SUBHRAJIT DAS

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EDUCATION

Indian Institute of Technology Gandhinagar *July 2023 - June 2025 (expected)*
M.Tech. in Computer Science and Engineering
CPI: 9.64
Specialization: Computer Systems.

University of Kalyani *Oct 2021 - Jun 2023*
M.Sc. in Computer Science
CGPA: 9.76

Panihati Mahavidyalaya *Oct 2018 - Jun 2021*
B.Sc. (Honours) in Computer Science
CGPA: 9.89

Kalyangarh Vidyamandir *Jun 2016 - Jun 2018*
Class XII
Science Stream: Physics, Chemistry, Mathematics, Computer Science
Percentage: 86.20

Prafulla Nagar Vidyamandir *Jan 2010 - May 2016*
Class X
Percentage: 79.28

RESEARCH INTERESTS

I am particularly drawn to the intersection of Computer Architecture, Operating Systems, and Security.

RESEARCH EXPERIENCE

Large Number Arithmetic Operations Jan 2024 - Present
Supervisors: Prof. Abhishek Bichhawat, Prof. Yuvraj Patel IIT Gandhinagar

· Designing algorithms for large number (beyond 65536-bit) arithmetic operations including addition, subtraction, and multiplication to exploit parallelism and system-level optimizations (AVX, multi-threading, THP, caching), including techniques from Vedic Mathematics.

· Profiling and debugging using various tools (PERF, Valgrind, RDTSC, Timespec, RUSAGE, etc.) and experimenting with various compilers (GCC and ICX) optimizations, including auto-vectorization.

· Benchmarking against popular GNU Multi Precision library, achieving nearly 70% faster performance for 65536-bit addition and subtraction with SIMD.

Studies on Various Maximal Covering Location Problems using Genetic and Artificial Bee Colony Algorithms Sep 2022 - Jun 2023
Supervisors: Prof. Priya Ranjan Sinha Mahapatra and Dr. Soumen Atta University of Kalyani

· Implemented an algorithm to solve the NP-Hard Maximal Covering Location Problem using Genetic Algorithm with Local Refinement, showing promising results in various SJC data sets in terms of both achieving near-optimal benchmark results and computational time. However, in some instances, the benchmark results were missed by a small margin, while it beats some of the existing models in terms of computational time by a multi-fold time.

· Designed and implemented an algorithm to solve the NP-Hard Probabilistic Maximal Covering Location Allocation Problem using Artificial Bee Colony Algorithm with Regional Facility Enhancement, achieving optimal benchmark results of commercial solver CPLEX in 50% of cases, with an average computational time of 85.83 seconds, with an average gap of 0.01%, but matched accuracy with other meta-heuristics models while beating most of the preceding models in computational time.

Reversible Multiplier Accumulate Unit
Supervisors: Mr. Biswanath Sen

Jan 2021 - Aug 2021
Panihati Mahavidyalaya

· Proposed a reversible design of the Multiplier Accumulate Unit (MAC) using reversible gates for low power consumption and heat dissipation, helping us in energy saving.
· Additionally, proposed a reversible design of Adder/Subtractor and Information Shifter, which is helpful for addition/subtraction and shifting information at a very low power energy.

PROJECTS

Online Authentication Habits of Indian Users [1]
Team Contributor

Oct 2023 - May 2024
IIT Gandhinagar

· Conducted a structured survey with 90 Indian participants, analyzing awareness, usage, and perceptions regarding password habits, password managers, and Two-factor Authentication (2FA).
· Highlighted many interesting insights, including a tendency to use default settings, and emphasized the need for tailored strategies to enhance password security.

Instant Payment Gateway
Team Contributor

Feb 2024 - April 2024
IIT Gandhinagar

· Developed an instant payment system using microservices architecture (Go, gRPC, Docker) with a single-server deployment, processing up to 400 requests/second and 1000+ concurrent connections, ensuring secure, fault-tolerant transactions via Nginx load balancing and sharded MySQL/SQLite.
· Designed key components (Authenticator, Payment Handler, Resolver, Banks) for transaction coordination, failure recovery, and notifications, leveraging ELK Stack and wrk for performance benchmarking.

TennisServe: A Parallel Game Matching Server
Individual Contributor

Jan 2024 - April 2024
IIT Gandhinagar

· Developed a simulation of a tennis game matching server where multiple players send requests for games: singles, doubles, male, female, or mixed. Utilized OpenMP threads to handle client requests and MPI calls for player communication. Managed the availability of limited tennis courts (4 courts) to continuously match players' requests.

PUBLICATIONS

[1] Pratyush Choudhary, **Subhrajit Das**, Mukul Potta, Prasuj Das, and Abhishek Bichhawat, "Online Authentication Habits of Indian Users," in *Proceedings of the IEEE BuildSec 2024 (to appear)*, Accepted for publication as Full Paper, Dec. 2024.

POSITIONS OF RESPONSIBILITY

Teaching Assistant   July 2023 - Present
Dept. of CSE   IIT Gandhinagar

· Assisting for Computer & Network Security course, Sem-I, 2024-25 under *Prof. Abhishek Bichhawat.* Managing and creating weekly cryptography challenges and assignments. Helping students with their projects and grading answer scripts.
· Previously assisted for Compilers and Data Structures and Algorithms - I courses in earlier semesters, under *Prof. Abhishek Bichhawat* and *Prof. Balagopal Komarath.* Involved in grading assignments, projects, answer scripts, and managing lab sessions.

Class Representative   Oct 2021 - June 2023
Dept. of CSE, MCS   University of Kalyani

· Elected as Class Representative for the Batch 2021-2023 M.Sc. in Computer Science.
· Facilitated communication between faculty, administration, and batch-mates in matters ranging from class-related concerns to advocating for a fee reduction for the batch.

ACHIEVEMENTS

MoE Scholarship for Teaching Assistantship, IIT Gandhinagar	*July 2023 - Present*
All India Rank of 530 in the GATE 2023 Computer Science examination	*March 2023*
Qualified for West Bengal SET in Computer Science for Lecturership	*March 2023*
Awarded with UGC NET JRF in Computer Science	*December 2022*
Qualified for UGC NET in Computer Science for Lecturership	*December 2022*
Swami Vivekananda Merit-cum-Means Scholarship, Govt. of West Bengal	*Oct 2021 - Jun 2023*

SKILLS/HOBBIES

Programming Languages	C, C++, Java, Python, Go, R, MATLAB, Shell, Prolog, Kotlin, HTML, CSS, JavaScript, JSP, SQL
Tools/Libraries/Simulators:	Git, Docker, gRPC, OpenMP, MPI, AVX, Valgrind, PERF, GDB, Wireshark, NS2, Mininet
Operating Systems	Linux/Unix, Windows
Hobbies	Enjoying Music and Travelling
Languages	Bengali (native), English (fluent) and Hindi (intermediate)

EXTRA-CURRICULAR ACTIVITIES

Selected for the 37th Inter IIT Aquatic Meet 2023 Training Camp at IIT Gandhinagar

Completed the Fifth-Year Examination in Fine Art (2017) from Sarbabharatiya Sangeet-o-Sanskriti Parishad with 1st Class in Theory and 1st Division with Distinction in Practical

Received multiple awards and medals as an Off-Spin bowler in Cricket during high school years, competing in district and state-level tournaments, including those organized by the Cricket Association of Bengal