NGU SI DANG

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EDUCATION

Boston University **Boston, MA** **Expected September 2025**

- Dual Degree Program: MSc & Ph.D. in Computer Science
- **Current GPA:** 3.89 / 4.00
- **Relevant Coursework:** Complexity Theory, Advanced Algorithms, Differential Privacy in Machine Learning and Statistics, Formal Methods in Privacy and Security, Machine Learning, Computer Networks, Mathematical Tools for Theoretical Computer Science, Natural Language Processing (Fall 2022)
- **Research Interests:** I am currently working in the field of Complexity Theory and Learning Theory where I focus on proving the hardness and lower bounds of some particular problems. In the past, I did some research in Machine Learning and Computer Vision and landed one publication.

Clark University **Worcester, MA** **May 2020**

- Bachelor of Arts in Computer Science | Mathematics & Data Science Minor | Computational Science Concentration
- GPA: 3.93 / 4.00; graduated with **Summa Cum Laude** and **High Honors in Computer Science.**
- **First Honors Dean's List** in 2018, 2019, and 2020.

TEACHING EXPERIENCE

Computer Science Department, Boston University, Boston, MA

- CS630 – Graduates Algorithms (Fall 2021) – Teaching Assistant
- CS235 – Algebraic Algorithms (Spring 2021) – Teaching Assistant
- CS132 – Geometric Algorithms (Summer 2022) – Teaching Assistant
- CS131 – Combinatoric Structures (Summer 2022) – Teaching Assistant

RESEARCH EXPERIENCE

Computer Science Department, Boston University, Boston, MA *(August 2020 – Present)*

Compression, Cryptography, and Universal Extrapolation (January 2022 – present)
A joint research project with former BU Postdoc, Marco Carmosino, and a fellow Ph.D. student, Rathin Desai, where we examine and survey the relation between string compression via the notion of Kolmogorov Complexity, Cryptography, and the concept of Universal Extrapolation, recently introduced by Mikito Nanashima.

The hardness of MCSP via Reverse Gate Elimination technique in Boolean Circuits (July 2021 – present)
A joint research project with former BU Postdoc, Marco Carmosino, and my advisor Prof. Steven Homer, where we aim to prove that Reverse Gate Elimination, a proof technique in Boolean Circuits, is not feasible enough to show the Hardness of the Minimum Circuit Size Problem (MCSP) even though it was successfully used to show hardness of variations and restricted versions of MCSP.

Hardness of Differentially Private ERM from the Existence of a Local PRG (March 2021 – present)
A joint research project with a fellow Ph.D. student, Ludmila Glinskih, where we study the hardness of solving the Empirical Risk Minimization problem for a simple set of functions such as DNFs in a differentially private setting under certain assumptions.

MCSP Tutorial and Survey (October 2020 – present)
A joint research project with former BU Postdoc, Marco Carmosino, and a fellow Ph.D. student, Fabian Spaeh, where we introduce the conjectures surrounding the Hardness of the Minimum Circuit Size Problem (MCSP) as well as potential research directions and popular techniques used in the field of Meta-Complexity. Our main goal is to circulate this work around the Meta-Complexity Bootcamp at Simons Institute – UC Berkeley in Spring 2023.

Computer Science Department, Clark University, Worcester, MA *(May 2019 – May 2020)*

Voronoi Decomposition of Aperiodic Sets Closed Under Fixed-Parameter Extrapolation (June 2019 – May 2020)

The project examines the Voronoi decomposition of some aperiodic sets closed under fixed-parameter extrapolation operation and makes the first exploratory and computational steps to understand how the closure of these sets corresponds to aperiodic tiling and related problems in computational geometry.

- Implemented a program in Java to provide visualization of Voronoi decomposition of aperiodic sets.
- Modified Fortune's algorithm to identify the distinct Voronoi cells that arise in the decomposition, and thereby obtain at least a lower bound on the number of tiles necessary.

Camera Mouse for Android (September 2019 – May 2020)

The project aims to provide people with motor impairment access to Android mobile devices. People with Cerebral Palsy, Spinal Muscular Atrophy, ALS, and others can benefit from this application since it takes advantage of the user's head movements and translates them into cursor movements on the phone screen.

- Identified the limitations of available facial mouse software caused by restrictions of the Android platform.
- Designed a new method to create a robust Camera Mouse software for Android that has improved functionalities and can overcome some limitations of similar software.

