SHU Tian
Doctor of Philosophy
Computer Science and Engineering
The Hong Kong University of Science and Technology (HKUST)

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EDUCATION

- **The Hong Kong University of Science and Technology**, Hong Kong SAR, China   *08/2024 – Present*
  Doctor of Philosophy in Computer Science and Engineering
  Co-supervised by Prof. Ke YI and Prof. Amir GOHARSHADY

- **The Hong Kong University of Science and Technology**, Hong Kong SAR, China   *09/2020 – 06/2024*
  Bachelor of Science in Data Science and Technology (DSCT) and Computer Science (COSC)
  Cumulative Grade Average (CGA): 4.134/4.3; Ranking in DSCT Major: 1/45 (among top 5%);
  Top 2% among all HKUST students; Major Cumulated Grade Average (MCGA): 4.205/4.3.

  Relevant Coursework: Applied Statistics (A+), Honors Probability (A+), Statistical Inference (A),
  Honors C++ (A+), Software Engineering (A+), Operating Systems (A+), Machine Learning (A),
  Introduction to Algorithms (A+), Advanced Algorithms (A+), Combinatorial Optimization (A+).

- **Swiss Federal Institute of Technology in Zürich (ETH Zürich)**, Zürich, Switzerland   *02/2023 – 09/2023*
  Mobility Student under the Department of Computer Science (D-INFK)
  Cumulative Grade Average (CGA): 5.932/6.

  Relevant Coursework: Data Modeling and Databases (6/6), Introduction to Graph Theory (6/6),
  Information Theory (6/6), Convex Optimization (5.75/6).

RESEARCH INTERESTS

- **Subject:** Theoretical Computer Science and Database Theory

- **Fields of Interest:** Parameterized Algorithms; Approximation Algorithms; Combinatorial Optimization;
  Graph Theory; Differential Privacy; Distributed Databases.

- **Specific Topics of Interest**
  ○ Fixed-parameter Tractable Algorithms for Graph Problems
  ○ Approximation Algorithms with Combinatorial Optimization Techniques
  ○ Privatized Data Release under User Differential Privacy

ACADEMIC EXPERIENCES

- **Final Year Thesis on Differential Privacy**, *Participant*   *06/2023 – 05/2024*
  Conducted research under the supervision of Professor Ke YI
  Studied truncation mechanisms for privatized SJA query release under user differential privacy
  Focused on Race-to-the-Top (R2T), which performs adaptive truncation to attain instance optimality
  Designed an efficient greedy truncation with combinatorial proofs on privacy and utility guarantees
  Proposed a variant of R2T that improves the time complexity in marginal cases to almost linear
  Conducted empirical experiments along with some other mechanisms to evaluate practical performance

- **HKUST UROP: Dynamic Maintenance of Alphabetic Search Trees**, *Participant*   *09/2022 – 12/2022*
  Conducted research under the supervision of Professor Mordecai Jay GOLIN
  Studied dynamic maintenance of optimal alphabetic search trees w.r.t. empirical access probability
  The heuristic employs a left-adjusted structure and performs rebuilds on sufficiently large subtrees
  Experimented and analyzed the performance of the heuristic on a wide range of access sequences
  Implemented an adjusted heuristic adopting a delayed rebuild strategy with a tunable tolerance
  Concluded with experiments that the adjusted heuristic is efficient towards low-density access sequences

- **HKUST UROP: Efficient Queries over Database**, *Participant*   *06/2022 – 08/2022*
  Conducted research under the supervision of Professor Raymond Chi-Wing WONG
  Studied papers on architecture-intact distance and path oracle for dynamic spatial networks
  Adapted Shortcut Supporting Graph (SS-Graph) in the context of Update Efficient (UE) oracle

Explored correlations between sufficient information for query and relation type vertices in SS-Graph

Proposed a more efficient update algorithm for UE oracle based on breadth-first search on SS-Graph

Further formulated a bulk-update algorithm with lazy-update for minor weight modifications

TECHNICAL SKILLS

- **Languages:** Chinese: Native; English: C1 Advanced, TOEFL 112, IELTS 7.5, GRE 328 (Quant 169/170).

- **Professional Skills:** Expert in C++ (Grade A+ in the Honors C++ and OOP course); Skilled in Python, Java, and R; Proficient with LaTeX, Markdown, and Microsoft Word; Experienced in the design, analysis, and implementation of algorithms and data structures (Grade A+ in postgraduate-level courses related to Advanced Algorithms and Combinatorial Optimization).

- **Soft Skills:** Diligent and optimistic; Truthful and receptive in communication; Astute in critical thinking; Strong sense of responsibility; Cohesive and supportive in cooperation; Coordinated in time management; Adaptable to unfamiliar environments; Motivated and enthusiastic in study and research.

HONORS AND AWARDS

- Hong Kong PhD Fellowship Scheme *2024*
- The Joseph Lau Luen Hung Charitable Trust Scholarship *2023*
- The 18th HKUST Epsilon Fund Honorable Mention Award *2023*
- Tin Ka Ping Exchange Scholarship *2023*
- HKSAR Government Scholarship Fund – Reaching Out Award *2023*
- HKUST Dean's List Award of 2022-23 *2023*
- HKUST Scholarship Scheme for Continuing Undergraduate Students *2022*
- Chiaphua Industries Limited Scholarships for Chinese Mainland Undergraduate Students *2022*
- HKUST Dean's List Award of 2021-22 *2022*
- Mr Tommy Zau Jr Memorial Scholarship *2021*
- HKUST Dean's List Award of 2020-21 *2021*
- HKUST Admission Scholarship *2020*
- Second Prize in the 36th Chinese Physics Olympiad in Provinces *2019*
- Bronze Medal in the 12th Asia and Pacific Informatics Olympiad (China District) *2018*
- First Prize in the 24th Chinese National Olympiad in Informatics in Provinces (Senior Group) *2018*
- First Prize in the 23rd Chinese National Olympiad in Informatics in Provinces (Senior Group) *2017*
- First Prize in the 22nd Chinese National Olympiad in Informatics in Provinces (Junior Group) *2016*
- First Prize in the 21st Chinese National Olympiad in Informatics in Provinces (Junior Group) *2015*

EXTRACURRICULAR ACTIVITIES

- **EPGL Summer Python Course 2022 Summer**, *Teaching Assistant* *17/07/2022 – 30/07/2022*
  I served as a teaching assistant for the EPGL Summer Python Course offered by Center for Development of the Gifted and Talented (CDGT) at HKUST. The course was intended for secondary school students in Hong Kong. My role was to help prepare course materials, respond to queries, and provide feedback.

- **HKUST MSSSUG Peer Mentor Program**, *Peer Mentor* *06/2022 – 12/2022*
  I was a peer mentor for incoming freshmen in the program organized by HKUST Mainland Students and Scholars Society. My role was to organize gatherings and offer suggestions for course and major selection.

- **Volunteer at West China Hospital of Sichuan University**, *Volunteer* *02/02/2018 – 01/03/2018*
  I served as a patient inquiry volunteer at West China Hospital of Sichuan University (Huaxi Hospital). My role was to serve at the inquiry desk of the outpatient clinic, address patients' common inquiries, direct them to the appropriate departments, and offer assistance to those requiring extra support.

- **School Team of Competitive Programming in Chengdu No.7 High School**, *Member* *09/2016 – 03/2019*
  I was selected as a member of the school team and studied the design and implementation of algorithms and data structures for competitive programming. My role was to attend training and participate in the Chinese National Olympiad in Informatics and other relevant competitions.