Sitong Liu

(+81)080-9778-1976 | liusitong@keio.jp | github.com/sitong1011 | Kanagawa, Japan

Education

Keio University Kanagawa, Japan

Master of Media and Governance; GPA: 3.90/4.00 *Sep 2021 – Sep 2023 (Expected)*

- Cyber Informatics Program
- Seminar: Advancing Quantum Architecture Research Group
- Supervisor: Professor Rodney Van Meter

Bachelor of Arts in Environment and Information Studies; GPA: 3.68/4.00 *Sep 2018 – Sep 2021*

- Seminar: Advancing Quantum Architecture Research Group
- Relevant coursework: Quantum Information Processing, Fundamentals of System Programming, Computer Architecture, Software Engineering, Optimization Theory, Linear Algebra, Calculus, Probability, etc.

Research Interests

Quantum Computing, Quantum Programming, Fault-tolerant Quantum Computation, Quantum Error Correction, Quantum Algorithms, Measurement-Based Quantum Computation, Quantum Machine Learning, and Signal Processing.

Publications

Publications

[1] Yoshinori Aono, **Sitong Liu**, Tomoki Tanaka, Shumpei Uno, Rodney Van Meter, Naoyuki Shinohara, and Ryo Nojima. The present and future of discrete logarithm problems on noisy quantum computers. *IEEE Transactions on Quantum Engineering*, 3:1–21, 2022.

Conferences

[1] Yoshinori Aono, **Sitong Liu**, Tomoki Tanaka, Shumpei Uno, Rodney Van Meter, Naoyuki Shinohara, and Ryo Nojima. Executing discrete logarithm problem on superconducting quantum processors. In *The 43st Quantum Information Technology Symposium (QIT43)*, December 2020.

Awards & Scholarships

Honorable Mention Award, Qiskit Camp Asia, 2019, Japan

Tonen International Scholarship Foundation Scholarship, Apr 2022 – Mar 2022

Keio Research Encouragement Scholarship, 2022

Japanese Government (MEXT) Scholarship, Apr 2021 – Mar 2022

Yamaoka Kenichi Memorial Scholarship, Sep 2020 – Aug 2021

Monbukagakusho Honors Scholarship, Oct 2018 – Mar 2020

Yamaoka Kenichi Memorial Scholarship for New Undergraduate Students, Sep 2019 – Aug 2020

Research Experience

Generating Arbitrary Logical Quantum Graph States with Lattice Surgery Apr 2022 – Present

- Building a compiler for generating arbitrary fault-tolerant quantum graph states based on the rules given by "A Game of Surface Codes: Large-Scale Quantum Computing with Lattice Surgery" paper. Reducing the overhead when taking into account the time-space trade-off.

Quantum Algorithm Construction Survey Oct 2021 – Jan 2021

- A survey of the papers in the "Quantum Algorithm Zoo", summarised the techniques used in terms of various aspects such as data representations, common subroutines, etc.

Bachelor Thesis: Audio Identification and Classification with Quantum Computing Oct 2020 – May 2021

- Proposed a preliminary audio identification and classification solution with a hybrid quantum-classical algorithm. Two main quantum processes are included: quantum Fourier transform for extracting audio features and quantum machine learning algorithm (K-nearest neighbors algorithm) for classifying data.
- Summarised and compared existing studies on quantum audio representation, and proposed a new audio representation method based on the quantum image representation method.

Executing Discrete Logarithm Problem on Superconducting Quantum Processors May 2020 – Dec 2020

- Joint research project with Keio Quantum Computing Center and National Institute of Information and Communications Technology.
- Motivation: Investigating how resilient the classical cryptography algorithms are against quantum computers.
- Contribution to the project: Conducted experiments on running circuits from different size discrete logarithm problem instances on IBM's quantum devices and optimized the circuits for execution; measured the distance of the probability distributions between noisy and ideal execution and obtained a quantitative result for defining whether the experiment running on the device is "succeed".

Work Experience

IBM Quantum Tokyo, Japan
Research Student Intern *May 2022 – Sep 2022*

- Implementing frequency collision-aware transpiler passes for Qiskit. Pull Request #8621

IBM Quantum Tokyo, Japan
Community Advocate Intern *July 2021 – Dec 2021*

- Developed and supported the IBM Quantum Challenge Fall 2021. GitHub

Other Experience

Qiskit Advocate *Aug 2022 – Present*

Advancing Quantum Architecture Research Group Keio University
Student Group Leader *Sep 2022 – Mar 2023*

Linear Algebra Keio University
Teaching Assistant *Apr 2022 – July 2022*

Fundamentals of System Programming (C Programming Language) Keio University
Teaching Assistant *Oct 2022 – Jan 2023*

Fundamentals of System Programming (C Programming Language) Keio University
Teaching Assistant *Oct 2021 – Jan 2022*

Fundamentals of System Programming (C Programming Language) Keio University
Student Assistant *Oct 2020 – Jan 2021*

Chinese Language Lab Keio University
Programming Student Assistant *Oct 2019 – Mar 2021*

Skills

Programming: Python, C, Java, MATLAB, LaTeX, etc.

Languages:

- **English (Proficient)**
  TOEFL iBT: 108/120
- **Japanese (Advanced)**
  JLPT N1: 125/180
- **French (Elementary)**
- **Chinese (Native)**

References

Professor Rodney Van Meter
Faculty of Environment and Information Studies
Keio University
5322 Endo, Fujisawa, Kanagawa 252-0882, Japan
TEL: (+81)-0466-49-1100 Email: rdv@sfc.wide.ad.jp