



**Vaishnavi J**  
**Department Coordinator (ISCP 2022-23)**  
**(Aerospace Engineering Department)**  
Email: vaishjayak@gmail.com  
Contact no. : 8870662307



## 8. Department Faculties

### Aerodynamics (Specialization AE 1)

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#### Prof. Avijit Chatterjee

**Research Areas** : CFD, Computational Electromagnetics, Aerodynamics, Aircraft Design

**Phone** : 022- 25767128

**Email** : [avijit@aero.iitb.ac.in](mailto:avijit@aero.iitb.ac.in)



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#### Prof. J.C. Mandal

**Research Areas** : Computational fluid dynamics, Computation of Compressible and Incompressible flows, Incompressible two-phase flow problems, Numerical shock instability, Level set Methods

**Phone** : 022- 25767129

**Email** : [mandal@aero.iitb.ac.in](mailto:mandal@aero.iitb.ac.in)

**Website** : [www.aero.iitb.ac.in/~mandal/](http://www.aero.iitb.ac.in/~mandal/)



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#### Prof. V. Menezes

**Research Areas** : Experimental Hypersonic Aerothermodynamics, Hypersonic test facilities and measurement techniques, Medical applications of shock waves, Drug delivery devices

**Phone** : 022- 25767130

**Email** : [viren@aero.iitb.ac.in](mailto:viren@aero.iitb.ac.in)



## Prof. Vineeth Nair

**Research Areas** : Lagrangian Coherent Structures (LCS), Aeroacoustics, LES of turbulent combustion, Shock-turbulence interaction, Thermoacoustic Instability

**Phone** : 022- 25767105

**Email** : [vineeth@aero.iitb.ac.in](mailto:vineeth@aero.iitb.ac.in)

**Website** : [scholar.google.co.in/citations?user=VCn1T34AAAAJ](https://scholar.google.co.in/citations?user=VCn1T34AAAAJ)



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## Prof. R.K. Pant

**Research Areas** : Design and development of Lighter-than-Air-Systems, Aircraft Conceptual Design, Air Transportation, Evolutionary Optimization

**Phone** : 022- 25767127

**Email** : [rkpant@aero.iitb.ac.in](mailto:rkpant@aero.iitb.ac.in)

**Website** : [www.aero.iitb.ac.in/~rkpant/](http://www.aero.iitb.ac.in/~rkpant/)



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## Prof. Prabhu Ramachandran

**Research Areas** : Research Areas: Vortex methods, Particle Methods for Computational Fluid Dynamics, Scientific Computing, Applied Scientific Data Visualization,

**Phone** : 022- 25767121

**Email** : [prabhu@aero.iitb.ac.in](mailto:prabhu@aero.iitb.ac.in)

**Website** : [www.aero.iitb.ac.in/~prabhu/](http://www.aero.iitb.ac.in/~prabhu/)



## **Prof. Dhwani Shukla**

**Research Areas** : Low-Speed Aerodynamics, Rotorcraft Aerodynamics, Flow Diagnostic Techniques

**Phone** : 022- 25767119

**Email** : [dhwani@aero.iitb.ac.in](mailto:dhwani@aero.iitb.ac.in)

**Website** : <https://scholar.google.com/citations?hl=en&user=3HnQvFEAAAAJ>



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## **Prof. Aniruddha Sinha**

**Research Areas** : Fluid Dynamics: reduced-order modeling of flows, Aeroacoustics, Hydrodynamic stability theory, Feedback flow control, dataset analysis of experimental techniques and computational simulations.

**Phone** : 022- 25767103

**Email** : [as@aero.iitb.ac.in](mailto:as@aero.iitb.ac.in)

**Website** : <http://www.aero.iitb.ac.in/~aniruddha/>



## Dynamics And Control (Specialization AE 2)

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### Prof. Hemendra Arya

**Research Areas** : Solar powered miniature aircraft, development of inertial navigation system, development of ground based autonomous vehicle, ISRO launch vehicle simulation facility.

**Phone** : 022- 25767118

**Email** : [arya@aero.iitb.ac.in](mailto:arya@aero.iitb.ac.in)

**Website** : [www.aero.iitb.ac.in/~arya/](http://www.aero.iitb.ac.in/~arya/)



### Prof. Ashok Joshi

**Research Areas** : Structural Dynamics, Aeroservoelasticity & Aerothermoservoelasticity, Re-entry Guidance, Modelling, Navigation, Guidance and Control of Unmanned Aerial Systems.

**Phone** : 022- 25767113

**Email** : [ashokj@aero.iitb.ac.in](mailto:ashokj@aero.iitb.ac.in)

**Website** : [www.aero.iitb.ac.in/~ashokj/](http://www.aero.iitb.ac.in/~ashokj/)



### Prof. Shashi Ranjan Kumar

**Research Areas** : Guidance and Control, Cooperative Active Aircraft Protection, Cooperative Terminal Constrained Guidance, Consensus and Formation Control of Multi-Agent Systems, Cooperative Control, Collision Avoidance, and Path Planning of UAVs. Nonlinear and Robust Control Design, Sliding Mode Control.

**Phone** : 022- 25767108

**Email** : [srk@aero.iitb.ac.in](mailto:srk@aero.iitb.ac.in)

**Website** : <http://home.iitb.ac.in/~srkumar>





## **Prof. Arnab Maity**

**Research Areas :** Guidance, navigation and control of aerospace vehicles, Optimal control for online trajectory optimization and nonlinear systems, Adaptive control of uncertain systems, Distributed/decentralized control and estimation, Fault tolerant control and estimation, fault detection and diagnosis, Aerospace engine modeling and control, Formation flying and swarm of aerial vehicles, Nonlinear and robust flight guidance and control.

**Phone :** 022- 25767136

**Email :** [arnab@aero.iitb.ac.in](mailto:arnab@aero.iitb.ac.in)



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## **Prof. Rohit Gupta**

**Research Areas :** Dynamical systems, Geometric mechanics, Geometric control theory and applications, Optimal control theory and applications, Optimization theory and applications.

**Phone :** 022- 25767113

**Email :** [rohit@aero.iitb.ac.in](mailto:rohit@aero.iitb.ac.in)



## Propulsion (Specialization AE 3)

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### Prof. A.M. Pradeep

**Research Areas :** Active and passive flow control, flow characteristics of internal flows and turbomachinery, design and performance enhancement strategies in turbomachinery, experimental aerodynamics.

**Phone :** 022- 25767125

**Email :** [ampradeep@aero.iitb.ac.in](mailto:ampradeep@aero.iitb.ac.in)

**Website :** [www.aero.iitb.ac.in/~ampradeep/](http://www.aero.iitb.ac.in/~ampradeep/)



### Prof. Kowsik Bodi

**Research Areas :** Computational Fluid Dynamics, Magneto hydrodynamics, Electric Propulsion, Reacting Flows, Compressible Flows.

**Phone :** 022- 25767126

**Email :** [kbodi@aero.iitb.ac.in](mailto:kbodi@aero.iitb.ac.in)

**Website :** [www.aero.iitb.ac.in/~kbodi/](http://www.aero.iitb.ac.in/~kbodi/)



### Prof. Hrishikesh Gadgil

**Research Areas :** Propulsion, Atomization and Sprays, Combustion, Interfacial Instabilities, Computation of High Enthalpy flows with real gas effects, Effect of Acoustic Forcing on the characteristics of Liquid Fuel Atomizers for Aero Engines.

**Phone :** 022- 25767106

**Email :** [gadgil@aero.iitb.ac.in](mailto:gadgil@aero.iitb.ac.in)

**Website :** [www.aero.iitb.ac.in/~gadgil/](http://www.aero.iitb.ac.in/~gadgil/)



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## **Prof. T. Chandra Sekar**

**Research Areas :** Experimental Fluid Mechanics, Fluid-Structure Interaction, Aeroelasticity/Aerothermoelasticity - Prediction and Active Flutter Suppression (AFS), Gas Turbines - Performance, Testing and Integration, Turbomachines, Thrust Vectoring - Mechanical and Fluidic.

**Email :** [tchandra@aero.iitb.ac.in](mailto:tchandra@aero.iitb.ac.in)

---

## **Prof. Sudarshan Kumar**

**Research Areas :** Micro combustion, flameless combustion, MILD combustion, Emission reduction from combustion systems, Measurement of laminar burning velocity at higher mixture temperatures, Modeling of combustion systems, Rocket propellants, Supersonic combustion modeling, Turbulent combustion modeling, Lifted flames, Pattern formation of flames, Combustion instabilities in rocket engines.

**Phone :** 022- 25767124

**Email :** [sudar@aero.iitb.ac.in](mailto:sudar@aero.iitb.ac.in)

**Website :** [www.aero.iitb.ac.in/~sudar](http://www.aero.iitb.ac.in/~sudar)

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## **Prof. Shripad P. Mahulikar**

**Research Areas :** Aerothermal Studies - Hypersonic Vehicle, Aerothermodynamics, Aircraft Stealth Technology, Heat Transfer, Infrared Signatures of Aircraft Helicopters, Jet Propulsion, Microchannel Cooling of Gas Turbine Blades, Non-Equilibrium Thermodynamics

**Phone :** 022- 25767122

**Email :** [spm@aero.iitb.ac.in](mailto:spm@aero.iitb.ac.in)

**Website :** [www.aero.iitb.ac.in/~spm](http://www.aero.iitb.ac.in/~spm)

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## **Prof. Krishnendu Sinha**

**Research Areas :** Hypersonic and high-enthalpy flows, turbulence modelling in high-speed flows, computational fluid dynamics, high-performance computing, intake aerodynamics for Scramjet engines, re-entry capsule flow physics.

