

NGU DANG

SUMMARY

I'm a sixth-year CS PhD candidate who enjoys **computational complexity** with a focus on **circuit complexity** and its connection to **meta-complexity**. In particular, I study how popular and fundamental techniques can be used to characterize optimal Boolean circuits—fan-in/fan-out, wiring patterns, and compositional “shapes.” Beyond these structural questions, I explore how meta-complexity questions can leverage structural characterizations of explicit functions. I started researching in computer vision as an undergraduate and now regularly ship small, focused projects in ML, data science, and NLP—both to broaden my range and to demonstrate how quickly I can adapt and how well I can deliver in new technical areas.

EDUCATION

Department of Computer Science, Boston University

Boston, MA

*Ph.D. in Computer Science*2020 - 2026 (*expected*)

- Advisor: Prof. Steven Homer.
- Research area: Algorithms Design, Circuit Complexity, and The Minimum Circuit Size Problem (MCSP).
- GPA: 3.93/4.00 – Passed the PhD Candidate Qualifying Exam.

Department of Computer Science, Clark University

Worcester, MA

B.A. in Computer Science, Minors: Data Science and Mathematics.

2018 - 2020

- Advisor: Prof. Frederick Green.
- GPA: 3.93/4.00 — Graduated with Summa Cum Laude and High Honors.
- First Honors Dean's List in 2018, 2019, and 2020.

PUBLICATIONS & MANUSCRIPTS

1. Marco Carmosino, **Nguyen Dang**, Tim Jackman. 2024. **Simple Circuit Extensions for XOR in PTIME**. To appear in STACS 2026. A preprint of this work can be found [here](#).
2. Marco Carmosino, **Nguyen Dang**, Tim Jackman. 2023. **Formalizing Gate Elimination via Term Graphs Rewriting**. To be submitted to FSCD 2026. A preprint of this work can be found [here](#).
3. **Nguyen Dang**. 2025. **A Survey on The Multiplexer (MUX)**. A preprint of this work can be found [here](#).
4. Mariah Papy, Duncan Calder, **Nguyen 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.

WORK IN PROGRESS

1. Marco Carmosino, **Nguyen Dang**, Tim Jackman. 2025. **On Tightening Multiplexer Lower Bound**.
2. **Nguyen Dang**, Tim Jackman. 2025. **Characterizing Minimal Equality Testing Circuits**.

SKILLS

Programming: Python, Java, C++, MySQL.**Libraries:** Pandas, Numpy, Scipy, Tensorflow, PyTorch, Natural Language Toolkit (NLTK), Keras, Scikit-Learn, Seaborn, Z3.**Tools:** Git, Jupyter, Google Colab, Visual Studio, Microsoft Office Suite.**Scripting:** LaTeX, HTML, CSS.**OS:** Windows, Linux.

TEACHING EXPERIENCE	Teaching Fellow Boston University	2021 - present
	<ul style="list-style-type: none"> • CS131: Combinatorics Structures — Summer 2022, 2023. • CS132: Geometric Algorithms — Summer 2022. • CS235: Algebraic Algorithms — Spring 2021, Fall 2025 • CS237: Probability in Computing — Summer 2024. • CS332: Theory of Computation — Spring 2023, Fall 2023, 2024. • CS630: Advanced Algorithms — Fall 2021. 	
	Grader Boston University	2023 - 2024
	<ul style="list-style-type: none"> • CS535: Complexity Theory — Fall 2023. 	
	Undergraduate Teaching Assistant Clark University	2018 - 2019
	<ul style="list-style-type: none"> • CS120: Introduction to Computer Science — Fall 2018. • CS121: Data Structures — Spring 2019. • CS180: Automata Theory — Fall 2019. 	
OTHER PROJECTS	Tweet Dialect Classifier	
	. <i>Personal Project</i> — <i>Github Link</i>	06.2025 - 07.2025
	<ul style="list-style-type: none"> • Built a dialect classifying pipeline in Python with BERTweet-based model that distinguishes African American Vernacular English from Standard and regular African American English and achieved 0.95, 0.99, and 0.97 for accuracy, recall, and F1 score respectively. • Integrated the classifier into a bias-aware sentiment analysis pipeline, with statistical analysis (Kruskal-Wallis H Test) to provide insights on fairness in interpretation of social media text across different models (i.e. RoBERTa, RoBERTa-Latest, BERTweet). 	
	Real-Time Object Detector	
	. <i>Personal Project</i> — <i>Github Link</i>	05.2025 - 06.2025
	<ul style="list-style-type: none"> • Built a real-time object detection system by training YOLOv8 on Pascal VOC (Python) and implementing C++ ONNX Runtime inference with OpenCV for webcam-based detection. • Applied transfer learning with pretrained YOLOv8n weights and integrated ONNX Runtime C++ API to deliver fast, resource-efficient object detection with dynamic bounding box visualization and minimal latency. 	
	Human Activity Recognition Using Deep Learning	
	. <i>Personal Project</i> — <i>Github Link</i>	04.2025 - 05.2025
	<ul style="list-style-type: none"> • Built a deep learning pipeline using Python and PyTorch to classify human activities from Wi-Fi CSI data, achieving 0.98 accuracy score with a custom CNN-LSTM model. • Designed a complete preprocessing workflow including reshaping, normalization, smoothing, and statistical feature augmentation to improve model robustness. 	
	Churn Predictor for Subscription Service	
	. <i>Coursera's Challenge</i> — <i>Github Link</i>	03.2025 - 04.2025
	<ul style="list-style-type: none"> • Implemented an end-to-end churn prediction pipeline in Python for a video streaming service using a real-world imbalanced subscription dataset using an ensemble of three models — a neural network, XGBoost, and Random Forest — using weighted soft voting to optimize class ranking and maximize AUC. • Engineered advanced features (e.g., ratio metrics, interaction terms behavioral buckets, etc.) on top of 20 given features to boost signal quality and improve model discrimination and achieved achieved a ROC AUC score of 0.75. 	

PAST PROFESSIONAL EXPERIENCE	Undergraduate Research Assistant Worcester, MA	05.2019 - 05.2020
	<ul style="list-style-type: none"> Contributed to computer vision and computational geometry research projects for the Computer Science Department at Clark University. Implemented experiments, statistical analysis (e.g. ANOVA, Kruskal-Wallis), visualization, and geometrical simulations in Python and Java. 	
	CMS Assistant Worcester, MA	04.2018 - 08.2018
	<ul style="list-style-type: none"> Participated in building Clark University's new website on WordPress with the University's Marketing Department. Fixed 300 broken links as they were encountered and edited contents as needed. Handled tickets from other departments in the university that resolved their problems with accessing new website features. 	
CERTIFICATES	<ul style="list-style-type: none"> IBM Data Science by IBM on Coursera. Certificate earned on 08.31.2023. Neural Networks and Deep Learning by DeepLearning.AI on Coursera. Certificate earned on 12.31.2024. 	
AWARDS AND HONORS	<ul style="list-style-type: none"> Outstanding Academic Achievements, awarded by the Department of Computer Science at Clark University. Inducted to Phi Beta Kappa, Lambda of Massachusetts at Clark University on 05.24.2020. 	
ACADEMIC SERVICES	<p>Reviewer for: <i>Journal of Computer and System Science (JCSS).</i></p> <p>Organizer for: <i>Boston University Computer Science's Theory Seminar (Spring 2021).</i></p> <p>Vice President for: <i>Clark University Computer Science's Competitive Programming Club.</i></p>	