MARTIN ČAVARGA

3D Developer and Researcher in Geometric Algorithms

SKILLS

C++	5+ yrs
GIT	5+ yrs
R	3+ yrs
CMake	2+ yrs
Python	2+ yrs
Javascript/Typescript	2+ yrs

CONTACT

Sputnikova 8,
82102, Bratislava

+421 910 337 310

mcavarga@gmail.com

PROFILE

I specialize in combinatorial geometries in Euclidean space, particularly mesh surfaces and point cloud or voxel 3D data processing. My work includes CAD solid algorithms, geometric data structures, while adhering to clean, well-documented code, SOLID principles, and design patterns.

My expertise lies in developing numerical simulation frameworks using FEM or FVM on discrete geometries, based on differential geometry principles. Current research involves robust shrink-wrapping for 3D data and mesh simplification for MeshLab, alongside transitioning to 3D mesh elements in non-linear elastodynamic FEM simulations.

Recent projects include an Automated Polyhedral Wall Connection System for civil engineering and enhancing geometric functionalities in road module design, aiming to advance civil engineering practices.

WORK EXPERIENCE

C++ Developer — Aug. 2023 - NOW

Allplan: 3D Architecture

A more geometry-focused project at Allplan.

- development in a scrum team
- multi-level implementation of new features for civil engineers
- maintenance of legacy features
- testautomation

Technologies include:

- C++ 20
- Boost
- Parasolid Kernel
- Perforce

C++ Developer — Jul. 2022 - Jun. 2023

Hyperganic: Core Team

Development and maintenance of mesh processing features in a high-performance voxel engine for additive manufacturing.

- development in an agile team
- build system development
- testautomation

Technologies include:

- C++ 17

EDUCATION

2021 - now

PhD: Geometry and Topology
Faculty of Mathematics Physics and Informatics, Comenius University, Bratislava
Project of dissertation: Data-dependent, Topology-preserving Mesh Simplification. Teaching mostly graphics oriented courses as a TA.

2018 - 2020

Ms: Applied Mathematics
Faculty of Civil Engineering, Slovak Technical University, Bratislava

Learned advanced numerical methods like FEM, BEM, and FVM, parallel programming, computational fluid dynamics, construction statics for civil engineering, and numerical methods in image processing. I focused on mesh geometry processing, particularly for image and point cloud data segmentation, bridging the gap between mathematical theory and practical application.

2015 - 2018

Bc: Applied Mathematics
Faculty of Civil Engineering, Slovak Technical University, Bratislava

My Bachelor's degree focused on advanced mathematical foundations, including the theory of differential equations and numerical methods. Key areas of study also involved statistical methods, data analysis, and the essentials of programming and operating systems, laying a robust foundation for applied mathematical analysis and computing.

- CMake
- Google Test
- Qt
- Git

Achievements include:

- transferred the whole codebase to CMake in order to use Google Test framework.

C++ Developer Jul. 2020 - Jun. 2022
Allplan: Team Platform 1

Development and maintenance of geometric and data processing tools for BIM modeling in civil engineering.

- development in an agile team
- multi-level implementation of new features for civil engineers
- maintenance of legacy features
- testautomation

Technologies include:

- C++ 20
- Boost
- WPF
- Perforce

Achievements include:

- participated in a project regarding specialized polygonal data structures for engineering markdown which involved refactoring an almost 30-year-old legacy framework originally translated from Fortran.
- developed a BRep hole subtraction system for skeleton construction elements in Allplan.

Typescript Developer Jan. 2018 - Jun. 2020
Vectary

Development and maintenance of back-end 3D modeling tools in a web-based geometry engine.

- development in an agile team
- maintenance and multi-level implementation of new features for 3D designers

Technologies include:

- JavaScript/TypeScript
- HTML/CSS
- Git

Achievements include:

- research-developed a meta-object tool for geometry processing based on signed distance fields of input meshes.