**Phone :** 022- 25767135

**Email :** [krish@aero.iitb.ac.in](mailto:krish@aero.iitb.ac.in)

**Website :** [www.hypersonic-cfd.com/](http://www.hypersonic-cfd.com/)



---

## **Prof. Nagendra Kumar**

**Research Areas :** Combustion and flame, computational and experimental studies of propellants.

**Email :** [nagendra@aero.iitb.ac.in](mailto:nagendra@aero.iitb.ac.in)



## Structures (Specialization AE 4)

---

### Prof. Abhijit Gogulapati

**Research Areas :** Aeroelasticity, Aerothermoelasticity, Reduced Order Modeling, Optimization.

**Phone :** 022- 25767117

**Email :** [abhijit@aero.iitb.ac.in](mailto:abhijit@aero.iitb.ac.in)



### Prof. P.J. Guruprasad

**Research Areas :** Damage characteristics in flex-beam like structures for hinge-less and bearing-less helicopter rotor blades, Size effects in crystalline materials, Fatigue in metals and metallic alloys, Development of novel shape memory composite for morphing applications.

**Phone :** 022- 25767142

**Email :** [pjguru@aero.iitb.ac.in](mailto:pjguru@aero.iitb.ac.in)

**Website :** [www.aero.iitb.ac.in/~pjguru/](http://www.aero.iitb.ac.in/~pjguru/)



### Prof. Krishnendu Haldar

**Research Areas :** Nonlinear continuum mechanics, Modeling of multi-field interactions with matter in continuum scale, Active materials and smart structures, Phase transformation (Magnetic Shape Memory Alloys), Soft material (Magneto Active Polymers), Liquid crystals, Biomechanics, Computational mechanics.

**Phone :** 022- 25767114

**Email :** [krisnendu@aero.iitb.ac.in](mailto:krisnendu@aero.iitb.ac.in)

**Website :** <https://haldarkrishnendu.wixsite.com/krisnendu>



**Prof. P.M. Mujumdar**

**Research Areas** Aeroelasticity, Aeroservoelasticity, Structural Dynamics and Stability.

**Phone :** 022- 25767116

**Email :** [mujumdar@aero.iitb.ac.in](mailto:mujumdar@aero.iitb.ac.in)

**Website :** [www.aero.iitb.ac.in/~mujumdar/](http://www.aero.iitb.ac.in/~mujumdar/)



---

**Prof. Amuthan A. Ramabathiran**

**Research Areas** Multiscale modelling of material behaviour, wave propagation in solids.

**Phone :** 022- 25767111

**Email :** [amuthan@aero.iitb.ac.in](mailto:amuthan@aero.iitb.ac.in)

**Website :** [www.amuthanar.com/](http://www.amuthanar.com/)



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**Prof. Chandra Sekher Yerramalli**

**Research Areas** Failure modeling, damage analysis of composite materials with application to aerospace and renewable energy, battery storage technologies.

**Phone :** 022- 25767104

**Email :** [chandra@aero.iitb.ac.in](mailto:chandra@aero.iitb.ac.in)



## Additional Members of Faculty

Name	Specialisation	Phone	Email
<b>Emiritus Professor</b>			
Prof. N.K. Naik	Structures	022- 25767101	<b>nknaik@aero.iitb.ac.in</b>
<b>Adjunct Faculty</b>			
Prof. G.R. Shevare	Aerodynamics	022-25767112	<b>shevare@aero.iitb.ac.in</b>
Prof. Ganapathi Bhat	Aerodynamics		<b>gbhat.@aero.iitb.ac.in</b>
Prof. S.D. Sharma	Aerodynamics	022-25767123	<b>sds@aero.iitb.ac.in</b>
<b>Visiting Faculty</b>			
Prof. Harshad Khadilkar	Dynamics & Control	-	<b>harshadk@iitb.ac.in</b>
Prof. B.N. Raghunandan	Propulsion	-	<b>raghubn@aero.iitb.ac.in</b>
Prof. Bhupendra Khandelwal	Propulsion	-	<b>bhupendra.khandelwal @aero.iitb.ac.in</b>

## Department Office Staff

Name	Designation	Email
Mr. Omesh K Sharma	Jr. Administrative Assistant	<b>omesh@aero.iitb.ac.in</b>
Ms. Akanksha Ipte	Temporary Office Supporting Staff	<b>akanksha.ipete2010@gmail.com</b>
Mr. Sanjeev Shibe	Temporary Office Supporting Staff	<b>sanjeevshibe2918@gmail.com</b>
Mr. Vinay Narasimhan	System Administrator	<b>vinay@aero.iitb.ac.in</b>
Mr. Dilip Gangad	Multi-skilled Asst.	<b>dilip@aero.iitb.ac.in</b>
Mr. Vishal Karnekar	Administrative Superintendent	<b>vishal@aero.iitb.ac.in</b>
Mr. Sunil Bandsode	Sr. Draughtsman	<b>bandsode@aero.iitb.ac.in</b>



## 9. Department Facilities

### Department Lab facilities

#### Aerodynamics Lab

**Location :** Aero-Annex Basement

**Faculty In-Charge :** Aerodynamics Faculty

The lab is used for conducting experiments for both UG and PG students, having many experimental facilities such as wind-tunnels, 2D planar jet equipment etc. Allows students to get a hands-on experience on the various aspects such as flow past cylinder/airfoil, boundary layer development etc. taught in the theory courses in Aerodynamics.



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#### Cardio-Vascular Lab

**Location :** Aero-Annex Ground Floor

**Faculty In-charge :** Prof. S.D. Sharma

The lab focuses on research regarding cardiovascular flow dynamics. Flow dynamics on the Fontan model and flow through mechanical heart valves (MHVs) are the prime research areas currently being studied.

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## **Aircraft Propulsion Lab**

**Location :** Aero Main Building Ground Floor

**Faculty In-charge :** Propulsion Faculty

Practical course is organised in this lab for both UG and PG students. Various aspects of propulsion systems and the various components under different operating conditions are studied. Experimental facilities related to heat-transfer, turbomachinery and nozzle performance are available. Even a miniature gas turbine engine setup is present.



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## **Structures Lab**

**Location :** Aero Main Building Ground Floor

**Faculty In-charge :** Structures Faculty

Experiments related to measuring material properties and composite manufacturing are conducted as part of both UG and PG laboratory courses. Variety of setups such as Izod Impact Tester, Universal Testing Machine, Shear Centre determination and Laser Doppler Vibrometer are used for the various experiments.



### **Control and Instrumentation**

**Location :** Aero-Annex Ground Floor

**Faculty In-Charge :** Prof. Arnab Maity

This lab is used for conducting courses for both UG and PG students. The practical applications of concepts regarding control theory and various types of sensors used in many modern devices are demonstrated. Some of the setups include inverted pendulum, gyroscope, GPS and other sensors.



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### **Hypersonic CFD Lab**

**Location :** Aero-Annex Ground Floor

**Faculty In-Charge :** Prof. Krishnendu Sinha

This is primarily a PhD laboratory, with the research group carrying out theoretical analysis and numerical modelling of fundamental phenomenon observed in high-speed flows. Shock-boundary layer interaction, Shock-Turbulence interaction, Re-entry flow are some of the research topics currently being examined.

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### **High Speed Aerodynamics Lab**

**Location :** Aero-Annex Ground Floor

**Faculty In-Charge :** Prof. Vineeth Nair

This lab carries out research in high-speed flows along with aero-acoustic problems. Interaction of compressible turbulence with shock/detonation waves and its mathematical analysis with intermittent sound sources in reacting and non-reacting flow-fields are some of the active research topics being studied by the research group.

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### **Miniature Aerial Vehicle (MAV) Lab**

**Location :** Beside Aero-Annex

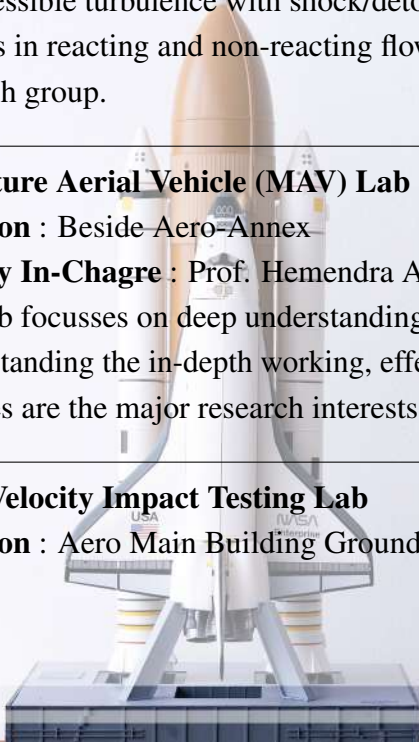
**Faculty In-Chagre :** Prof. Hemendra Arya

This lab focusses on deep understanding and hardware development of miniature and micro aerial vehicles. Understanding the in-depth working, effect of wing shape and development of drones and autonomous aerial vehicles are the major research interests.

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### **High Velocity Impact Testing Lab**

**Location :** Aero Main Building Ground Floor



**Faculty In-Charge :** Prof. C.S. Yerramalli

The lab facilities include tension, compression and torsion Hopkinson Bars and ballistics guns which are used for testing high strength armour and ballistics materials. It also develops strength strain rate dependent models from the Hopkinson setup data.

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### **Turbo-machinery Research Laboratory**

**Location :** Beside Aero Main Building

**Faculty In-Charge :** Prof. A.M. Pradeep

This lab has facilities to conduct cascade tests, low-speed axial compressor experiments and a low speed low turbulence wind tunnel amongst others. Studies related to compressor tip-leakage flows, contra-rotating fan studies and tandem bladed compressor with inlet flow distortion are some of the active research topics.



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### **Lighter-than-Air (LTA) Systems Laboratory**

**Location :** Aero Main Building Ground Floor

**Faculty In-Charge :** Prof. R.S. Pant

This lab focuses on research related to balloons and airships with many funded projects related to design, testing and fabrication of LTA systems. In flight span extension and inflatable wings for UAV applications as well as Multi-disciplinary design optimisation studies are some of the active research interests of the research group.



