# Sagnik Dey

3rd Year Undergraduate
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## Academic Qualifications

| Year | Degree/Certificate | Institute | CPI/% |
|---|---|---|---|
| 2017 - Present | B.S | Indian Institute of Technology, Kanpur | 8.66/10 |
| 2017 | CBSE(XII) | Delhi Public School, Navi Mumbai | 93.8% |
| 2015 | CBSE(X) | Delhi Public School, Navi Mumbai | 9.8 |

## Scholastic Achievements

- Granted a branch change to Mathematics department on the basis of academic performance.
- Among **15 students** selected out of 400+ for **Advanced Track Course** in ESC101 course for **C programming**.
- Secured **All India Rank 2549** in **JEE Advanced 2017** among the 1.7 Lakh shortlisted candidates.
- Secured **All India Rank 989** in **JEE Mains 2017** among the 12 Lakh candidates.

## Work Experience

- **Google Summer of Code Participant** (*May'19 - August'19*)
  **Organization: Boost C++**
  - Worked on the library Boost.Real which is a C++17 library, attempting to get rid of untracked errors brought about due to truncation in floating point arithmetic by using range arithmetic.
  - Changed the number base used internally from decimal to INT_MAX for optimal space usage when storing numbers as vectors of digits. Redesigned all tests to better address the library functionality after internal representation changes.
  - Added templating to the entire library to enable custom variable type for internal real number representation.
  - Adding Karatsuba Multiplication function currently for numbers represented in base INT_MAX.
  - Contributed towards several bug fixes in adding division operation to the library.
  - Added user defined literal functionality for declaring objects of type Boost.Real.
  - Final report on my github page.
- **Full Time Development Intern, IITK NYC Office** (*May'18 - July'18*)
  **Mentor: Prof. Manindra Agrawal**, Department of Computer and Science and Engineering.
  - Worked on the backend of a scalable web application using Scala language with Akka http library.
  - Led a team of 4 members during the course of the internship.

## Projects

- **Low Rank Matrix Approximations and Algorithms** (*May'19 - June'19*)
  **Mentor: Sumit Ganguly**, Department of Computer and Science and Engineering.
  - Read up on and implemented **sampling algorithms** for **matrix approximations**.
  - Implemented **length squared sampling based** matrix multiplication.
  - Implemented **CUR method** for matrix sketching.
  - Implemented **low rank approximation** of matrix using sampling algorithms.
- **Personal Audio** (*Dec'18 - Ongoing*)
  **Mentor: Rajesh M. Hegde**, Department of Electrical Engineering
  - Aim: To implement adaptive equalization methods to create acoustic contrast controlled personal audio zones.
  - Implemented a generalized **Kalman Filter** for the estimation of channel response in dynamic scenarios.
  - Implemented **BACC** approach to estimate inverse filters for personalized audio zone creation.
  - Currently looking for models for extended Kalman filters to get state transition matrix for the dynamic channels along with the channels themselves. This will be used to approximate the filters instead of time intensive recalculations.
- **Scrabble Game** (*Jan'18 - April'18*)
  Project under **Advanced Track** for **ESC101** course
  - Implemented GUI based scrabble game.
  - Algorithmic computer player of three difficulties with greedy selection of current best word.

## Technical Skills

- **Programming Languages:** C, C++, Java, Scala, MATLAB
- **Other Skills:** git, Phabricator, LaTeX

## Extra - Curriculars

- **Secretary at Book Club, IIT Kanpur**

## Interests

- Graph Algorithms
- Approximation Algorithms
- Algorithms for Big Data analysis
- Signal Processing

## Relevant Courses

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|---|---|
| Introduction to Programming | Probability and Statistics |
| Data Structures and Algorithms | Real Analysis |
| Linear Algebra | Set Theory and Logic |
| Introduction to Electronics | Machine Learning (online course on Coursera) |
| Complex Analysis* | Several Variable Calculus* |
| Time Series Analysis* | Applied Stochastic Processes* |

(*) = ongoing