Sean Bone

Personal Data

Address:	Georg-Kempf-Strasse 10, 8046 Zürich CH
Phone:	+41 78 795 52 63
email:	bones@ethz.ch
Date of Birth:	18.08.1996
Nationality:	Swiss
Portfolio:	https://seanbone.ch

Education

Sep 2020 – present

Master's degree in Computational Science and Engineering
ETH Swiss Federal Institute of Technology, Zürich

Focus: Control Systems, Computational Fluid Dynamics

Main courses: Advanced Numerical Methods for CSE,
Writing Fast Numerical Code,
Fundamentals of CFD,
Control Systems, Recursive Estimation,
Dynamic Programming & Optimal Control,
Orbital Dynamics

Sep 2016 – Aug 2020

Bachelor's degree in Computational Science and Engineering
ETH Swiss Federal Institute of Technology, Zürich

Focus: Robotics, Computational Fluid Dynamics

Bachelor Thesis: "Comparative study of density-based versus pressure-based solvers for supersonic flow"

Main courses: High Performance Computing for CSE,
Numerical Methods for Computational Science and Engineering,
Image Analysis and Computer Vision,
Programming Techniques for Scientific Simulations,
Software Design, Information Systems,
Introduction to Mathematical Optimization

Software Skills

- C++ with a focus on High Performance Computing and simulation
- Performance optimization on CPU and GPU (SSE/AVX, CUDA, ...)
- Scientific computing libraries and paradigms (Eigen, BLAS, LAPACK, OpenMP, MPI, ...)
- Python for scientific applications (including NumPy, SciPy, pandas, matplotlib, ...)
- MATLAB and Simulink
- Robot Operating System (ROS)
- Relational database design (MySQL)
- Web development (JS, PHP, HTML, CSS, ...)
- Game development and computer graphics (OpenGL, C#, MonoGame, libigl)
- Version control and build systems (Git, GNU Make, CMake)
- Experienced Linux user

Analytical Skills

- Solid foundation in Physics and Mathematics

- Numerical Mathematics
- Theory of Fluid Dynamics and its numerical treatment (FDM, FVM, SPH, ...)
- Numerical methods for ODEs and PDEs (FEM, quadrature, ...)
- Robotics, state estimation and control systems
- Mathematical optimisation and mathematical programming
- Statistics and Machine Learning
- Orbital Dynamics
- Computer Graphics, Physically-Based Simulation

Language Skills

Italian:	Mother tongue
English:	Mother tongue
German:	Fluent spoken, intermediate written
French:	Fluent spoken, intermediate written

Past Projects

Apr – Nov 2022

"Multi-robot exploration with Decentralised Monte-Carlo Tree Search"
MSc thesis at Vision for Robotics Lab (ETHZ)
Supervising professor: Prof. Margarita Chli, V4RL ETH

Implementation (in C++/ROS) of a decentralised planner for coordinated multi-robot exploration of subterranean environments, based on the MCTS algorithm. The project received a very good grade and is being prepared for publication.

See more: https://seanbone.ch/msc-thesis/

Dec 2021 – Mar 2022

"Optimal design of a HESS for peak shaving BEV fast charging demand at a highway rest stop"
Semester Project at Paul Scherrer Institut

Implementation of a MATLAB framework to simulate a Hydrogen Energy Storage System for a peak-shaving application at a battery-electric vehicle fast-charging station.

See more: https://seanbone.ch/hess-simulation/

Feb – Jun 2021

"Optimisation of a FLIP Fluids Solver"
ETH course project: Advanced Systems Lab

In a team of four we revisited the FLIP fluids solver (written in C++) from the "Meteorite Strike" project to optimise it using the techniques from the lecture, e.g. ILP, SSE/AVX, cache optimisations.

See more: https://seanbone.ch/optimisation-flip-solver/

Sep 2019 – Oct 2020

Supersonic Sounding rocket EULER
ARIS Space

As CFD Specialist I simulated the aerodynamics of the rocket in OpenFOAM, contributing to the choice of airbrake design and the development of trajectory simulations, controller and state estimation.

See more: https://seanbone.ch/project-euler/

Feb – Jul 2020

"Comparative study of density-based versus pressure-based solvers for supersonic flow"
BSc Thesis in Computational Fluid Dynamics

Supervisor: Prof. P. Jenny, IFD ETH

Goal of the project was to compare two OpenFOAM solvers in order to validate them and determine which would be best for use to simulate a supersonic sounding rocket at ARIS.

See more: https://seanbone.ch/bsc-thesis/

Feb – Jun 2020

Computer game project: "Silly Gilly"
ETH course: Game Programming Laboratory

In a team of five we developed a computer game, from brainstorming to release. We used the C# language and the MonoGame framework, and deployed the game on PC and XBox. The game was awarded first place by the jury and second place by audience vote.

See more: https://seanbone.ch/silly-gilly-the-game/

Sep – Dec 2018

Computer Graphics project: "Meteorite Strike"
ETH course: Physically-Based Simulation for CG

As a team of three we implemented a FLIP fluids solver in C++, to produce a video clip depicting the strike of a meteorite in the ocean. We awarded second place by the jury and first place by audience vote.

Video and more: https://seanbone.ch/flip-fluids-simulation/