Tom Hands

Date of Birth: redacted for website
Citizenship: British Citizen
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Technical Skills

- Various experience in numerical modeling and machine learning including hydrodynamics.
- Extensive C++, C# and object-oriented experience, particularly in high performance computing (HPC).
- Extensive Python experience including numpy, scipy, pandas, scikit-learn, tensorflow, xgboost.
- Experience of code development and optimisation on a variety of platforms, including parallel, vector and GPU computing, usage of HPC systems and version control.
- Experienced in Kotlin, C, OpenCL and Java development, working knowledge of FORTRAN.

Practical Experience

12/2022 -present **ETH Zürich**

Scientific Programmer with Prof. Dr. Harald Bugmann

- Led the development of new, efficient scientific algorithms and codes for forestry, including interfacing with practitioners in the field.
- Led a project on simulating seed dispersal in Python, modeling the interaction of millions of seeds with 2D, turbulent wind fields.
- Developed a perfomant Unity/C# 3D visualisation tool for forestry simulations with millions of trees.
- Maintenance and lead development of C# .NET projects including HPC applications.

10/2016–4/2022 **University of Zürich**

Post-doctoral Research Assistant with Prof. Dr. R.Helled, Dr. J.Stadel, Prof. Dr. B. Moore

- Ported large sections of my parallel C++ *N*-body code to OpenCL to enable GPU computations for modelling outer solar-system dynamics.
- Developed a novel time-stepping scheme for improved simulation accuracy and run-times.
- Ran large-scale parallel simulations on the UZH supercomputer and Piz Daint.
- Used Python to develop further analysis and visualisation routines.
- Accelerated astrophysical models using XGBoost and tensorflow in Python.
- Published 9 papers (4 first author).

6/2016 - 9/2016 **University of Leicester**

Post-doctoral Research Assistant – Supervisor: Prof. Dr. Richard Alexander

- Ran OpenMP and OpenMPI simulations using my code and others on supercomputers.

2012 - 2016 *Ph.D student* – Supervisor: Prof. Dr. Richard Alexander

- Re-wrote an existing code to model astrophysical discs in C++, achieving a 10x speed-up.
- Developed a new, OpenMP parallel C++ code to solve gravitational systems.
- Published 2 first-author papers.

Awards & Research Grants

- Universität Zürich Forschungskredit Fellowship 2019
- Tomalla Fellowship 2018
- STFC Ph.D. studentship 2012
- Awarded departmental prize for being the top performing final year MPhys (Physics) student

Languages

- English (native),
- German (Up to ELP B2 level)

Education

2012–2016 *PhD in Astrophysics*, awarded: August 2016 – Supervisor: Prof. Dr. Richard Alexander

- Thesis title: "The enthralling tale of the formation and evolution of compact planetary systems".

2008–2012 *MPhys (Physics) with First Class Honours*

- Masters dissertation title: "The trajectory of emboli in the major cerebral arteries".
- Bachelors dissertation title: "A method to correct field non-uniformity in images acquired from a phased array MRI head coil".

2011 *Summer Studentship* – Supervisor: Prof. Walter Dehnen

- Title: "Artifical Conductivity in Smoothed Particle Hydrodynamics".

Extra-curricular activities

2022-present Developed and released an indie video game called "Cat Herders" in C# using the Unity engine (https://store.steampowered.com/app/2183920/Cat_Herders_Couch_Coop_Cat_Corralling/). Led the team that developed the game and published it on Steam and itch.io.

2015-2022 Peer-review referee for *AAS Publishing*, *A&A* and *Computer Physics Communications*

4/2014 *Exoplanet fly-by video* - YouTube video with over 65,000 views designed to demonstrate the vast variety of planetary systems to a general audience (https://www.youtube.com/watch?v=Nw_KfDEypTY).

2013 *ExoVis* - Developed the exoplanet visualisation tool *ExoVis* in HTML, CSS and Javascript, to aid with the visualisation of exoplanetary systems (http://tomhands.com/exovis/). This tool won the 2013 Open Exoplanet Catalogue visualisation prize.