

Anubhav Dhar

Third Year Undergraduate Student

Integrated B.Tech-M.Tech - Computer Science & Engineering

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EDUCATION

Degree	Institute	Score	Year
Integrated B.Tech-M.Tech (CSE)	Indian Institute of Technology Kharagpur	9.85*/10	2025
Higher Secondary Education	Hijli High School	98.0%	2020
Secondary Education	Hijli High School	95.7%	2018

*Cumulative GPA for the first four semesters (as of November 2022)

RELEVANT PROJECTS

- **Exploring Convexity and Various Specific Cases of the Euclidean Steiner Tree Problem:** *March 2022 - present*
Supervisor: Prof. Sudeshna Kolay
 - The **Euclidean Steiner Tree Problem** is a NP-Hard Problem in Computational Geometry where the input is a set of points on the Euclidean Plane and problem asks to find the tree of minimum total length interconnecting the input points. The objective is to look at **specific configurations** of the input points that allow **polynomial time** solution or efficient exponential time solutions
 - The configurations explored so far are specific cases of **Pair of Concentric Regular Polygons** and **Points in Convex Position** with a small number of points inside
 - The future aim is to have better exact or approximation algorithms to solve these specific cases by exploiting the structure
- **Codeforces Round 819 (Div-1 + Div-2) Co-Author and Co-Editorialist:** *June 2022 - September 2022*
Coordinator: Artyom Titov Co-Author: Mainak Roy
 - Competitive Programming Contest on **codeforces.com** on coding problems related to **Algorithms and Data Structure** with **22026** global participants.
 - **Authored** problem ideas of problems **A, B** and **H** based on **Greedy Paradigm** and **Computational Geometry**.
 - **Editorialist** of problems **A, B, C, E, G, H** with problems on **Greedy Paradigm, Computational Geometry, Optimization** using **Data Structures, Combinatorics, Dynamic Programming** and **Polynomial Multiplication** using **FFT** in **Finite Fields**

OTHER PROJECTS

- **RISC Processor Design and Implementation on FPGA:** *October 2022 - November 2022*
 - **Computer Organisation Lab Project** to design a suitable **single-cycle instruction architecture** for a RISC instruction set consisting of 23 instructions (including arithmetic operations, bitwise operations, branch instructions and memory load-store instructions)
 - Implemented **Von Neumann Architecture** with **Xilinx ISE 14.7** on the **Spartan 3 FPGA board**
 - Suitable **mnemonics** chosen for opcode and implemented **Assembler** with elementary error detection using flex
- **'tinyC' Compiler Design and Implementation:** *August 2022 - November 2022*
 - **Compilers Lab Project** to build a compiler for a subset of the **C-syntax** capable of handling functions (with recursion), pointers, loops, conditionals, arithmetic operators, etc.
 - Used **Flex** for **Lexical Analysis**, **Bison** for **Syntax Analysis & Translation** to intermediate representation, and **C++** for translation to **x86_64 assembly**.
 - Included features indicating location and cause of **Syntax Error**, option to produce **Verbose Output** and used basic optimizations in translation.
- **Clap Triggered Robotic Model:** *December 2020 - March 2021*
 - **DIY Lab Project** of designing a **Robotic Model** of a dog capable of performing different mechanical movements based on the **number of consecutive claps**
 - **Arduino UNO** board was programmed for processing analog data from a **microphone amplifier circuit**, soldered with basic electronic components
- **PID Controlled Ball Balancing Table:** *May 2017 - June 2017*
 - Created a **PID controlled** ball balancing table, as a part of **MIT-IIT Robotics Program 2017**, for school students, using Resistive Touch Screen, Servo Motors and **Arduino Nano** board

SKILLS AND EXPERTISE

- **Programming Languages:** C, C++, bash, flex, bison, gawk, Python, Java, HTML
- **Assembly Languages:** MIPS, x86_64
- **Hardware Description Language:** Verilog
- **Platforms:** Linux, Windows, Xilinx ISE 14.7, Arduino, Freecad

COURSEWORK INFORMATION

- **Computer Science:** Programming and Data Structures*, Algorithms-I*, Discrete Structures, Formal Language and Automata Theory, Switching Circuits and Logic Design*, Algorithms-II[†], Randomized Algorithm Design[†], Software Engineering*, Systems Programming Laboratory, Compilers*[†], Computer Organisation and Architecture*[†]
- **Mathematics:** Advanced Calculus, Linear Algebra, Probability and Statistics, Operations Research
- **Other Courses:** Basic Electronics*, Signals and Systems, Physics of Waves*, Chemistry*, Basic Engineering Mechanics, Science of Living Systems, Electrical Technology, Engineering Laboratory, Cell and Molecular Biology, Economics[†], Engineering Drawing*, Environmental Science, English for Communication*, DIY Laboratory

