

## Educational qualifications

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2020	<i>Master of Technology</i>	IIT Kanpur	Aerospace Engineering	CPI: 9.5/10	Rank: 3/60
2018	<i>Bachelor of Technology</i>	IIST Shibpur	Aerospace Engineering	CPI: 9.18/10	Rank: 3/23
2014	<i>ISC (XII)</i>	St. Xavier's Collegiate School, Kolkata		Percentage: 96.25	
2012	<i>ICSE (X)</i>	St. Xavier's Collegiate School, Kolkata		Percentage: 96.8	

## Scholastic achievements

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- Academic Excellence Award (2019, 2020) for being in the top 5% of students in a batch of 60
- Institute Fellowship for pursuing masters degree at IIT Kanpur (2018 - 2020)
- Secured all India rank of 11 among 5000 candidates who took GATE for Aerospace Engineering (2018)
- Selected among 60 students in India for INAE summer research fellowship program at IIT Kanpur (2017)

## Publications: [google scholar](#)

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- **D Banik**, K Gaurav, I Sharma. **Ridge formation and spin evolution of top-shaped asteroids due to multiple landslides**. In preparation. To be submitted to the *Proceedings of the Royal Society A*.
- **D Banik**. *Master's thesis*. **Spin evolution of top-shaped asteroids due to landslides**. IIT Kanpur (2020)
- K Gaurav, **D Banik**, I Sharma, P Dutt. **Granular flow on a rotating and gravitating elliptical body**. *Journal of Fluid Mechanics* (2021)

## Conference proceedings and posters

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- **D Banik**, K Gaurav. **Spin change of rubble piles due to mass shedding culminating from surface motion**. presentation. *52nd Lunar and Planetary Science Conference-2021* Virtual.
- **D Banik**, I Sharma. **Equilibrium landscape of top-shaped asteroids**. Poster presentation. *2nd Indian Planetary Science Conference-2021* at PRL Ahmedabad
- **D Banik**, K Gaurav, I Sharma. **Axisymmetric landslides on top-shaped asteroids**. Accepted for oral presentation. *Powders and Grains 2021* at Buenos Aires, Argentina
- **D Banik**, I Sharma. **DEM simulations of granular flow over rotating gravitating ellipses**. *13th International Conference on Complex Fluids and Soft Matter-2019* at IISER Bhopal
- **D Banik**, S Palathingal, G K Ananthasuresh, A Ghosh. **A Mechanical OR Gate Using Pinned-Pinned Bistable Arches**. Proceedings of the *5th Asian MMS Conference-2018* at IISc Bangalore

## Projects

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### M. Tech. Thesis | Dec 2019 - Dec 2020 (*thesis defended*) - Ongoing

*Title: Spin evolution of top-shaped asteroids due to landslides | Supervisor: Dr. Ishan Sharma (IITK):* Mathematically modeled the spin evolution and surface regolith motion of top-shaped asteroids like Bennu using a shallow granular flow theory (Gray and Hutter, 1999). A set of hyperbolic conservation laws derived in a conical curvilinear coordinate system were solved using the central schemes of Kurganov and Tadmor (2000) in a Finite Volume framework.

### M. Tech. Project | Dec 2018 - Dec 2019

*Title: Granular flow over rotating and gravitating ellipses | Supervisor: Dr. Ishan Sharma (IITK):* Modified the open source Soft Sphere Discrete Element Method (SSDEM) software LAMMPS to study granular avalanches on rotating and gravitating ellipses and matched the results with the corresponding theoretical model.

### Course Project (ME773A) | January 2019 - May 2019

*Title: Waves in Planetary Rings | Supervisor: Dr. Ishan Sharma (IITK):* A simple hydrodynamic analysis of a fluid ring around a spherical central body was used to inspect the possibility of Rossby wave instabilities using Linear Perturbation theory.

### B. Tech. Thesis | July 2017 - May 2018

*Title: A Mechanical OR Gate using Pinned-pinned Bistable Arches*  
*Supervisors: Dr. Amitabha Ghosh (IISTE), Dr. G. K. Ananthasuresh (IISc):* Analysed the bi-stability of shallow arches to optimize travel and switching force as per requirement. The two minimum energy configurations denoted binary digits 0 and 1. An OR logic gate was designed using analytical methods and then fabricated using a 3D printer.

### Summer Internship Project | May 2017 - July 2017

*Title: Flow Past Cylinders with Trips | Supervisor: Dr. Sanjay Mittal (IITK):* Studied flow past circular cylinders with trips at various angles to force turbulence in the boundary layer and prepone drag crisis. This was done using a stabilized Finite Element Method to discretize the Reynolds Averaged Navier Stokes (RANS) equations on an unstructured grid and solving the corresponding equations on a High-Performance Computing facility.

### Winter Internship Project | December 2016

*Title: Designing of Minimum Length Supersonic Nozzles using MOC | Supervisor: Dr. Sandeep Saha (IITKgp):* Euler's equations for compressible flow were solved for a given exit Mach number of a nozzle using the Method of Characteristics (MOC). Thus, minimum length of nozzle was determined.

## Technical skills

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C, C++, Python, Bash script, Computing in clusters, Matlab, Mathematica, Maple, ANSYS, Comsol Multiphysics, Solidworks, L<sup>A</sup>T<sub>E</sub>X, Inkscape, LAMMPS, OpenToonz animation

## Positions of responsibility

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- Member of the core organising committee of Open House, IITK 2020 where approximately 2500 school students visited the campus and were motivated about STEM (2020)
- Teaching Assistant of around 30 students for a course on Technical Arts 101, IITK (2019-20)
- Academic mentor for the courses Finite Element Analysis and Post-graduate Mathematics at IITK (2019)
- Secretary, Adventure Sports Club, IITK (2019)
- Trek leader for 2 trekking groups to Bhutan and Uttarakhand, with Adventure Sports Club, IITK. Managed finances and health of trekkers (2019)

## Voluntary activities

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- Part of Team Space-Popcorn trying frugal solutions to deal with MMOD as a part of the open course 'Frugal Science - BioE 271' at Stanford University (2020)
- Organising member of Research Scholar's Day, Department of Aerospace Engineering, IITK (2019)
- Attended the IUTAM Symposium on Dynamics of Complex Fluids and Interfaces held at IITK (2018)
- Industrial internship: Hindustan Aeronautics Limited, Helicopter Division, Bangalore (2016)
- Summer project: Land Acquisition - Problems, Strategies and People, IEST (2015)

## Extra-curricular achievements

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- Certification in Violin performance from Trinity Guildhall, London for examinations up to Grade 5 (2012).
- Exchange program with students of Belvedere College, Dublin, Ireland. Receipt of community care certificate, for social service rendered at the St. Mary's Home for the Visually Impaired (2011).

## Academic referee details

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### Acronyms used:

- IITK/Kgp : Indian Institute of Technology Kanpur/ Kharagpur
- IESTS : Indian Institute of Engineering Science and Technology Shibpur
- GATE : Graduate Aptitude Test in Engineering
- INAE : Indian National Academy of Engineering
- IISc : Indian Institute of Science
- MMS : Mechanism and Machine Science
- DEM : Discrete Element Method
- IUTAM : International Union of Theoretical and Applied Mechanics
- MMOD : Micro-meteoroid and Orbital Debris
- STEM: Science Technology Engineering Management