

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 <i>Ph.D. in Computer Science</i>	Boston, MA
		2020 - 2026 (expected)
	<ul style="list-style-type: none">• 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 <i>B.A. in Computer Science, Minors: Data Science and Mathematics.</i>	Worcester, MA
		2018 - 2020
	<ul style="list-style-type: none">• 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, Ngu 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, Ngu 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. Ngu Dang. 2025. **A Survey on The Multiplexer (MUX)**. A preprint of this work can be found [here](#).
4. 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.

WORK IN PROGRESS

1. Marco Carmosino, Ngu Dang, Tim Jackman. 2025. **On Tightening Multiplexer Lower Bound**.
2. Ngu 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
• 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
• CS535: Complexity Theory — Fall 2023.	
Undergraduate Teaching Assistant Clark University	2018 - 2019
• 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
• 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
• 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
• 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
• 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 a ROC AUC score of 0.75.	

PAST
PROFESSIONAL
EXPERIENCE

Undergraduate Research Assistant | Worcester, MA 05.2019 - 05.2020
• 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
• 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

- **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

- **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

Reviewer for: *Journal of Computer and System Science (JCSS)*.
Organizer for: *Boston University Computer Science's Theory Seminar (Spring 2021)*.
Vice President for: *Clark University Computer Science's Competitive Programming Club*.