## Combustion Research Laboratory

**Location :** Aero Main Building Ground Floor

**Faculty In-Charge :** Prof. Sudarshan Kumar

In this lab where a lot of research on combustion theory and techniques take place. Studies to better understand the combustion process and develop new techniques for more efficient and environment friendly combustion. Flame-less combustion, combustion instabilities and power generation from micro combustors are some of the active research topics.



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## Shock Tunnel Lab

**Location :** Aero Main Building Ground Floor

**Faculty In-Charge :** Prof. Viren Menezes

The lab is equipped with a shock tunnel capable of simulating free stream Mach number of 8, with the facility to test hypersonic models smaller than 100mm dia. Forces, moments and surface heat transfer rates on hypersonic re-entry models can be tested as well as the design and testing of blast mitigation and thermal protection systems.



## Lab Staff Members

Name	Designation	Email
Mr. Jitendra Kumar	Jr. Mechanic	<a href="mailto:jitendrkr@iitb.ac.in">jitendrkr@iitb.ac.in</a>
Ms. Swapnali Bhandare	Technical Superintendent	<a href="mailto:swapnali@aero.iitb.ac.in">swapnali@aero.iitb.ac.in</a>
Mr. Abhishek Pednekar	Technical Superintendent	<a href="mailto:abhishek@aero.iitb.ac.in">abhishek@aero.iitb.ac.in</a>
Mr. Rajesh Gadekar	Asst. Technical Officer	<a href="mailto:1000007@iitb.ac.in">1000007@iitb.ac.in</a>

## Other Facilities in the Department

### Department Study Room:

The Aero-Annex Lecture Hall (ALH) present on the ground floor (closer to the infinity corridor side) of the Aero-Annex building is used as a study hall exclusively for students of the Aerospace Department. The timings of the hall are from 10 AM to 3 AM.

### Image Based Spray Diagnostic Facility (Central Instrumental Research Facility:)

The facility is used for characterising fuel sprays using laser based optical diagnostics. The system works based on either Particle Image Velocimetry (PIV) technique or the shadowgraph technique. Present in the Combustion Research Laboratory, it is used in investigating combustion phenomenon in flames, burners, propulsion systems and furnaces amongst others. More details can be found on the website:

[rnd.iitb.ac.in/research-facility/image-based-spray-diagnostic-facility](http://rnd.iitb.ac.in/research-facility/image-based-spray-diagnostic-facility)

**Prof. In-Charge :** Prof. Sudarshan Kumar

### 3D Printing Facility:

Exclusive 3D printing facilities are available for the faculty and students of the Aerospace Department related to official projects. Request for using the facility can be made on the official website: [www.aero.iitb.ac.in/3dprinter/](http://www.aero.iitb.ac.in/3dprinter/)

### Department Library :

It is an exclusive library of the Department containing a good collection of books and journals catering to the needs of the students, faculty as well as research scholars. It is located within the department office and remains open from 10 AM to 4 PM. Anyone can suggest if any book is required. If the relevance of the book is felt enough, the council will try to get that into the library. Department library books link: <https://tinyurl.com/ye3rv3cr>



## Technical Teams and Clubs

### 1. IIT Bombay, Student Satellite Program :

The IIT Bombay Student Satellite Project is a landmark project taken up by the space enthusiasts in IIT Bombay. The objective of this project is to make IIT Bombay a respected centre for advancement in Satellite and Space Technology in the world. This project kicked off with 'Pratham', IIT Bombay's first venture into satellite technology, which was successfully launched from Sriharikota on 26th Sept 2016. Its payload was measuring Total Electron Count in the ionosphere. We are an interdisciplinary team of 50+ students that works on designing space systems for CubeSats. The team is also a part of the Great Lunar Expedition for Everyone, which is a global initiative led by the Space Grants of the University of Colorado. Along with this, we are also working on creating a software framework for Rendezvous and Docking simulations for CubeSats. Ham Radio Club of the institute also functions under IITBSSP, where we conduct amateur radio club activities.

**Website :** <http://iitbssp.ml/>

### 2. IIT Bombay, Rocket Team

Interdisciplinary team of 25 students from various departments aims to build a solid motor rocket which can carry a payload upto 3 km apogee. With this short term mission goal ,team is gearing up to participate in Spaceport America championship to be held in May 2022. Vision of the team is to bring Rocketry oriented Tech culture to IIT Bombay.

**Website :** <https://iitb-rocket-team.github.io/>

### 3. Mars Rover Team :

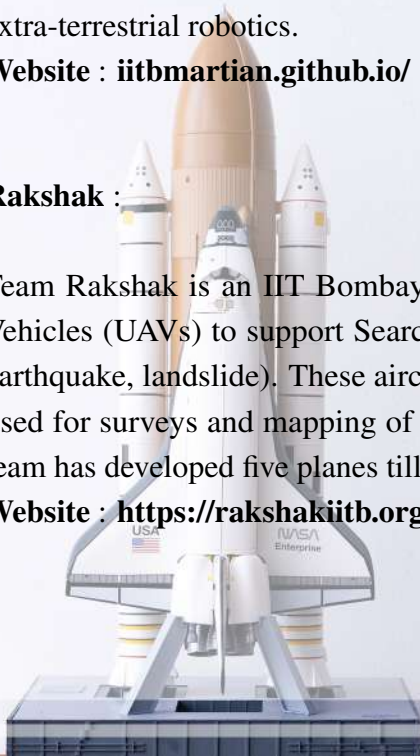
The IITB Mars Rover project is a student initiative working to gain hands on knowledge about development of all terrain rovers and space biosciences and build a prototype Mars rover capable of extra-terrestrial robotics.

**Website :** [iitbmartian.github.io/](http://iitbmartian.github.io/)

### 4. Rakshak :

Team Rakshak is an IIT Bombay student initiative to develop a fleet of robust Unmanned Aerial Vehicles (UAVs) to support Search and Rescue Operations (SRO) in the event of disasters (floods, earthquake, landslide). These aircrafts can provide relief measures in disaster-stricken areas, can be used for surveys and mapping of cities and conservation of wildlife with slight modifications. The team has developed five planes till date and has showcased their work in the international level.

**Website :** <https://rakshakiitb.org/>



## 5. ExoFly :

ExoFly aims to design and build a safe, quiet, ultra-compact, near-VTOL personal flying device capable of flying 20 miles while carrying a single person. The team is participating in a Global Competition 'GoFly', sponsored by Boeing.

**Website : [www.exofly.org/](http://www.exofly.org/)**

## 6. AUV-Autonomous Underwater Vehicle :

The team works towards participating at AUVSI Robosub Competition, which is held annually in July at San Diego, California. The competition is a platform for students to display their skills in underwater robotics and build a connection with industries working along similar verticals. The competition demands designing and manufacturing of an autonomous underwater vehicle that can perform predefined tasks.

**Website: [www.auv-iitb.org/](http://www.auv-iitb.org/)**

## 7. Innovation Cell :

A design and engineering center that enables students across IIT-Bombay to come together to develop technological innovations and participate in national and international competitions. They compete in Mahindra rise challenge, ASME student design Competition, IARC.

**Website : [www.umiciitb.com/](http://www.umiciitb.com/)**

## 8. Shunya :

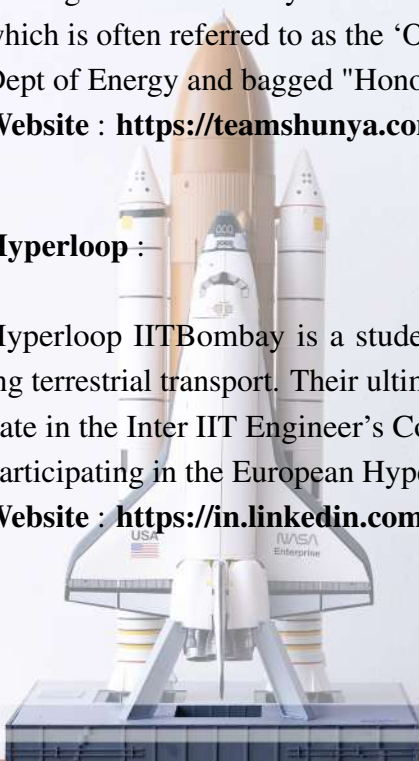
Aiming to build "affordable prefabricated net zero solar powered houses" making India's future energy secure. Their mission is to bring about a change in the Indian building industry, by demonstrating the affordability of sustainable housing, They took part in Solar Decathlon Europe (2014) which is often referred to as the 'Olympics of Sustainable Architecture' which is organised by the US Dept of Energy and bagged "Honourable mention in Sustainability"

**Website : <https://teamshunya.com/>**

## 9. Hyperloop :

Hyperloop IITBombay is a student organisation, built with a goal of reinventing and revolutionizing terrestrial transport. Their ultimate target is the SpaceX Hyperloop Pod Competition. They participate in the Inter IIT Engineer's Conclave and Desert Hyperloop Competition. Currently the team is participating in the European Hyperloop week (EHW).

**Website : <https://in.linkedin.com/company/hyperloop-iitb>**



## 10. Astronomy Club :

The club organizes periodic star - gazing sessions and field trips to places like the GMRT, IUCCA and the Nehru Planetarium. Besides star charts and other literature, the club has a 6" Newtonian reflector telescope.

## 11. Aeromodelling Club :

The Aeromodelling Club of IIT Bombay is one of the premier clubs for technical exploration in the institute .It deals with anything that is capable of flight from drones and planes to rockets and boomerangs. It draws participation from over a thousand students across branches for various events and technical activities.The flagship event of the club for freshmen is the RC Plane Competition which gives students a hands on introduction to flight .

Here students build and fly their first airplanes after learning the fundamentals of flight from club seniors who mentor teams throughout the process. The club has seen success at national level aeromodelling competitions over the years like the Boeing Aeromodelling Challenge and is always open to ideas for interesting projects . Over the years it has seen work done on Ion Propulsion , Bionics for flight , VTOL aircraft and high performance quadcopters . If you find flight fascinating and are excited by challenges the Aeromodelling Club is the place for you.