Simulation of MI with "Reverse Angle Mouse" in a Head-Controlled Pointer Fitts's Law Task (May 2019 – August 2019)

The project explores a potential simulation software that can both decrease the burden on users with Motor Impairment (MI) and help software designers develop a proper UI as they can be able to gain some perspective on the difficulties that MI individuals face when using the software.

- Collaborated with a team of four to implement the Reversed Angle Mouse (RAM) and integrate RAM to the Camera Mouse software to perform simulation of MI.
- Provided proof that our method gave better performance by conducting statistical analysis of the experimental results.

PUBLICATION

1. Mariah Papy, Duncan Calder, **Ngu Dang**, Aidan McLaughlin, Breanna Desrochers, and John Magee. 2019. Simulation of Motor Impairment with "Reversed Angle Mouse" in Head-Controlled Pointer Fitts's Law Task. *In Proceedings of the 21st International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS '19)*; ACM, Pittsburgh, PA, USA. DOI: https://doi.org/10.1145/3308561.3354623

HONORS & AWARDS

- Inducted to Phi Beta Kappa – Lambda of Massachusetts at Clark University on May 24th, 2020
- Academic Outstanding Achievement in Computer Science – Clark University Class of 2020

OTHER WORK EXPERIENCE

Graduate Teaching Assistant — **Computer Science Department, Boston University, Boston, MA** — **January 2021 – Present**

- Leading discussion/lab sections, holding weekly office hours, and grading assignments and exams for all-level algorithms and fundamental math classes such as Discrete Math, Linear Algebra and Number Theory.
- Supervising 15 undergraduate and master course assistants and graders.

Undergraduate Teaching Assistant — **Computer Science Department, Clark University, Worcester, MA** — **August 2018 – December 2019**

- Contributed to simulating the curriculums of coursework in Data Structures & Algorithms and Automata Theory by leading discussion/lab sections, holding weekly office hours, and grading assignments for coursework.
- Engaged in discussion from the perspective of a peer mentor with learners.

CMS Assistant **Marketing Office, Clark University, Worcester, MA** **April 2018 – August 2018**

- Participated in building Clark University's new website on WordPress
- Fixed 300 broken links as they were encountered and edited contents as they were needed
- Aided departments and offices to resolve problems with accessing new features of the website

PERSONAL PROJECTS

Price Predictor **Boston University, Boston, MA** **September 2021 – December 2021**

- Implemented an Airbnb price predictor using two different methods, a simple one and a more complicated one, and compared the results for a Machine Learning course project.
- The chosen methods were linear regression and a simple neural network. The final submission received full credit.

Scheme Interpreter **Clark University, Worcester, MA** **January 2020 – May 2020**

- Implemented a Scheme Interpreter in C for the Analysis of Programming Language course project.
- The final submission received the second highest score in the class.

Clark CPG **Clark University, Worcester, MA** **September 2019 – May 2020**

- Collaborate with a team of three to design an Android application in Kotlin for Clark University's Center of Counseling and Personal Growth (CPG)
- The application provides students with interactive counseling resources and keeps track of their progress, feelings, emotions, and thoughts

C Compiler **Clark University, Worcester, MA** **January 2019 – May 2019**

- Implemented a compiler for a small subset of the C programming language in Java
- The compiler supports variables with primitive types, simple if-else, and while statements

ACTIVITIES & LEADERSHIP

Co-Organiser **BU Theory and Algorithm Seminars, Boston, MA** **September 2021- May 2022**

- Sent invitations to prospective speakers, including professors, postdocs, and Ph.D. students
- Updated the Seminar website with presentations details on WordPress
- Monitored the talk during the hour to make sure it goes smoothly

Vice President **Clark Competitive Computing Club, Worcester, MA** **August 2019 – May 2020**

- Participated in programming contests (ACM-ICPC, CCSCNE)
- Engaged in solving interview questions and competitive contest problems during weekly training sections
- Ranked 8 over 40 in the CCSCNE competition 2018

Peer Advisor **Residential Life Office, Clark University, Worcester, MA** **Fall 2018 and Fall 2019**

- Mentored 15 first-year students during the New Student Orientation
- Provided counseling support for 12 international students with their transition to the US
- Trained in program planning and development, team building, crisis intervention, and public speaking

SKILLS

- Programming: familiar with Java, Python C/C++, LaTeX, Kotlin, MATLAB, HTML, CSS
- Documenting: proficient with Microsoft Office Suite, WordPress, and TeXStudio
- OS: familiar with Windows and Linux
- IDE: familiar with IntelliJ, Visual Studio, Android Studio, Jupyter Notebook, Spyder