

Education	École Polytechnique Fédérale de Lausanne, Switzerland	Sept 2017 - Present
	Masters of Science in Mathematics	
	Indian Institute of Technology, Kanpur, India	July 2013 - May 2017
	Bachelor of Science in Mathematics and Scientific Computing	
	Cumulative Performance Index (CPI), during graduation: 9.0/10	
Scholastic Achievement	<ul style="list-style-type: none"> • Qualified and secured an All India Rank of 871 out of over 123 thousand candidates in the second round, in Joint Engineering Exam (Advanced), a two-phase exam where over 1.26 million candidates appeared. • Secured a rank of All India Rank 5 in National Entrance Screening Test 2013, an entrance exam where over 70 thousand candidates appeared. • Selected for the prestigious Charpak Research Internship Program 2016, organized by 'Campus France', a French-national agency. • Recipient of INSPIRE scholarship, granted by the Department of Science and Technology, India. • Recipient of the J.N.Tata Scholarship for Higher Education. 	
Background	Programming I have experience in Python, C, C++, openCV, openGL, sage. I have worked on programming project independently and like to develop openGL-based mathematical visualizations. I have a working knowledge of HTML, php and WebGL. Here is my github .	Mathematics I have a thorough background in all major areas of theoretical mathematics. My mathematical interests aren't concretely decided, however I feel most inclined to pursue certain areas in geometry (and some intersection with number theory). I maintain this mathematics blog .
	<ul style="list-style-type: none"> • Current courses (EPFL): To be decided • Past courses (EPFL): Probability Theory, Combinatorial Geometry, Set theory, Riemann Surfaces • Past courses (IITK): Programming, Real Analysis, ODE & Linear Algebra, Abstract Algebra, Probability and Statistics, Mathematical Logic, Data Structures & Algorithms, Complex Analysis, Galois theory, Differential Geometry, Numerical methods, Topology, Lie groups, Alg. Number Th., Alg. Topology, Topics in Arithmetic, Functional Analysis, Intro. to Algebraic Groups, Fluid Mechanics, Theory of Computation, Hyperbolic Geometry, Geometry of differential forms, Measure theory, Partial differential equations. 	
Workshops attended	Differential Geometry	July, 2017
	<i>Organised by Prof. Mahan Maharaj, Prof. Indranil Biswas, Prof. Tejas Kalelkar at Indian Institute of Science Education and Research, Pune</i>	
	J-holomorphic curves and Gromov Witten invariants	July, 2017
	<i>Organised by Prof. Ritwik Mukherjee, Prof. Somnath Basu at National Institute of Science Education and Research, Bhubhaneswar</i>	
	Representation Theory of Finite Groups	June, 2017
	<i>Organised by Prof. K V Subramanian, Prof. Amritanshu Prasad and Prof. K. Raghavan at Chennai Mathematical Institute, Chennai</i>	
	Probability and Representation Theory	March, 2016
	<i>Organised by Prof. Arvind Ayyer, Prof. Amritanshu Prasad and Prof. K. Raghavan at Institute of Mathematical Sciences, Chennai</i>	
Projects	Arithmetic Hyperbolic 3-Manifolds	Fall, 2017
	<i>Supervised by Maryna Viazovska, EPFL</i> <ul style="list-style-type: none"> • This project concerned consisted of reading the book <i>The Arithmetic of Hyperbolic 3-Manifolds</i> (Maclaclan, Reid). This project provided me an extensive background in the knowledge of expressing arithmetic hyperbolic 3-manifolds as quotients of Adèle groups harmonic analytic methods on Adèles and Idèles. • I read Don Zagier's 1987 paper titled <i>Hyperbolic manifolds and special values of Dedekind zeta-functions</i>, which involved finding a peacial value of the Dedekind zeta function using volumes of arithmetic hyperbolic 3-manifolds. • An expository report for the paper and the necessary background required has been written. 	

Polylogarithms and Combinatorial Hopf Algebra Summer, 2016

Supervised by [Prof. Gérard H E Duchamp](#), [Prof. H N Minh](#)

Laboratoire d'Informatique de Paris-Nord, Université Paris-Nord

- This project continued the existing line of work of Prof. Duchamp and Prof. Minh that concerned with understanding polylogarithms with the aid of tools from combinatorics of words. This is an ongoing project and more details can be given on request.

Classical Invariant Theory

Sixth Semester, 2016

Supervised by [Prof. Preena Samuel](#), IITK

- [Documented](#) and read *Classical Invariant Theory (Kraft, Procesi)*, building towards algebraic groups.
- Wedderburn Theory and the Double Centralizer Theorem was covered.
- Understood the Schur-Weyl Duality and in the context of the Representation Theory of $GL(n, \mathbb{C})$.