* marked courses include laboratory component as well

[†] marked courses are completed but are pending evaluation results

AWARDS AND ACHIEVEMENTS

- Secured **All India Rank of 489** in **JEE Advanced, 2020** among 1.5 lakh shortlisted candidates
- Secured **All India Rank of 126** in **KVPY SA, 2018** after qualifying aptitude test and interview round among 1 lakh candidates
- Secured **All India Rank of 381** in **KVPY SX, 2019** after qualifying aptitude test and interview round among more than 1.5 lakh candidates
- Secured **12th rank** in **West Bengal Joint Entrance Examination 2020** among 1.2 lakh candidates
- Secured **2nd Position** in **ICPC for Schools 2019, Amritapuri Regionals**
- Selected for Round 3 in **Google Code Jam 2021** among 37398 participants securing a **Global Rank of 418** with a **Country Rank of 5** in Round 2
- Selected for Round 3 in **Google Code Jam 2022** among 32702 participants securing a **Global Rank of 658** with a **Country Rank of 7** in Round 2
- Selected for Round 2 in **Facebook Hackercup 2021** and **2022** securing a **Global Rank of 395** in 2021 (among 34584 participants, leading to advancement in Round 3) and **749** in 2022 (among 27604 participants).
- **Regionalist** in **ICPC 2020** (held in 2021) securing ranks of **35** in **Amritapuri Regionals** and **80** in **Gwalior Regionals**.
- Multiple time participant in **Google Kick Start**, with best Global Ranks of **178** (2022 Round C, among 12425 participants), **109** (2021 Round A, among 19841 participants), **325** (2020 Round D, among 11704 participants)
- Qualified **Indian National Olympiad in Informatics** and selected in **Indian International Olympiad in Informatics Training Camp** in **2019** and in **2020**
- Qualified **Regional Mathematics Olympiad** after qualifying Pre-Regional Mathematics Olympiad in **2018** and **2019**
- **Indian National Mathematics Olympiad Merit Awardee** of the year **2019**
- Qualified **National Standard Examination in Chemistry, 2020**
- Qualified **National Standard Examination in Astronomy** in the years **2019** and **2020**.
- **Senior Scholar** at **Jagadish Bose National Science Talent Search** after qualifying three levels in JBNSTS exam, 2020
- Eligible for **Swami Vivekananda Merit-cum-Means Scholarship** from the Government of West Bengal based on Higher Secondary Performance (**rank 10** among 7.6 lakh students)
- **'Master'** at **Codeforces** with a rating of **2189** (global rank 1518 among 133,934) and **'6-star coder'** in **Codechef** with a rating of **2351** (global rank 223 among 239,962)

POSITIONS OF RESPONSIBILITY

- **General Secretary** of **Codeclub**, the Departmental Society of Computer Science & Engg. IIT Kharagpur
- **Associate Member** of **Grimoire of Code**, the Official Competitive Programming Society of IIT Kharagpur
- **Secretary, Maths Olympiad** of Lal Bahadur Shastri Hall of Residence IIT Kharagpur, for 2021-22
- **Associate Member** of **Chess Club** IIT Kharagpur

EXTRA CURRICULAR ACTIVITIES

- **Volunteer at National Service Scheme(NSS), IIT Kharagpur (Dec 2020 - March 2020 & Jan 2022 - Apr 2022):** Performed various online and offline activities for the welfare of people in the villages near Kharagpur including cleanliness drives and raise awareness about various government schemes, planned and created a model demonstrating rain water harvesting that can be implemented in school campus and houses for the purpose of conserving water in drought-prone areas, worked on location at waste management plant on segregation of plastic from biodegradable waste.
- **Chess:** Active chess player on chess.com (bullet rating: 1822) and lichess.org (bullet rating: 2022). Part of the Tactics Team, editor for the coverage on 2021 World Chess Championship Match, of Chess Club IIT Kharagpur.
- **Keen Problem Setter:** Problem Setter on platforms of Codeforces, Codechef and Hackerrank.
- **Indian Classical Music(Vocal):** 17 years of training; last 14 years under the guidance of Vidushi Sangeeta Bandhyopadhyay. Part of *National Cultural Appreciation* of IIT Kharagpur (March 2021 - Dec 2021).