Brian Wheatman

brianwheatman.com

EDUCATION

Johns Hopkins University (JHU) Baltimore, MD
PhD Computer Science: Advisor: Randal Burns

Massachusetts Institute of Technology (MIT) Cambridge, MA
Master of Engineering in Computer Science and Engineering June 2019
Concentration in Systems

Massachusetts Institute of Technology (MIT) Cambridge, MA
Bachelor of Science in Computer Science and Engineering June 2017
Bachelor of Science in Mathematics
Minor in Economics - Minor in Management Science

RESEARCH EXPERIENCE

JHU Computer Science Baltimore, MD
Researcher with Professor Randal Burns Jan 2020 - Present

- Designing new data structures to efficiently store dynamic graphs and matrices to reduce memory bandwidth requirements of analysis and computations run on these structures

JHU Distributed Systems and Networks Lab Baltimore, MD
Researcher with Professor Yair Amir Sep 2019 - Sep 2021

- Investigating methods for providing theoretical guarantees in systems using artificial intelligence
- Designing a traffic light control algorithm, which is able to outperform static algorithms using machine learning, without suffering from edge cases as in standard machine learning approaches

MIT Computer Science and Artificial Intelligence Laboratory (CSAIL) Cambridge, MA
Master of Engineering Thesis with Prof. Charles Leiserson in Performance Computing Sep 2017 - Jun 2019

- Improved an image processing pipeline containing petabytes of images with approximate locations to create a single, large mosaic with accurate locations
- Decreased time and resource requirements, allowing the pipeline to run on one server, instead of a cluster

MIT Computer Science and Artificial Intelligence Laboratory (CSAIL) Cambridge, MA
SuperUROP Researcher with Prof. Daniela Rus and Prof. Sertac Karaman Sep 2016 – Jun 2017

- Designed and implemented a new, online algorithm for a NP-Hard variant of the Traveling Salesperson Problem, which enables solutions to be found ten times faster than the current approach

MIT Human Dynamics Laboratory at MIT Media Laboratory Cambridge, MA
Undergraduate Researcher with Prof. Alex (Sandy) Pentland Sep 2015 – Jun 2016

- Modeled energy use given data from mobile phone records using machine learning, particularly clustering algorithms, to be used by the country of Andorra for predicting energy needs
- Created predictive models for population movement using mobile phone records

MIT Sloan School of Management Cambridge, MA
Undergraduate Researcher with Prof. Stephen Graves Feb 2014 – Aug 2014

- Designed and developed a program for simulating a user-specified production line, including raw materials, intermediaries, finished goods, costs, and time constraints to be used as a visualization and teaching tool

TEACHING EXPERIENCE

Teaching Assistant for Parallel Programing (JHU 601.320) Fall 2021

- Taught practical uses of parallel programing for data science and scientific computing

Teaching Assistant for Intermediate Programming (JHU 601.220) Fall 2020

- Taught low level programming, object oriented design and use of libraries using c and c++

Teaching Assistant for Computation Structures (MIT 6.004) Spring 2018 - Spring 2019

- Taught an introduction to computer structures from combinational logic to parallel systems

Teaching Assistant for Seminar in Undergraduate Advanced Research (MIT 6.UAR) Fall 2017

- Advised undergraduates and led section to help prepare undergraduates for their senior projects

Lab Assistant for Introduction to Digital Communications (6.02) Fall 2016
Tutor for Introduction to Algorithms (6.006) and Design and Analysis of Algorithms (6.046)
Grader for Introduction to Algorithms (6.006) and Design and Analysis of Algorithms (6.046)

PROFESSIONAL EXPERIENCE

Google Various, USA
Software Engineering Intern Summer 2021
- Investigating distributed processing frameworks to select one for a distributed solver
- Implementing the distributed solver on the selected distributed processing framework

Software Engineering Intern Summer 2020
- Investigated a hierarchical traffic engineering system to simplify routing
- Simulated the new system with past data to determine the impact of the hierarchical system

Software Engineering Intern Summer 2019
- Designed a machine learning model for use in a proprietary, truth inference problem
- Implemented the truth inference model and a distributed pipeline for preprocessing the data

Software Engineering Intern Summer 2018
- Worked on Akaros, a new operating system for high performance and real time applications
- Developed a port of the Go programming language to run on Akaros

Software Engineering Intern Summer 2017
- Enhanced a large, Map-Reduce data processing pipeline used to aggregate and report advertising data
- Created software cache for fast access to critical path metadata stored in slow storage

Five Rings Capital New York, NY
Software Engineering Intern January 2017
- Conducted an evaluation of different database solutions on the basis of cost, scalability and ease of use
- Reduced cost for the cloud database by structuring data to reduce the memory requirement

Facebook Menlo Park, CA
Data Engineering Intern Summer 2016
- Created pipelines to collect and organize third party data to be used for business intelligence purposes
- Worked with multiple, large databases using several database engines, including Oracle and Hive
- Created self-documenting code that generates textual and visual aids to help understand the pipeline

JP Morgan Chase & Co. New York, NY
Software Engineering Intern Summer 2015
- Designed and implemented an automated testing process for a large, transaction system with nightly generated statistics and visualizations of performance
- Created a website to display results of the tests and long term trends

PAPERS, PRESENTATIONS AND PUBLICATIONS

For more information see brianwheatman.com/projects

Pandey, P., Wheatman, B., Xu, H., & Buluc, A. "Terrace: A Hierarchical Graph Container for Skewed Dynamic Graphs." Proceedings of the 2021 International Conference on Management of Data. 2021.

Wheatman, Brian, et al. "RADICS: Runtime Assurance of Distributed Intelligent Control Systems." 2021 51st Annual IEEE/IFIP International Conference on Dependable Systems and Networks Workshops (DSN-W). IEEE, 2021.

Wheatman, Brian, and Helen Xu. "A Parallel Packed Memory Array to Store Dynamic Graphs." 2021 Proceedings of the Workshop on Algorithm Engineering and Experiments (ALENEX). Society for Industrial and Applied Mathematics, 2021.

Kaler, Tim, Brian Wheatman, and Sarah Wooders. "High-Throughput Image Alignment for Connectomics using Frugal Snap Judgments." 2020 IEEE High Performance Extreme Computing Conference (HPEC). IEEE, 2020.

Wheatman, Brian. Image alignment and dynamic graph analytics: two case studies of how managing data movement can make (parallel) code run fast. Diss. Massachusetts Institute of Technology, 2019.

Wheatman, Brian, and Helen Xu. "Packed compressed sparse row: A dynamic graph representation." 2018 IEEE High Performance Extreme Computing Conference (HPEC). IEEE, 2018.

Wheatman, Brian, Alejandro Noriega, and Alex Pentland. "Electricity demand and population dynamics prediction from mobile phone metadata." International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction and Behavior Representation in Modeling and Simulation. Springer, Cham, 2016.

AWARDS AND HONORS

- HPEC 2020 Best Student Paper Award
- Gordon Croft Fellow
- Lockheed Martin Undergraduate Research and Innovation Scholar
- Member of Eta Kappa Nu (Computer Science Honor Society)
- Member of Tau Beta Pi (Engineering Honor Society)
- Boy Scouts of America Eagle Scout