Algebraic Geometry

Winter, 2015

Supervised by [Prof. Sudarshan Gurjar](#), IIT Bombay

- Covered the book *Algebraic Curves (William Fulton)*.
- Received fundamental knowledge of algebraic geometry including Riemann-Roch theorem, sheaves and Noether-normalization theorem.

Representation theory and Combinatorics

Fifth Semester, 2015

Supervised by [Prof. A K Lal](#), IITK

- Read *Enumerative Combinatorics, Vol 2 (Richard Stanley)*, *Young Tableaux (William Fulton)*.
- Understood the Representation Theory of S_n and the connection with Schur polynomials and Young Tableaux. Details are [documented](#).

Algebraic and Enumerative Combinatorics

Summer, 2015

Supervised by [Prof. B. Sury](#), Indian Statistical Institute, Bangalore

- [Studied](#) Polya Theory of orbit counting and representation theory of symmetric groups, along with an introduction to matching theory.
- Applied Polya Theory to count the number of hexaflexagons structures, and derive the series [A000207](#) from [A000108](#). Details are in this [report](#).
- Read the popular text *Combinatorics: Theory and Applications (V. Krishnamurthy)*, found an erroneous proof and a way to [circumvent](#) the error. Built a notation [guide](#).

KNOT (a 3D visualization tool for Mathematical Knots)

Summer, 2014

Guided by [Prof. Aparna Dar](#), IITK

- Read the books *The Knot Book (Collin Adams)* and *Knot Theory and Its Applications (Kunio Murasugi)*
- [Implemented](#) Knot Theory on OpenGL to compute invariants like Dowker-Thistlethwaite codes, crossing numbers, writhe, Fox-N-Colorability of any knot using concepts in Computational Geometry like the Bentley-Ottmann sweep line algorithm.

Background Subtraction and Object Tracking

Summer, 2014

Guided by [Programming Club](#), IITK

- [Developed](#) an open source software to remove mobile objects from a video feed and extract the background image and various statistical models were tested and perfected to achieve the desired accuracy and efficiency. Haar-like feature cascading was implemented using openCV.

ISAAC (a 2D OpenGL-based physics simulation engine)

First semester, 2013

Course project under [Prof. Subhajit Roy](#), IITK

- [Worked](#) upon an interface where user-drawn 2D solids could collide and interact. The entire physics algorithm was [designed](#) from scratch. My project helped me achieved a distinction in the course.

ABU Robocon 2014 (International robotics competition)

Winter, 2013

Supervised by [Mechatronics Lab](#), IITK

- [Worked](#) to program a pole-to-pole, laterally traversing robot for the institute team.
- Won awards: **Best Innovative Design at National ROBOCON 2014**, **Most Innovative Implementation at Student Research Convention 2014**, IITK.

Some talks
given

Some properties of the image of the star of the plane

12th July, 2016

Journée-séminaire de combinatoire, LIPN, Université Paris-Nord. Here is the [abstract](#).

Cyclic Sieving Phenomenon

15th January, 2016

CoNTRA, Department of Mathematics and Statistics, IITK. Here is the [presentation](#).

Positions of Responsibility	Senior Executive, Research Cell	2016-Present
	<i>Research Cell is a student wing that strives to promote and improve the atmosphere and image of research at IIT Kanpur.</i>	
	Organizer, CoNTRA	2016-Present
	<i>CoNTRA is an interest group, of students that hosts student seminars. CoNTRA stands for Combinatorics, Number Theory, Representations and Algebra.</i>	
	Hobby Group Leader, Science Coffeehouse	2015-2016
	<i>Science Coffeehouse is a student-based science discussion group</i>	
	Coordinator, Card and Board Games Club	2015-2016
Extra-curricular Activities	<i>CBG is a club which has a vast collection of board games (mostly Euro-style)</i>	
	Coordinator, English Literature Society	2015-2016
	<i>Organizer of activities like Word Puzzles, Just A Minute, Poetry slams, etc.</i>	
	Academic Mentor for Mathematics, Counseling Service	2014-2015
	<i>Gave informal academic lectures to aid incoming freshmen with academic courses</i>	
Extra-curricular Activities	Active participant in many student activities, skilled in dancing (I have won a state-level competition at the age of 11), skilled in playing music instruments such as Flute and Saxophone, ardent science enthusiast (organise and give talks at Science Coffeehouse), board games lover.	
	I once took a week-long workshop aimed at high school students. Here is some material that I had made.	
	I sometimes make animated pedagogical visuals. They can be found here .	