**Website :** [www.tech-iitb.org/aeromodelling-club/](http://www.tech-iitb.org/aeromodelling-club/)

## Aerospace Centres

- **National Centre for Aerospace Innovation and Research (NCAIR) :**

The National Centre for Aerospace Innovation and Research is a collaborative consortium of the Indian aerospace manufacturing sector providing research and technology to its members with a vision to create a world class aerospace manufacturing ecosystem in India. The founding partners for the Centre were IIT Bombay, Department of Science and Technology (DST), Boeing, Hindustan Aeronautics Limited (HAL) and National Aerospace Laboratories (NAL). The establishment of such a centre was to serve as a catalyst for collaboration between industry, academia, research and development organisations and the government. It aimed to provide economically viable and sustainable solutions to the Indian aerospace manufacturers by promoting innovation, knowledge creation, entrepreneurship and dissemination of technical understanding. It helps Indian small and medium enterprises to enhance manufacturing quality to aerospace standards by providing technical support, and state of the art manufacturing facilities to demonstrate new capabilities and human resources training.

**Website :** <http://ncair.in/>

- **Centre of Propulsion Technology (CoPT) :**

This centre is set up with funding from the Defence Research and Development Organisation (DRDO)





funding with IIT Bombay being the host institute and a few other institutes of national importance as participating members. The centre aims at spearheading fundamental and applied research in areas related to aerodynamic design and performance analysis of various components and technologies associated with aerospace propulsion devices. It also tries to develop trained manpower through research on various areas related to propulsion technology. The establishment of the centre is hoped to be a significant step towards achieving self-sufficiency in various aspects of gas turbine engines, hypersonic craft, rocket propulsion technology and futuristic morphing aircraft development in India.

**Prof. In Charge :** Prof. A.M. Pradeep

**Website :** <https://rnd.iitb.ac.in/node/102326>



## 10. Highlights of the department

All these activities are organised during the normal offline semester. Extreme circumstances due to COVID led to all activities being shifted to online mode. This led to the cancellation of many events which could only be held in-person. But, still we managed to arrange some events online. However, we hope that given the conditions are improving, this year we will see all these events back again.

- **Department freshman orientation**

This event is conducted for the first year UG and PG students so as to give them a brief overview about the department and the council. Last year this event was organised in online mode and it consisted of two parts:- first one was formal and the other, informal. In first part the students were addressed by AeA council in-charge Prof. R S Pant. In the latter half, informal session was planned where inter batch interaction took place and it was very helpful in senior junior interaction as well.

- **Department Sports Day**

In this event students from each batch comes to compete for the best in different sports. Sports Day conducted in second semester. The sports in which students competed were Badminton and Table Tennis..

- **Department Traditional Day**

Traditions are the things which bind us with each other, reminds us of what we were. To nourish intra-departmental bonding, the AEA council arranged this event. This informal event was really helpful to enhance Senior-junior interaction and it ended with photoshoot.

- **Farewell**

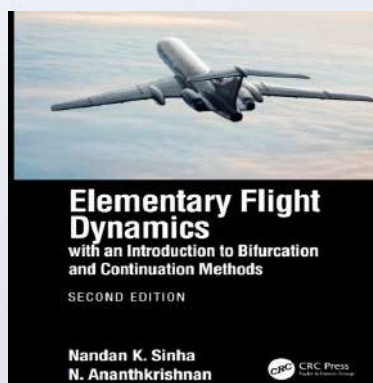
It was an unofficial event arranged by the juniors for the passing out seniors with a motive to cherish the memorable moments of their journey in the Institute. The event was arranged in PC Saxena Auditorium on 27th of May 2022. It was a fun filled and emotional event where we bid adieu to our seniors. Event involved singing and dance performances from both seniors and juniors.





## 11. Achievements of the department

- Prof. Sudarshan Kumar (HOD), Prof. Shripad P. Mahulikar (Professor), Prof. Niranjan K. Naik (Emeritus Professor), Prof. Rameshchandra P. Shimpi (Retired Professor) from Aerospace department recognized as **top 2% scientist of the world**.
- Prof. Sudarshan Kumar, Head of the Department of Aerospace Engineering, has been elected as Fellow of **International Society for Energy Environment and Sustainability (ISEES)** for the year 2020.
- Successfully developed an indigenous **Anti-Hail gun** with LPG as a fuel and low operational cost to substantially help reduce the damage to farmer's crop produce from hailstorms by Combustion Research Laboratory under the guidance of Prof. Sudarshan Kumar
- Developed **low-cost oxygen concentrators** for medical and industrial purposes with high purity. Developed product was further handed over to OMNILIFE SYSTEMS PRIVATE LIMITED for full scale manufacturing. The project was developed by Prof. Sudarshan Kumar.
- Prof. R.K. Pant's (Department of Aerospace engineering) two papers got published in International Journals. <https://doi.org/10.1016/j.paerosci.2019.100587> along with four International Conference Papers, one of them receiving the title of "Best Paper Award".
- Prof. N. Ananthkrishnan recently published 2nd edition of "**Elementary Flight Dynamics: with introduction to Bifurcation Continuation methods**" by N.K. Sinha N. Ananthkrishnan.
- Prof. Aniruddha Sinha, Department of Aerospace Engineering, was honored with **Department Award for Excellence** in Teaching in 2020.
- Ph.D scholar Pallavi R. (Roll no. 154010008, Category: Institute TA) successfully defended Ph.D-thesis in record fastest time from Aerospace Department i.e in 2-yrs 10-months. The field of her PhD research was Irreversible Thermodynamics. PhD-research of candidate resulted in 4 published journal articles so far, with only the student guide as two authors.
- Prof. Prabhu Ramachandran of Aerospace Engineering has been selected for the Kenneth Gonsalves Award 2014, annual award constituted by Python Software Society of India for recognition of substantial and original community contribution towards Python programming by an Indian.



## 12. Research Opportunities

- The research programs pursued in the department are mostly funded by government agencies organizations such as **ARDB** and **DST**, **ISRO**, **DRDO**, **HAL**, **BARC** and **ADA**, as well as private industry. Apart from contributions of R&D activities to national aerospace programs, recent years have shown the collaboration of faculty with research groups at the **University of Michigan**, **University of New South Wales**, **Georgia Tech**, **Caltech** and **RWTH, Aachen**.

For more info: [www.aero.iitb.ac.in/home/research](http://www.aero.iitb.ac.in/home/research) For in campus research highlights, please visit: [www.iitb.ac.in/en/research-highlights/archive](http://www.iitb.ac.in/en/research-highlights/archive)

- As a part of MoU signed by IITB with several universities abroad for student exchange programmes, interested students can participate in such programmes to conduct their course work and/or project work at an Institution with which IITB has a MoU. For more details visit website : <https://www.ir.iitb.ac.in/>

- **IIT Bombay Research park** : Its an industry academia collaboration which facilitates two-way flow of knowledge and resources along with creation of joint IITB-industry RD groups for stronger impact. **Website** : <https://www.iitbresearchpark.com/>

- **IIT Bombay Monash Research Academy** : It is a major Australian-Indian research collaboration formed between IITB and Monash University. Monash is ranked in the world's top one percent of universities by Time Higher Education 2016-2017. This collaboration is addressing the growing need for multidisciplinary research and is finding innovative solutions to research questions across eight specialist areas of growing global significance.

The PhD program at IITB-Monash Research Academy allows graduate students from India to work with both IITB and Monash supervisors, as well as industry partners. Spending at least one year in Australia, students graduate with a joint PhD degree from IITB and Monash University, ensuring a truly global experience, setting them up for future career success. For more details visit website : <https://www.iitbmonash.org/>

- **Tata Center for Technology Design (TCTD)** : It acts as a virtual centre for teaching and research that draws faculty members and graduate students from various academic units across IIT Bombay. The centre focuses on challenges in the areas of Agriculture and Food, Education, Energy, Healthcare, Housing, Water and Waste Management. To know more about different project under Tata centre, visit: <https://www.tatacentre.iitb.ac.in/>



- Aerospace Engineering department at Embry-Riddle Aeronautical University, Daytona Beach, Florida offers Ph.D. program in many research areas like multidisciplinary design and optimization, aeroelasticity, vibration control, impact analysis of composites and ceramics, and additive manufacturing. The chances of getting funding (tuition waver plus research or teaching assistantship) for the PhD program are good here. Dr. Mandar Kulkarni who is a distinguished alumnus of Aerospace department, IITB is a Professor in this university. For more details, please visit: [www.erau.edu/](http://www.erau.edu/)
- University of Central Florida (UCF), Orlando, FL provides opportunity to obtain Ph.D in Aerospace engineering. They provide many financial aid opportunities to Ph.D students. Prof. Subith Vasu is an Associate Professor in this university. His research interests is in the areas of energy science, combustion chemistry, chemical kinetics, and laser diagnostics. For further details, visit : [www.mae.ucf.edu/mmae/Research/VasuLab/](http://www.mae.ucf.edu/mmae/Research/VasuLab/)  
[www.ucf.edu/](http://www.ucf.edu/)
- Ministry of Human Recourse Development (MHRD, Government of India, launched the **Prime Minister's Research Fellows (PMRF)** program for direct admission to the PhD program at IISc and IITs. This program also gives opportunity to student pursuing or have completed M.Tech/MS by Research at the IISc/IITs/IISERs. More details may be found on the PMRF website at [www.pmrf.in/](http://www.pmrf.in/)



## 13. Entrepreneurship Opportunities

### **Society for Innovation and Entrepreneurship (SINE) :**

**SINE**, is an umbrella organisation at IIT Bombay which was setup in 2004 with the goal of fostering entrepreneurship and nurturing tech start-ups. It administers a business incubator which provides ‘Start to scale’ support for technology based entrepreneurship and facilitates the conversion of research activity into entrepreneurial ventures. Till date, 180 + start-ups have been physically or virtually incubated in SINE, creating over 800+ entrepreneurs and generating job opportunities for 4300+ people. The SINE incubated companies have collectively raised 2399 crore INR for funding their journey.

