Aryaman Jha

aryaman0211@gmail.com

Ph: +919818236998(IND), +14708852144(US)

C88, Upkar Apartment, Mayur Vihar Extension, Delhi

EDUCATION

Degree	CGPA / %	College / School	Year
Doctor of Philosophy in **Physics**	**3.80/4.0**	Georgia Institute of Technology	*Aug 2021 - Present, (Year 5)*
Bachelor of Science in Physics & **Minor in ML**	**8.74/10.0**	Indian Institute of Technology, Kanpur	*2016-2020*
Class 12 (CBSE)	**95%**	Ahlcon Public School, Delhi	*2016*

NOTABLE PROJECTS

- **Percolation Theory approaches to the Statistical Physics of Traffic**
  With Prof. Kurt Weisenfeld, School of Physics, Georgia Tech and Prof. Jorge Laval, GT School of CEE *Jul'23- Oct'25*
  - Developed mapping between concepts in percolation theory and 1D lattice models of traffic
  - Developed $O(N)$ algorithm for existing $O(N^2)$ algorithm simulating the lattice model.
  - Performed Finite-size scaling analysis to obtain statistics for large simulations from smaller simulations.
  - Obtained exact analytical results using theory of Markov Processes.
  - Developing parallelized city-scale simulations of vehicular traffic.
  - Developing Renormalization Group (RG) based calculations to understand large-scale behaviour.
  - Scaling analysis published in Physical Review E(2025): Paper Link , Project code Link
  - Preprint on *Field Theoretic RG of deterministic TASEP* in preparation (expected Nov 30)

- **Scaling Analysis of Freeway Traffic Data**
  With Prof. Kurt Weisenfeld, School of Physics, Georgia Tech and Prof. Jorge Laval, GT School of CEE *Jul'23- July'25*
  - Performed statistical data analysis of the MOTION I-24 freeway traffic data.
  - Defined analogs of KPZ scaling exponents and explored their values in the I-24 dataset.
  - Developing robust measures and algorithms to analyse noisy data.
  - Extending finite-size scaling analysis to real freeway traffic data.
  - Work presented at the TRC-30 conference: Preprint Link,Conference Paper Link

- **Smarticles: Programmable Decentralized Collectives of Shape Morphing Robots**
  With Akash Vardhan and Prof. D. Zeb Rocklin, Prof. Daniel Goldman, School of Physics, Georgia Tech *Jan'22- Jan'23*
  - Developed fast Python-based simulations for shape-morphing robots, enabling efficient exploration of 2D robot configurations.
  - Obtained analytical results, using group theory and differential equations, to predict stable robot swarm configurations
  - Developed novel numerical schemes to identify dynamical symmetries in the configuration space of the robots
  - Work presented at the APS march meeting 2023: Talk Abstract Link

- **Genetically Engineering Ecoli to degrade SDS detergent using Synthetic Biology**
  Team Project as part of Team iGEM IIT Kanpur: Work led to Silver Medal at iGEM Competition 2018 *Jan'18- Oct'18*
  - Mathematically modelled the rate of protein synthesis inside the organism using chemical kinetics and modelled the interaction of bacteria with SDS to predict the overall protein synthesis as a function of various parameters.
  - Modeled the protein synthesis from the genetically modified bacterium in the bioreactor to optimize bioreactor design.
  - Created a CAD model of a Bio-Reactor for degrading SDS
  - Implemented a naive bayes classifier on Natural Language Processing (NLP) data to filter and extract valuable experimental data to explore the NCBI GEO datasets
  - Part of large scale multi-author study published in Nature (2020): Paper Link, Project Website Link

- **Role of Adhesion, ECM and Mechanotransduction in Limb Joint Patterning**
  With Dr. Amitabha Bandyopadhyay, Developmental Biology Lab, Dept. of Biological Sciences and Bioengineering, IIT Kanpur *Jul'18- May'19*
  - Performed extensive literature survey and formulated a mechanotransduction-based model for limb joint patterning.
  - Performed anti-proliferative experiments to study limb size dependence on joint patterning.
  - Created a computational vertex model and continuum-based model of the Yorkie pathway of mechanotransduction in cells to understand experimental data.

CONFERENCES

- **Transportation Research Board Annual Meeting 2025 (TRBAM)** Presented work on percolation analysis of traffic models
- **Aspen Center for Physics, Winter school on Active Matter, 2023:** Presented work on Robotic self-organising matter(Smarticles)
- **ICTS Winter school on the Physics of Morphogenesis, 2019** Participant
- **Indian Academy of Science Conference on Morphogenesis, Feb 2019:** Conference at Orange County Coorg

RELEVANT COURSEWORK

Machine Learning	Statistical Physics	Nonlinear Dynamics and Chaos	Soft Matter Physics
Introductory Biophysics	Data Structures and Algorithms	Differential Equations	Real Analysis
Linear Algebra	Complex Analysis	Bioinformatics	Abstract Algebra

TECHNICAL STRENGTHS

- **Programming**: C, C++, Python, JavaScript, SQL, Matlab, Mathematica, R Studio, Latex, Numpy, Scipy, Pandas, TensorFlow, sklearn;
- **Command-line**: Bash, Powershell
- **Simulation**: Simulink, Mesa, Auto-CAD, DART(Rigid Body Dynamics Library C++)
- **Languages**: Hindi(Mother Tongue), English(Fluent), French(Basic Conversational)

AWARDS AND ACHIEVEMENTS

- Won **Silver medal at iGEM 2018** international competition for Synthetic Biology.
- **All India rank 991 out of 150,000** candidates in IIT-JEE Advanced examination 2016, equivalent to 99.9 percentile.
- **1st position in New-Delhi region** in National Talent Search Examination 2013 among about 10,000 participants, conducted by Unified Council of India.
- In **top 3 among 3000 students** in the Delhi region competing for the Shell Junior National Science Scholarship 2013 organised by Royal Dutch Shell in collaboration with the British Council for meritorious students.
- Selected for **Winter School on Physics of Morphogenesis 2019** at ICTS Bangalore (Dec 2019).
- Participated in a prestigious **Indian Academy of Sciences meeting on Mechano-Biology** (Feb 2019, Orange County Coorg) as the only undergraduate selected among a group of PhD students and faculty.
- Awarded **Academic Excellence Award** thrice at IIT Kanpur for excellent academic performance in first, second and third year of undergraduate studies.
- Awarded **KVPY Scholarship (SA stream) 2014** with All India Rank **188/100,000**, a national fellowship in basic sciences by the Department of Science and Technology and Indian Institute of Science, Bangalore.

LEADERSHIP AND ACTIVITIES

- **Head, Grad Pride, Georgia Tech** *Feb'23 – Sep'23*
  Grad Pride is a campus Sexuality and Gender Diversity awareness group for graduate students . I coordinated awareness sessions, open and closed discussions and documentary screenings to spread awareness about LGBTQ as well as gender-based issues. I also organised group lunches and outings.
- **Group Leader, Science Coffeehouse IITK** *Aug'18 – Apr'19*
  Conducted and delivered talks on diverse topics in Mathematics, Physics and Theoretical Computer Science to create an atmosphere of research and innovation among undergraduates. Organised science-based events as part of Takneek, the inter-hall Science and Technology competition.
- **Student Guide, Counselling Service IITK** *Aug'17 – Apr'18*
  Provided emotional and academic assistance to 8 freshmen during sophomore year, continuing support beyond the required period.
- **Secretary, English Literary Society IITK** *Aug'17 – Apr'18*
  Coordinated the poetry performance for the Freshers' event during the Orientation Programme 2017.