

# AMATYA SHARMA

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Department Of Computer Science and Engineering

Indian Institute of Technology, Kharagpur

## EDUCATION

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**Indian Institute of Technology (IIT), Kharagpur**

4<sup>th</sup> Year Dual Degree (B.Tech + M.Tech)

Computer Science and Engineering Department

*August 2017 - Present*

GPA 9.58/10

Rank 5

## WORK EXPERIENCE

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**Computer Science and Automation, IISc Bangalore**

*Summer Research Intern*

May - July 2019

- Research Intern at Indian Institute of Science (IISc), Bangalore mentored by Dr. Arindam Khan.
- Designed PPTAS for 2-D Guillotine Knapsack (refer Research Experience Section).

**Computer Science and Automation, IISc Bangalore**

*Winter Research Intern*

December 2019

- Formalized paper on 2-D Guillotine Geometric Knapsack Problem.
- Improved the present best approximation factor and established algorithmic links to the general version.

## RESEARCH PROJECTS

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**On Guillotine Separable Packings for the Two-dimensional Geometric Knapsack Problem**

*Accepted at SoCG'21 (37th International Symposium on Computational Geometry)*

*May 2019 - March 2020*

- Designed an Approximation Algorithm (PPTAS) for a of 2-Dimensional Guillotine Geometric Knapsack.
- Improved previous best approximation factor for both weighted and cardinality cases of the problem.
- Mentor: Dr. Arindam Khan (CSA, Indian Institute of Science (IISc), Bangalore).

**On Parameterized Complexity of Liquid Democracy**

*July 2019 - December 2019*

*Published at CALDAM'21 (7<sup>th</sup> Annual International Conference on Algorithms and Discrete Applied Mathematics)*

- Designed Parameterized Algorithms for Computational Social Choice Theory problem of Liquid Democracy.
- Proved hardness results employing standard complexity reductions and branch & conquer techniques.
- Provided an LP formulation and polynomial time algorithm for a variant of Liquid Democracy.
- Mentor: Dr. Palash Dey (Computer Science Department, IIT Kharagpur).

**The Art Gallery Problem : A Survey**

*July 2020 - January 2021*

- Studied NP-hardness,  $\exists R - Completeness$  and bounds on AGT problem
- Studied numerous approximation and parameterized algorithms for AGT.
- Submitted to ACM-Computing Surveys Journal 2021.

**Parameterized Complexity of Margin of Victory**

*Jan 2020 - Jun 2020*

- Developed algorithms for Game Theoretic problem of computing Margin of Victory for tournament solutions.
- Designed parameterized algorithms with parameters including tree-width for the NP-Hard problem.
- Mentor: Dr. Palash Dey (Computer Science Department, IIT Kharagpur).

- Term Project in Advanced Machine Learning Course
- Studied local and global approximations of Gaussian kernels.
- Studied techniques for automations for kernel learning.

**SOFTWARE PROJECTS**

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**Shoten***Jan 2019 - July 2019*

- Web Application serving as Online Book Store and Print Shop
- Implemented a website to serve as an e-book store and print request portal on institute level
- GitHub Repository Link: <https://github.com/aaysharma/Shoten>

**TinyC Compiler***July 2019 - Nov 2019*

- Compiler for language TinyC, a subset of C with a reduced subset of functionalities.
- Implemented parser and lexer with output as non-optimized machine level assembly language instructions.
- Code Bases and Languages employed: Yacc, BISON, FLEX, C, C++
- GitHub Repository Link: <https://github.com/aaysharma/TinyC-Compiler>

**RISC Processor***July 2019 - Nov 2019*

- Developed Reduced Instruction Set Computer Processor and simulated on FPGA Spartan 3 boards.
- Designed a single cycle executable processor using Verilog for a subset of MIPS instructions.
- GitHub Repository Link: <https://github.com/aaysharma/RISC-Fuggit>

**SKILLS AND COURSE WORK**

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<b>Algorithms</b>	Approximation and Online Algorithms, Algorithmic Game Theory, Advanced Graph Theory, Parameterized and Randomized Algorithms.
<b>Other Courses</b>	Deep Learning, Advanced Machine Learning, Natural Language Processing,
<b>Software &amp; Tools</b>	MySQL, LaTeX, Matlab, SolidWorks, HTML, CSS, PHP, JSP Java, Python, C++, C, BISON, Yacc, FLEX.
<b>Other Relevant Courses</b>	Linear Algebra, Discrete Mathematics, Algorithms, Operating Systems, Computer Networks, Software Engineering.
<b>Languages</b>	English, French, Hindi.

**ACADEMIC ACHIEVEMENTS**

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<b>Department Rank</b>	Currently holding Department Rank 6 in the Computer Science Department.
<b>Department Change'19</b>	Changed Department to CS (first year) with rank among top 10 at IIT Kharagpur.
<b>JEE Advanced'17</b>	Attained an All India Rank of 1464 among 1.7 lakh students in JEE Advanced 2017.
<b>SJVN Merit Scholar'17</b>	Awardee of SJVN Merit Scholarship for performance in Senior Secondary Examination.
<b>NTSE'15</b>	Recipient of National Talent Search Examination (NTSE) Scholarship (State Rank 1).
<b>RIMC'13</b>	Secured National Rank in top 60, State Rank 1 in Rashtriya Indian Military College Exam.

**EXTRA CURRICULAR**

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Co-Founder Annapurna, an initiative working against global poverty, hunger and wastage of food resources.