**Website :** <https://sineiitb.org/>

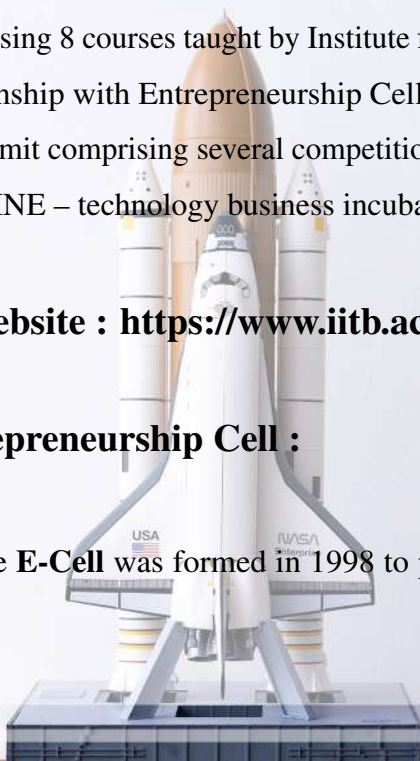
### **Desai Sethi Centre for Entrepreneurship (DSCE) :**

**DSCE** trains aspiring entrepreneurs through courses and structured mentoring programs at IIT Bombay. The entrepreneurship courses offered by Institute and adjunct faculty have benefited more than 1750 students. About 350 students were mentored by the alumni, and 30 teams incubated their startup ventures. This vision took shape in 2014 when an alumnus of IITB, Mr. Bharat Desai (B.Tech, Electrical Engineering, 1975) and his wife Neerja Sethi donated one million dollars to start the Centre. Finally, it was established in 2014 at IIT Bombay to foster innovation and entrepreneurship. The Centre offers B.Tech (Minor) in Entrepreneurship, comprising 8 courses taught by Institute faculty along with industry experts. The DSCE team has a symbiotic relationship with Entrepreneurship Cell managed by the students, who organize the annual flagship event E-Summit comprising several competitions, high-profile talks and workshops. The DSCE also works closely with SINE – technology business incubator of IITB, where students can give shape to their dreams.

**Website :** <https://www.iitb.ac.in/dsce/>

### **Entrepreneurship Cell :**

The **E-Cell** was formed in 1998 to promote the culture of entrepreneurship within the campus of IIT



Bombay. In the last 20 years, E-Cell launched several initiatives for budding entrepreneurs in IIT Bombay and other colleges across India. We at E-Cell, IIT Bombay believes that entrepreneurship is the key to India's development. To fulfill this vision, we have conceptualized and successfully implemented various initiatives to help the students, young entrepreneurs and professionals in this entrepreneurial journey. E-Summit is the annual flagship event of E-Cell, which brings together budding entrepreneurs, venture capitalists, investors, start-ups and other major contributors to the entrepreneurial ecosystem. STAB (Students' Technical Activities' Body) is also managed by the students and drives technology projects including Mars Rover, Racing Formula, Autonomous Underwater Vehicle, Pratham Satellite and Shunya (zero-energy housing). Eureka! is Asia's largest B-Model competition which aims at encouraging people from across the globe to flesh out their ideas and form global enterprises that combine technology, vision and business acumen.

**Website : [www.ecell.in](http://www.ecell.in)**





## 14. Aero PG in Institute Cultural

Every year the Aerospace Department is blessed with students having a plethora of talents. Along with the academics, the aerospace students have actively engaged in various cultural events from music and dance to theatre and fine arts in a number of events taking place at both institute and departmental level. The participation and enthusiasm has been on the rise with every year passing by. Our department also created history by winning the first time overall PG Cult trophy in 2017-18. In 2020-22, however the scenario has changed to online semesters and the events also modified similarly to suit the scenario. Singing, dancing, painting, photography etc. events took a new form and they hold some memories behind them. Best pose perfect competition winner and design Vogue it event first runner up were from the Aerospace department 2020-21.

To know more about IITB-Culturals, please visit <https://gymkhana.iitb.ac.in/cultural>





## DESIGN

### WINNERS

#### VOGUE IT

WINNER: TAVISHI HARPALANI  
1ST RUNNER UP: TABIYAR RASESH NARENRABHAI  
2ND RUNNER UP: CHEVLI KESHMINA SANJAYKUMAR

#### GOOGL-E-DOODLE

WINNER: AKSHATA KHARE  
1ST RUNNER UP: POOJA NANAVARE  
2ND RUNNER UP: SHREELAKSHMI CR



### HR AND HS PERSONALITY

**WINNER:**  
Shreya Kundu (CESED)  
Vishnu Teja (CTARA)

**FIRST RUNNER UP:**  
Manisha Sahu (Earth Science)  
Mohit Halia (Aerospace Depart)

**SECOND RUNNER UP:**  
Rageshuari Marolikar (CHEMS)  
Ojasvi Verma (CPS)  
Pravesh Douthan (Civil Engine)

**THIRD RUNNER UP:**  
Priya Asudani (CTARA)  
Sachin (CESED)  
Ashutosh Nitra (CSNE)



## 15. Aero PG in Institute Sports

IIT Bombay boasts itself of a rich culture of sports, thriving on immense participation across all departments and the kind of infrastructure. It allows you to participate at different levels of competition ranging from Intra-hostel to Inter hostel, Inter department to Intra-department level, in UG level as well as in PG levels and of course, the crowning glory for every sports person here at IIT Bombay, the Inter IIT Sports meet. The sports here are at different levels Students from the Aerospace department have always been highly enthusiastic in sports. They promise the students of an energizing and exhilarating experience and a much needed diversion from the rigorous routine of academics. Most importantly winning is not everything all the time but spending a great time, showing a good game spirit and making great memories are all about it that last forever. This past year being in a hybrid mode, has urged students to develop our indoor games skills along with outdoor games. By the end of spring semester, with most students reaching campus there has been an active participation towards Badminton, Football, Cricket, Cycling, Lawn Tennis, Athletics, swimming etc. This year Aerospace participated very enthusiastically in various sports events of PGGC.

The achievements from Aerospace department for last few years:

- **2021-22**

- PGGC Cricket 4th position
- PGGC Squash 2nd position
- Cycling Event participation

- **2020-21**

- Sports orientation winner
- Intra departmental chess - 4th position
- Sports quiz winner

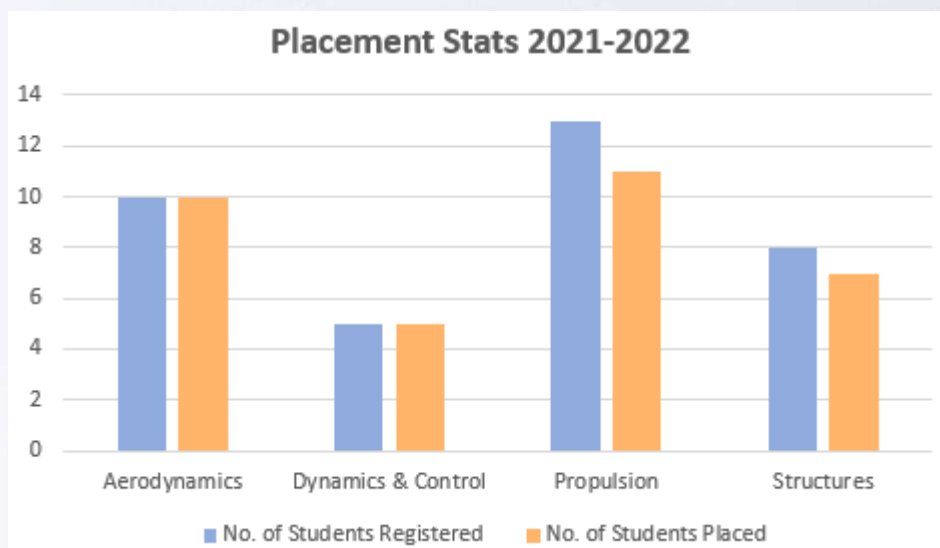


## 16. Placement Statistics

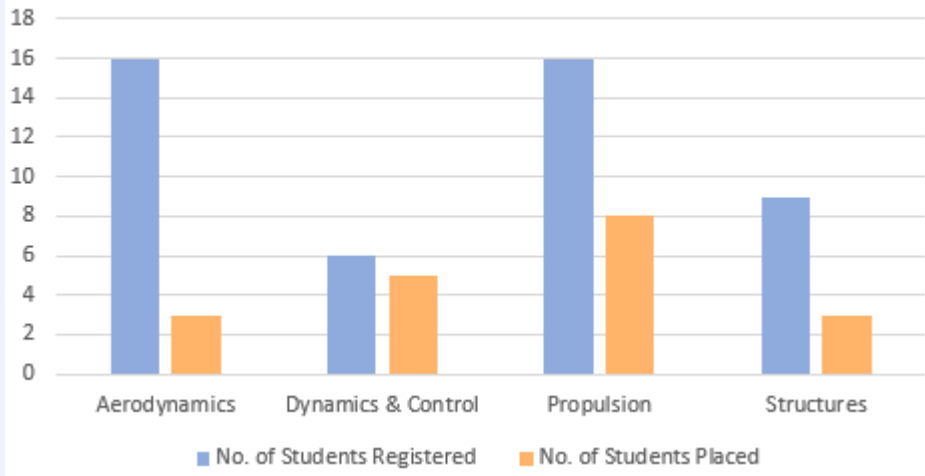
IIT Bombay being the top tier institute, it has attracted renown industries and R& D sectors for the placement seasons. Every year, placement season starts with a great zeal of enthusiasm with many students procuring placements in the initial days. The results were a combined efforts of all friends who ensured that the motivation in the batch mates remain high throughout the placement process.

