Charles **WADE**

PhD Student | University of Colorado Boulder

+1 (740) 403-3168 @ chwa4670@colorado.edu

EDUCATION

2022-Present **University of Colorado Boulder**, Student of Doctorate of Philosophy in Computer Science

2017-2021 **University of Toledo**, Bachelor of Science in Computer Science & Engineering, *Cum laude & College Honors*

EXPERIENCE

Present – August 2022 | **PhD Student & Draper Scholar, MATTER ASSEMBLY COMPUTATION LAB, Boulder, CO**

- Researching novel methods for engineering design automation under the advisement of Dr. Robert MacCurdy
- Awarded a position in the Draper Scholar program. This position provides full funding for the duration of my PhD studies
- Developing computational design tools for multi-material 3D printers
- Authored a major journal publication on and submitted a patent for a multi-material design framework called OpenVCAD

Computational Design | Automation | Simulation | Additive Manufacturing

August 2022 – January 2022 | **R&D Assistant Staff Member, OAK RIDGE NATIONAL LABORATORY, Oak Ridge, TN**

Research professional in the Digital Manufacturing Analysis and Frameworks Group at the Manufacturing Demonstration Facility.

- Developed novel software methods, visualizations, and controls for several experimental 3D-printing systems
- Researched a hybrid tool-path planning method that dramatically reduced computational requirements for large-scale additive manufacturing machines
- Collaborated with NASA on an experimental wheel prototype for extraterrestrial rovers
- Mentored four undergraduate students by providing technical and research skills support
- Formulated publications and presented at conferences
- Developed a hybridized method for fitting arc and splines to tool-paths to enable highly accurate object construction
- Co-developed Slicer 2, a major toolpath planning program used by researchers at ORNL and by industry partners

Additive Manufacturing | High-performance Computing | Visualization | Algorithms | C++

August 2021 – June 2019 | **Research Intern, OAK RIDGE NATIONAL LABORATORY, Oak Ridge, TN**

Participated three terms in Department of Energy funded research programs at the Manufacturing Demonstration Facility researching additive and advanced manufacturing.

- Developed high-performance computing algorithms, using NVIDIA CUDA, as part of next-generation software that powers large-scale 3D printing
- Applied advanced topics in computational geometry and optimization to tool-path planning algorithms
- Implemented patented algorithm to allow for 3D printing objects with single paths using graph theory
- Authored research papers and gave presentations at Department of Energy wide events

C++ | CUDA | Scientific-writing | Oral Presentation

April 2019 – May 2018 | **Undergraduate Researcher, THE UNIVERSITY OF TOLEDO, Toledo, OH**

- Conducted independent research under the direction of multiple professors
- Designed and tested an embedded device that monitors harmful algae blooms in Lake Erie
- Presented at the National Conference on Undergraduate Research 2019 in Kennesaw, Georgia
- Authored and published a paper in the Proceedings of The National Conference on Undergraduate Research

Embedded systems | C++ | Scientific-writing

Technical Skills

Programming Languages	**C/C++**, CUDA, GLSL, Java, Javascript, Python, Rust, LaTeX
Frameworks	Qt, OpenGL, OpenVDB, Embedded, Android
Software Development	Git, CMake & Make, VueJS, Keras
Computer Aided Design	ABAQUS, Fusion360, SOLIDWORKS, Autodesk Eagle, AutoCAD
Systems	Linux, Windows, MAC OS X

Publications

Dec. 2023 **Charles Wade**, Graham Williams, Sean Connelly, Braden Kopec, and Robert MacCurdy "OpenVCAD : An open source volumetric multi-material geometry compiler", *Additive Manufacturing*, DOI

Nov. 2023 **Charles Wade**, Breanne Crockett, Michael Borish, and Robert Maccurdy "Determining Optimal Print Orientation Using GPU-Accelerated Convex Hull Analysis", *Proceedings of the 8th ACM Symposium on Computational Fabrication*, DOI

Sep. 2023 Michael Borish, Alex Roschli, **Charles Wade**, Brian Post, Liam White, and Cameron Adkins "Single Path Generation for Closed Contours via Graph Theory and Topological Hierarchy", *Solid Freeform Fabrication Symposium 2023*, DOI

Jul. 2023 Benjamin Stump, Brian Gibson, Jay Reynolds, **Charles Wade**, Michael Borish, Peter Wang "Load balancing for multi-beam additive manufacturing systems", *Additive Manufacturing*, DOI

May. 2023 **Charles Wade** and Robert MacCurdy "Multi-Material Volumetric Three-Dimensional Modeling", *Provisional Patent*

Nov. 2022 Eda Yildirim-Ayan, Halim Ayan, and **Charles Wade** "Adjustable gravity simulator for tissue and organ culturing", *Provisional Patent PCT/US2022/050364*, DOI

Sep. 2022 **Charles Wade**, and Michael Borish "Hybrid Curve Fitting for Reducing Motion Commands in Object Construction", *Solid Freeform Fabrication Symposium 2022*, DOI

Jun. 2021 Michael Borish and **Charles Wade** "A GPU-based Approach for Path Planning Optimization via Travel Length Reduction", *Procedia Manufacturing 53*, DOI

Apr. 2019 **Charles Wade**, and Teran Ericksen. "Low Cost Remote Algae Detection Utilizing Embedded Hardware, Custom Sensors, and Additive Manufacturing", *Proceedings of the National Conference of Undergraduate Research 2019*, DOI

Teaching

May 2022 – August 2022 — **Teaching Assistant, Department of Computer Science, CU Boulder**

I was a teaching assistant for two semesters for CSCI 2270 : Data Structures.

- **Awarded : Outstanding TA of the Year Award** : Department of Computer Science
- Lectured to and collaborated with students during recitation sections
- Developed new assignments, graded assignments, and conducted office hours

C++ | Data Structures | CMake | Oral Presentation

December 2021 – October 2017 — **Teaching Assistant, College of Engineering, University of Toledo**

I was a teaching assistant in the university sponsored maker space workshop for 6 semesters.

- Created lesson plans, lectured students and administered tests on workshop machines, tools and safety
- Processed 3D printing requests from students
- Worked hands-on with students in Freshman and Senior Design classes to build prototypes
- Developed an algorithm that analyzes 3D models to optimize their 3D printing orientation and simulate their probability of success
- Studied using computer vision and machine learning to determine if and when a failure has occurred while 3D printing

3D-printing | Laser cutting | Digital Fabrication | Prototyping

Outreach and Volunteering

Present
October 2023

Mentor, Research Seminar in Science, Boulder Valley School District,

- Mentor two high school students in conducting scientific research at a university
- I work one-on-one with students on a weekly basis to formulate research ideas, train them on scientific instruments, and develop their presentation skills.

Mentorship | Local schools | Research skills

December 2021
May 2018

President, Maker Society,

- Mangaged a 501(c)(3) non-profit student organization whose mission is to promote education into the maker-movement and advanced manufacturing practices
- Organized and conducted events to improve STEM literacy within the community
- Lead weekly meetings

Maker-movement | Leadership | Non-profits

References

Dr. Robert MacCurdy
Assistant Professor, CU Boulder
@ maccurdy@colorado.edu
+1 (607) 279-7722

Dr. Michael Borish
Associate Researcher, Oak Ridge National Laboratory
@ borishmc@ornl.gov
+1 (850) 543-4592