Aerospace has a reputed and glorious past. Most students are placed in firms they like and profiles they prefer. It is a helpful suggestion for the upcoming batch to start thinking and exploring what interests the most. Most of the students get placed by day 5, confirming the job in core companies such as Airbus, Eaton, GE, Bajaj, Quest, ZF India and many more, with a decent amount of package offered to the students which are obvious, varies from company to company. There are non-core companies also especially in the field of finance, Data analysis, banking, consulting that visit the campus where most of the UG students show their interest in. Thus, overall We see recruiters coming from a number of sectors- Core, Data science, Finance (Banks), Health Care, Retail, Technology Startups, Information Technology, Automobile/Production, Machine Learning, Supply Chain Management to name a few.

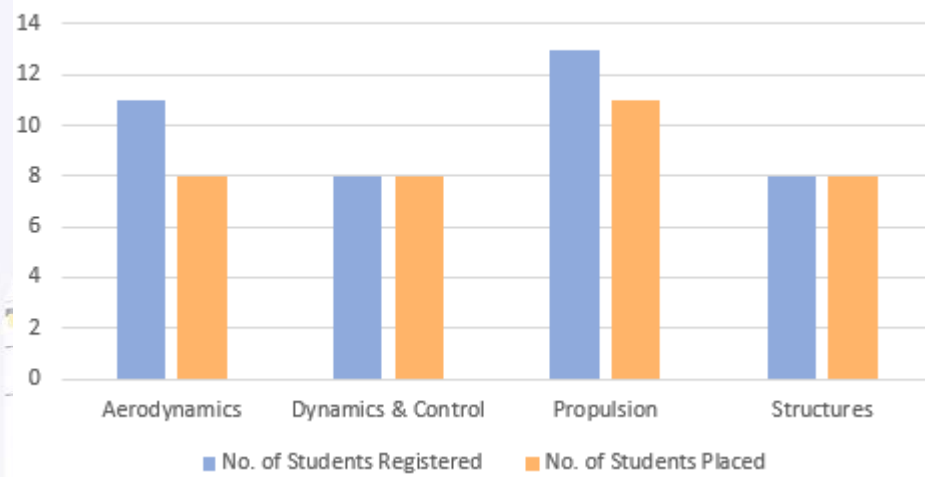
An important observation is made that the students who put in their best efforts during the placements get selected regardless of academic qualifications and experiences. In placement season 2021-22, total of 33 students were placed out of total 36 registered students. Below are the placement statistics for the previous two Aerospace engineering post-graduate batches at IIT Bombay :



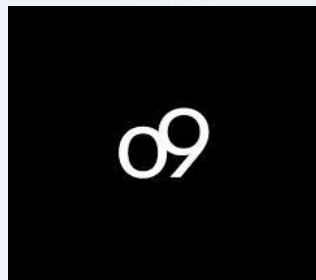
### Placement Stats 2020-2021



### Placement Stats 2019-2020



**AIRBUS**



**TEJASE AEROSENSE**



## 17. Current PhD Topics

- Ph.D. scholar mentored by Prof. Krishnendu Sinha

Name	Arena
Pratik Kumar Rajee	Turbulence modeling, High-speed compressible flows, CFD, Shock/Turbulence interaction, Multi-jet interaction
Pranav B. Thakare	Shock/Flame - gas inhomogeneity/turbulence interaction, Compressible turbulence
Vemula Jagadish Babu	Three dimensional shock wave boundary layer interactions, shock tubes
Subhajit Roy	Shock Boundary Layer Interactions, Heat-flux modeling
Harsha Rathi	Shockwave Boundary Layer Interaction, Hypersonic flows, Reactive flows, Turbulence Modelling

- Ph.D. scholars mentored by Prof. A. M. Pradeep

Name	Arena
Amit Kumar (2016-present)	Aerodynamics of Tandem Blading in Compressors
Manas M P (2016-present)	Tandem Blading in Contra-rotating Axial Fans

- Ph.D. scholars mentored by Prof. Sudharshan Kumar

Name	Arena
M. Assad Khan	Development of micro injectors
Rohit Kumar	Flame speed measurement of liquid fuels
Akanksha Chaudhry	Combustion Instabilities in solid propellants
Pragya Berwal	Measurement of Laminar Burning Velocity of Alternative Gaseous Fuel-Air Mixtures
Saurabh Srivastava	Combustion Modeling
Harshal Kolekar	Combustion based micropower generator development
Vijay Shinde	Laminar burning velocity measurement
Aboli Pingle	Mechanistic understanding of organic additives through molecular modelling
Amardeep Fulzele	Measurement of laminar burning velocities of liquid fuel air mixtures at high temperature and pressure conditions



- Ph.D. scholars mentored by Prof.Krishnendu Haldar

<b>Name</b>	<b>Arena</b>
Avinash Kumar	Modeling and numerics of magnetic shape memory alloys
Rahul Jangid	Modeling and numerics of soft biological tissue
Arijit Garai	Modeling and numerics of soft magnetic material
Swapna Gane	Modeling and numerics of FOLED
Vivek Kumar Singh	Modelling and computation of magneto-viscoelastic hydrogel responses

- Ph.D. scholars mentored by Prof.Amuthan A. Ramabathiran

<b>Name</b>	<b>Arena</b>
Divyesh Mistry	Dislocation Dynamics
Dharamveer Kumar	Mathematical electronic structure analysis of crystalline defects
Geethesh Naiyyalga	Topology Optimization of Micro-architected materials and metamaterials

- Ph.D. scholars mentored by Prof.Kowsik Bodi

<b>Name</b>	<b>Arena</b>
Vinay Unnikrishnan (2013-present)	VSSC
Sujith R Pillai(2013-present)	VSSC
AnantDiwakar (2015-present)	Modelling and numerical simulation of high temperature reacting flows in re-entry spacecraft
Asish James (2015-present)	URSC
Shekhar Panuganti (2016-present)	LPSC
Amit Makhija	Study of the heat transfer and reactions in the regenerative cooling channel of a scramjet engine.

- Ph.D. scholars mentored by Prof.Shashi Ranjan Kumar

<b>Name</b>	<b>Arena</b>
Kakoli Majumder	Finite-time Convergent Guidance Strategies with Terminal Constraints
Prajakta Surve	Guidance and Control of Aerospace Vehicles with In-Flight Constraints
Vijith Mukundan	Mission Planning and Trajectory Optimization of Launch Vehicle
Srijan-Tripathi	Seeker based Guidance Design for Constrained Trajectories
Uttam Kumar Sahu	Guidance and Control of Spinning Vehicles
Kumar Abhinav	Guidance and Control strategies for Unmanned Aerial Vehicles
Saurabh Kumar	Guidance and Control of Autonomous Vehicles





- Ph.D. scholars mentored by Prof. Arnab Maity

Name	Arena
Pramod P	Nonlinear Suboptimal Control and its Application to Guidance of Aerospace Vehicles
Richa Singh	Modeling, Simulation and Control of Gas Turbine Engine
Viswanathan S	Nonlinear Adaptive Control of Autonomous Vehicles
Ramesh Duvvuru	Cooperative Field-of-View and Impact Angle Constrained Guidance
Surve Prajakta Shankar	Guidance and Control of Aerospace Vehicles with In-Flight Constraints
Vijith Mukundan	Mission Planning and Trajectory Optimization of Launch Vehicle with Air-Breathing Propulsion
Srijan Tripathi	Seeker based Guidance Design for Tactical Interceptors
Uttam Kumar Sahur	Guidance and Control of Spinning Vehicles
Elias Eliot	Unmanned Aircraft System Traffic Management for Urban Airspace
Rohit Kumar Maurya	Fault Tolerant Control, Fault Detection and Diagnosis
Manish Patel	Nonlinear Adaptive Flight Control
Prajakta Surve	Guidance and control of aerial vehicles with in-flight constraints.

- Ph.D. scholars mentored by Prof. Aniruddha Sinha

Name	Arena
Nikhil Sohoni	Theoretical modelling of jet engine exhaust noise
Shabeeb N. P.	Theoretical modelling of jet engine exhaust noise
Salil Harris	Thermoacoustic instability in combustors
Satya Prakash	Unsteady flow around weapons bay cavity
Navdeep Pandey	Aircraft store separation analysis using reduced order modelling.

- Ph.D. scholars mentored by Prof. Rajkumar S. Pant

Name	Arena
Keshava Sharma	Investigation of strategies employed by Air Traffic Managers for handling Cognitive Workload
Tanvi Prakash	Span Extension Morphing for High Altitude Long Endurance UAVs
Sohan Suvarna	Design of a controller for autonomous indoor airships
M. Manikandan	Design Optimization of Tri-Lobed Lifting-Body Dynastat Airships
K. M. Kiran Babu	Multi-disciplinary Design Optimization of a Lighter-Than-Air Platform for Venus Exploration
Devendra Singh	Design Optimization of Electric/Hybrid Regional Transport Aircraft
Shashwat Trivedi	Design and Optimization of Solar Propulsion system for Hybrid airships
Apruv Tiwari	Computer-Aided Air Traffic Management
Sohrab Mistri	Multidisciplinary Optimisation of Inflatable Wings



- Ph.D. scholars mentored by Prof. Viren Menezes

Name	Arena
Alex Ruban	Hypersonic SBLI in scramjet inlets
Ashok Chitharenjan	Aerodynamics
Maitri Kshetrimayum	Skin friction measurement at hypersonic speeds
Priyanka Hankare	Shockwave driven needle-free liquid jet injector
Shamim Sattarkhan Pathan	Viscous drag measurement on hypersonic bodies
Ashwin Kumar Subramanyam	Viscous drag measurement on hypersonic bodies
Sanjeev Kumar Manjihi (IPDF)	Shockwave driven needle-free liquid jet injector, Shock in solids

- Ph.D. scholars mentored by Prof. Avijit Chatterjee

Name	Arena
Swapnil Ahire	Flow simulation, numerical methods, CFD software packages
Apurva Tiwari	Higher order methods, Discontinuous Galerkin methods, Computational Electromagnetics

- Ph.D. scholars mentored by Prof. Dhwani Shukla

Name	Arena
Rahul Viswam	Inter rotor aerodynamic interactions

- Ph.D. scholars mentored by Prof. Prabhu Ramachandran

Name	Arena
Muta Abhinav	Adaptive spatial resolution in Smoothed Particle Hydrodynamics
Pawan Singh Negi	Incompressible Smoothed Particle Hydrodynamics schemes
Navaneet	Supersonic Smoothed Particle Hydrodynamics
Anchal Varshney	Data Driven Turbulence Modelling

- Ph.D. scholars mentored by Prof. Vineeth Nair

Name	Arena
C. P. Premchand	Intermittent sound sources in confined flow fields
Pranav Thakare	Weakly nonlinear theory for the interaction of disturbances with shocks
Swapnil Tupkari	Numerical Investigation of reacting and non-reacting coaxial jets
Ashutosh Narayan-singh	Dynamics of trapped vortex combustors



- Ph.D. scholars mentored by Prof. Chandra Sekher Yerramalli

Name	Arena
Bibhuti Bikash Kagyung	Polyaniline based Conducting Polymer for Lightning Strike Protection in 3D Woven Composites
Manish Kumar Das	Behaviour of Solid Particle Erosion on Woven Fiber Reinforced Polymer Composites
Sneha Bhushan Cheryala	A Micromechanical and Experimental Study on the Significance of Fiber Distribution in the Critical Failure Behavior of the Hybrid Polymer Composites
Sachin Rajaram Vankar	Fatigue analysis of Carbon Reinforced Composites
Bhaskar Ramagiri	Design of Advanced Composite Armor for High Velocity Impact Application
Kumara Raja E	Load mitigation in Wind turbine tower

- Ph.D. scholars mentored by Prof. Hrishikesh Gadgil

Name	Arena
Santanu Kumar Sahoo	Understanding the pulsation dynamics in a gas-centered swirl coaxial injector
Surendra Singh Ratnu	Atomization of gelled propellant

- Ph.D. scholars mentored by Prof. S P Mahulikar

Name	Arena
Ashish Bhatt	IR Signature of aero engine exhaust plume from frontal and bottom aspects
Rohan shilwant	Aero-thermal mapping of reusable hypersonic vehicle for design of thermal protection system.



## 18. Student Companions (SCs) (ISCP 2022-23)

### AERODYNAMICS



**Harshith Reddy T D**  
t.d.harshith@gmail.com  
(+91 9629605038)



**Ushaswini Tirunagari**  
t.ushaswini@gmail.com  
(+91 8017306209)



**Vedanth S Saor**  
vsaaor@gmail.com  
(+91 8618342816)

### DYNAMICS AND CONTROL



**Shreyan Chatterjee**  
deep.shreyan@gmail.com  
(+91 8697331964)



**Rasesh Tabiyar**  
raseshtabiyar@gmail.com  
(+91 9687849521)



## PROPULSION



**Niladri Pahari**  
niladripahari@gmail.com  
(+91 8017932713)



**Talatiya Hardev**  
talatiya.hardev@gmail.com  
(+917986653638)



**Aditya Sharma K P**  
adisharmawormhole@gmail.com  
(+91 7411713537)

## STRUCTURES



**Arpitha L Rathod**  
rathodarpitha1@gmail.com  
(+91 8762033458)



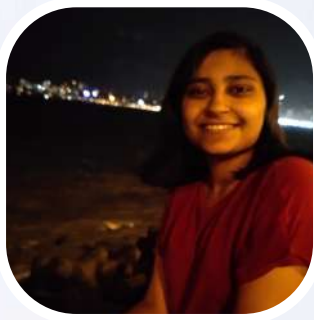
**B Krishna Kishore**  
krishnakishore9885@gmail.com  
(+91 9447784414)



# 19. Faces of Aerospace PG (22-23)

## Placement Team

Aerospace in Institute Placement Team (2022-2023)



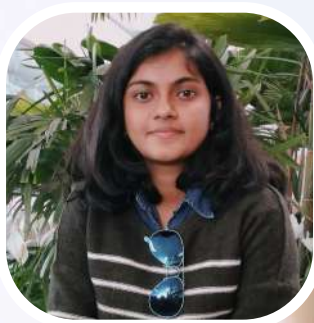
**Shipali**  
Company Coordinator  
(+91) 8588037969



**Srinithi S**  
Company Coordinator  
(+91) 8300947833



**Ushaswini Tirunagari**  
Company Coordinator  
(+91) 8017306209



**Arpitha L Rathod**  
Dept. Placement Coordinator  
(+91) 8762033458



**Pavan Singh Yadav**  
Dept. Placement Coordinator  
(+91) 93695 75272



**Kasukurthi Saathvika**  
Dept. Placement Coordinator  
(+91) 76800 35473



## Department Council (AeA Council) (2022-23)



**Gourav Kumar**  
Department General Secretary  
(+91 82903 82865)



**B Krishna Kishore**  
Dep.Dept.General Secretary(PG)  
(+91 9447784414)



**Mahipal Singh Rathore**  
AURAA  
(+91 90797 97429)



**Srihari Kuchika**  
PG Representative  
(+91 6303 649 395)



## 20. Academics

### Grading Policy

IIT Bombay follows the grade point system for the calculation of CPI (Cumulative Performance Index). The student is awarded a letter grade in every course taken as per the curriculum. These letter grades indicate a qualitative assessment of the student performance along with the quantitative equivalent (grade point).

Letter grade	Grade Points	Letter Grade	Grade Points
AP	10	FR	0/Fail (Repeat the Course)
AA	10	DX	Fail due to Lack of attendance
AB	9	II	Incomplete
BB	8	DR	Dropped
BC	7	PP	Passed
CC	6	NP	Not Passed
CD	5	AU	Audit
DD	4	W	Withdraw
		FF	0/Fail (Re-exam is permitted)

1. The academic system in IIT Bombay is based on credits. The total minimum credits required for the entire programme usually vary in the range of 156 to 170.
2. The academic unit provides an opportunity to do course adjustments at the start of every semester to provide a facility for the student to choose his choice among all the available courses and the course dropping window is active for starting few days to drop additional courses after attending few lectures.
3. After the deadline, all the activities done by students like withdrawn, the dropping of courses will be mentioned in the transcript and date for dropping such course by the student will be two weeks after the mid-semester examination for the semester-long courses and one week after the mid-semester examination for the half-semester courses. The last date for course drop will be included in the Academic Calendar.
4. The minimum passing grade in a course is DD & all grades (including FR, DX, W, etc. ) obtained by a student will be mentioned in the transcript.
5. The letter grades FF and FR shall be treated as failure grades and II and DR are placeholders. II is awarded temporarily on medical grounds and gets converted to an appropriate grade after the Semester end re-examination. On the other hand, DR indicates that the course has been dropped and it has to be cleared in subsequent semesters.
6. Re-examination may be permitted for a course if he/she obtains FF grade. After such re-examination, if the student passes in that course, he/she will be awarded the maximum grade of DD in that course. If a student does not take or fails in the re-examination, he/she will be awarded the grade FR.



7. Once the student gets fail grade (FR) in 2 or more subjects there is a real possibility that it could lead to the expulsion of a student from the institute.
8. The grade DX in a course is awarded if a student does not maintain the attendance requirement in the Lecture/Tutorial classes. This grade does not count in the SPI/CPI. However, it will be counted as a backlog.
9. The student registered for a course as audit shall be awarded the grade AU if they fulfil the requirement set by the instructor of that course. The difference between taking a course as audit compared to credit is that it helps the student to sit through all lectures without having to commit too much time (in terms of assignments, exams, etc.) to meet the requirements for getting an audit grade ('AU').
10. A student in a PG Programme, where minimum CPI for coursework is 6.0, will be eligible for repeating a course for grade improvement if he/she has a CPI less than 6.0 and has been permitted by PGAPEC to continue in the Programme on Academic Probation. For this, the student has to re-register in the course in a subsequent semester if the course is offered. The student can avail this option only for TWO courses in the entire programme and only ONCE for a specific course.
11. Academic malpractices are severely dealt with. The details about Academic malpractices are available at: [www.iitb.ac.in/newacadhome/punishments201521July.pdf](http://www.iitb.ac.in/newacadhome/punishments201521July.pdf)

## Different Course Tags

One of the most important responsibilities of a new student is to choose subjects. While interest of a student and aptitude are the most important, the following information would help to choose the courses as well:

Subjects for M.Tech can be broadly divided into 4 categories:

- **Core Courses :**

These are the compulsory courses (tagged as 'C') which must be completed within the stipulated duration of the programme.

- **Compulsory Non Graded Courses :**

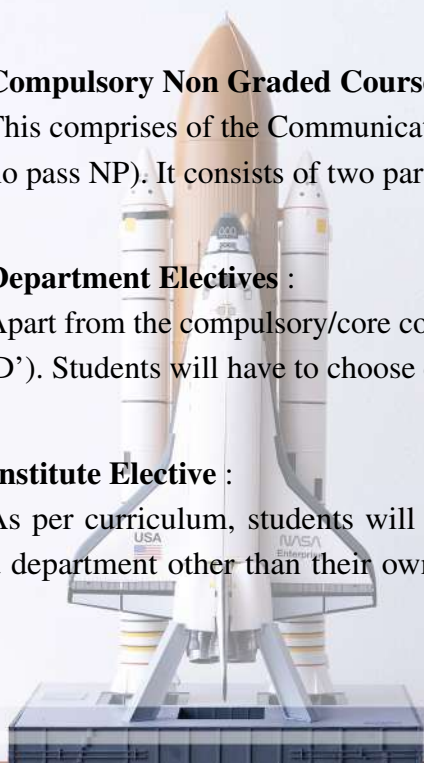
This comprises of the Communication Skills course which is compulsory but non graded (pass: PP or no pass NP). It consists of two parts—one offered by the department and one by the institute.

- **Department Electives :**

Apart from the compulsory/core courses a student needs to register for department electives (tagged as 'D'). Students will have to choose electives from the list approved by the Department.

- **Institute Elective :**

As per curriculum, students will be required to choose one institute elective (tagged as 'I') from a department other than their own. Students choosing institute elective from the list approved by



the Institute will not require any special permission. However a Master's student can choose any Post-graduate level course of sufficient credits in an academic unit other than his/her own, as Institute elective. To choose such courses, prior approval of his/her faculty Advisor and/ or his/ her Dissertation Supervisor, as appropriate, together with that of the Convener, DPGC/ PGC/IDPC of his/her academic unit shall be required. Both Department and Institute electives are a part of the curriculum and will count in CPI calculations.

- **Audit :**

A student, who wants to get exposure to a course without obtaining a grade, may choose to audit the course. The minimum requirement is 80% attendance, with any additional requirements as set by the instructor such as submission of assignments and minimum performance in some of the in-sem evaluations.

- **Additional Learning :**

Apart from compulsory courses and electives, students have an option of taking a course as "Additional Learning" in addition to the minimum credit requirement. Grades obtained in additional learning tagged courses (denoted by 'T') will not be used for CPI/SPI calculations. There will be one-time option of re-tagging these courses to Department/Institute elective and vice-versa.

- **Use of NPTEL/SWAYAM courses :**

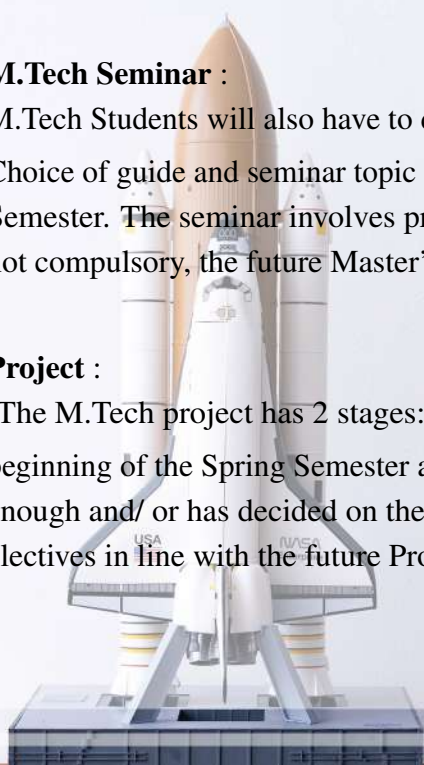
Regular students (students not under Academic Rehabilitation Program (ARP) / Academic Probation) can take maximum 2 NPTEL/SWAYAM courses in place of departmental electives. Students under ARP/Academic Probation can take NEPTL/SWAYAM courses in place of any courses including "Core" courses, after approval from DUGC/DPGC of the parent department towards the partial completion of mandatory academic curriculum. NPTEL/SWAYAM courses can be taken as "Additional Learning" courses subject to not exceeding credit limit (for UG students) and not on Academic Probation (for PG students) based on approval of DUGC/DPGC.

- **M.Tech Seminar :**

M.Tech Students will also have to do a seminar of 4 credits on a suitable topic as decided by the guide. Choice of guide and seminar topic and registration for the same happens in the beginning of the Spring Semester. The seminar involves preparing a report and a presentation on the chosen topic. Although not compulsory, the future Master's project is often related to the topic of the M.Tech seminar.

- **Project :**

The M.Tech project has 2 stages: Stage I and Stage II. Registration for Stage I must be done in the beginning of the Spring Semester along with the seminar. If a student has selected his/her Guide early enough and/ or has decided on the Project topic, it is advisable to consult his/her Guide for choosing electives in line with the future Project.



## 21. Gender Cell

IIT Bombay's Gender Cell is an institutional body which works towards promoting equality, nondiscrimination and gender justice on the campus. It was established as Women's Cell in 2002. With the enactment of the Institute's policy on sexual harassment, the cell has been renamed the Gender Cell (GC).

### Objectives

- Promoting gender amity amongst all the Institute's employees and students, and sensitizing the Institute community on gender issues.
- Observing the law on sexual harassment, through its Internal Complaints Committee and providing guidelines for protection from sexual harassment.
- Inquiring into complaints of sexual harassment within a fixed time frame, and recommending appropriate punitive action against the guilty to the Director.
- Creating an atmosphere of equality, non-discrimination and gender justice.

### Procedure

To initiate a complaint, contact the conveners or any member of the Gender Cell, or contact Dean SA, or security office. You can find these information from the website link given below:

<http://www.gendercell.iitb.ac.in/en/home/contacts>

You can also initiate a complaint by sending email to: [gendercell@iitb.ac.in](mailto:gendercell@iitb.ac.in)

Please see Gender Cell website for IIT Bombay Policy on the Prevention, Prohibition and Redress of Sexual Harassment in the Workplace and inquiry procedures.

<http://www.gendercell.iitb.ac.in/>



## 22. Student Wellness Centre

After securing admission at the Institute, there are a few issues that almost everyone in the Institute faces initially like academic concerns, social (family and peer) pressure etc., leading to feelings of loneliness, low confidence, anxiety, stress, anger and sadness, to name a few. So, if we do not take care of these problems at the right time, this could lead to poor performance both academically and personally.

To help you refrain from losing focus and being unhappy, Student Wellness Centre (SWC) encourage you to approach them for any problem that you are facing - be it academic, emotional, social or financial-without hesitation.

Services provided by SWC are:

- **Individual Counselling:** In a one-on-one meeting with a counsellor, students are helped to explore and express feelings, examine beliefs and ways of thinking about their present situation, reflect on patterns of behavior, and work toward making healthier and happier changes.
- **Psychological Assessment:** In some cases where more precise diagnoses are required, SWC conducts some psychological assessments, where tests are administered by a trained psychometrician.
- **Workshops and Events:** Preventive and positive mental health activities are organized to help inculcate life and productivity skills among students. Workshops are conducted on topics like- time management, stress management, goal management, EQ workshops for upcoming students.

In the current situation where you all must be worried about your upcoming life, the door of SWC is always open for you. There is nothing to be shy about this rather it will make you happy and more confident.

For more information please visit: <http://www.iitb.ac.in/counselling/en>

Also for regular motivation and productivity inputs follow the Facebook page of SWC: <https://www.facebook.com/ICareIITB>



## 23. Essential Websites and Applications

### 1. Application Software Centre (ASC) – Administration

**Website :** <https://asc.iitb.ac.in/>

This website is the main interactive website for a student for all of his/ her's administrative requirements. From paying your fees to checking your grades, all can be done on this website. The website also has links to all other websites of the institute. Some of the most important facilities offered by this website are given under:

- Payment of fees
- Registration and de-registration from courses
- Checking previous years' grades awarded in any subject
- Brief contents of any subject being offered
- Own personalized timetable
- Checking of own academic performance (grades)

### 2. Moodle-Academics

**Website :** <https://moodle.iitb.ac.in/>

This website provides academic interaction between students and faculty for all courses enrolled by a student. You can download study material/ books/ notes uploaded by a professor/ TA and also submit projects etc here. The website also offers a interaction platform where you can interact with the Professor/ TAs/other students on any subject related matter.

### 3. Webmail

**Website :** <https://webmail-sso.iitb.ac.in/>

This is your personalized email in IIT. Every student gets one when you enroll. Along with normal mails, here you also get alerts for registration/ de-registration of course, fees payment and any broadcast on moodle among others. You have to regularly check (5-6 times a day) GPO to get updated.

### 4. Library

**Website :** <https://www.library.iitb.ac.in/opac-search/>

The website for the central library offers a search engine for books available in the library. You can also check the number of books issued at any given time, renew them and "queue" up for any book already drawn by some other individual.

### 5. Aerospace Department Official homepage

**Website :** <https://www.aero.iitb.ac.in/home/>



Our department's website, it has the contact details of all faculty members, staff and students of our department. It also displays the academic research areas of the department.

**6. Software center:**

Website : <https://www.cc.iitb.ac.in/>

**7. Free Softwares for students :**

Website : <https://www.cc.iitb.ac.in/page/services-software>

**8. How to setup Wifi in Laptop :**

Website : <https://www.cc.iitb.ac.in/page/n-wired>

**9. Connect GPO (IITB email interface) with G-mail :**

Website : <http://homepages.iitb.ac>

**10. Official site of IIT Bombay :**

Website : <http://iitb.ac.in/en/about-iit-bombay>

**11. ISCP :**

Website : <https://gymkhana.iitb.ac.in/~scp/scp/index.html>

**12. Student activities :**

Website : <https://gymkhana.iitb.ac.in/>

**13. Sports affairs :**

Website : <https://gymkhana.iitb.ac.in/~sports/>

**14. Hostel affairs :**

Website : <https://gymkhana.iitb.ac.in/~hostels>

**15. SARC :**

Website : <http://www.sarc-iitb.org/>

**16. Buy and Sell :**

Website : <https://www.facebook.com/groups/buysell.iitb/>



# 24. Institute Map

Website : <https://www.iitb.ac.in/en/about-iit-bombay/campus-map>



## 25. Important and Emergency Contacts

**Note:** The numbers inside the brackets are extension numbers. If you are calling from a landline inside IIT Bombay, use only the 4 numbers in the brackets.

**Ambulance :** 022 – 2576 (1110)

**Hospital :** 022 – 2576 (7051/1110)

**Main Gate :** 022 – 2576 (1123)

**Y Point Gate :** 022 – 2576 (1121)

**Security :** 022 – 2576 (1100)/ 9167398596

**Quick Response Team :** 9167398598 / 9833337979 / 9833338989

**Police Station(Powai) :** 022 – 25702690

**Seven Hills Hospital :** 022-6767(6767/6766)

**Hiranandani Hospital :** 022-2576(3333/3300)

**Fire Control Room :** 022-23076111





So, we have reached the end of this handbook. This is just a short guide to help you settle down to the IITB culture. There is a lot more you will learn along the way. Welcome to IITB, welcome to the Aero Matka-Family. It's time now to spread your wings like an eagle soar, for the Aerospace Engineering department at IIT Bombay has opportunities galore.

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**AEROSPACE ISCP TEAM 2022-23**

