# Christian Blume, PhD

Senior Software Developer

NZ Resident, German Citizen

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⑤ bloomen

in christian-blume

# Summary

Experienced software developer and data science specialist with a demonstrated history of creating software for a variety of applications. Skilled in C++, Python, Rust, Linux, machine learning, data mining, and digital signal processing. Strong engineering professional with degrees in physics and geoscience. Author of popular open-source libraries. Website: https://bloomen.github.io

## Work Experience

Since Apr 20 R&D Software Engineer (Senior Researcher II) at Soul Machines in Auckland, New Zealand.

- o Investigate strategies for predicting and generating 3D meshes using machine learning
- o Improve the facial animation engine of digital humans; collaborate with 3D artists
- Research and implement strategies to quickly generate unique digital humans
- Develop efficient software in C++ from libraries and command line tools to end user interfaces
- Mentoring, guide junior research engineers, literature and code reviews, unit testing
- o Tech: Windows, Linux, C++, Python, Eigen, dlib, LIBSVM, OpenCV, Maya, Boost, HDF5, Visual Studio

#### Apr 19 - Mar 20 Senior Software Developer at Mega Limited in Auckland, New Zealand.

- Develop cross-platform software in C++ for Mega's desktop and mobile applications
- o Implement a novel synchronization strategy that allows for the one-way transfer of data
- Various improvements to the open-source SDK, e.g., FAT filesystem support, two-factor auth, high-speed logging, better performance and stability
- Implement a tool to allow for the quick analysis of chat archives for monitoring purposes
- Focus on highly efficient and scalable solutions; Continuous integration and unit testing
- o Tech: Linux, Windows, Mac, C++, C, Crypto, Qt, SQLite, gtest, inotify

#### Jul 16 - Mar 19 Senior Software Engineer at Serato Limited in Auckland, New Zealand.

- Build real-time applications (Serato DJ, Serato Studio) for the audio industry on Mac/Windows
- Develop object-oriented, multi-threaded, low-latency software in C++
- o Improve graphical user interfaces using Qt and in-house GUI technology
- o In-depth work with MIDI and audio interfaces and hardware
- Helped release Serato DJ v2.0 and Serato Studio v1.0
- Unit testing, mentor fellow developers, sharing knowledge in seminars
- Tech: Mac, Windows, C++, Python, Bash, SQL, SQLite, Qt, Boost, Juce, gtest, XCode, Visual Studio, LLDB, QML, Curl

#### Mar 14 - Jun 16 Senior Software Developer, Team Lead at Fotech Solutions Ltd in Calgary, Canada.

- o Develop server-based Distributed Acoustic Sensing (DAS) applications on Linux
- Lead a team of four to five developers within an agile environment
- o Build high-throughput, multi-threaded, high-performance software in C++ and CUDA
- o Develop algorithms for data analysis, signal processing, and machine learning
- Design and implement novel noise floor estimation using support vector machines
- Design and implement a new data storage system based on HDF5 and lossless compression
- Real-time data processing, graph-based data flow, high-performance storage
- Unit testing, system testing in Python, and continuous integration
- Tech: Linux, C++, C, CUDA, Python, Ruby, Bash, SQL, SQLite, Qt, Boost, libunittest, Armadillo, NetCDF4, HDF5, LIBSVM, Eclipse, GDB, REST, Websockets, Curl

#### Jun 12 - Feb 14 Software Developer at Blue Yonder GmbH in Karlsruhe, Germany.

- Develop an automated cloud-based prediction service on Linux
- Object-oriented, highly-available software in Python and C++
- Build software for data analysis, web services, machine learning, user interaction
- Work with data scientists on improving predictions and feature understanding
- o Build and test REST interfaces, in-depth work with relational databases
- Unit testing, system testing, and continuous integration
- Tech: Linux, Python, C++, Bash, SQL, Redis, PostgreSQL, EXASOL, Boost, CppUnit, NumPy, Pandas, Scikit, SciPy, Flask, GDB, REST, Nginx

### Feb 09 - Apr 12 Research Scientist at Freie Universität Berlin, Germany.

- Predict stratospheric phenomena using machine learning and pattern recognition
- Compare methods such as neural networks and support vector machines including ensemble techniques
- Apply clustering techniques to gain insights and manage the feature space
- o Develop high-performance applications to model high-dimensional, geophysical data
- Publish several peer-reviewed papers and present results at conferences
- Hold seminars in statistics and data analysis
- Tech: Linux, C++, Python, Matlab, Bash, NetCDF3, ROOT, TMVA, LIBSVM, FFTW, GDB, LaTeX

#### Sep 08 - Jan 09 Intern at Siemens in Munich, Germany.

o Build the prototype of a web interface for internal business processes using PHP and MySQL

#### Oct 07 - Jan 08 Intern at IBM Research and Development in Böblingen, Germany.

Evaluate the Linux I/O Stack on an IBM Mainframe using C and C++

#### Education

Feb 09 - Apr 12 Doctorate degree in geoscience from Freie Universität Berlin, Germany.

Areas of research: Atmospheric interactions, stratospheric weather and climate patterns, prediction and pattern recognition, machine learning. Develop software in C++, Python, and Matlab for machine learning, signal processing, and data analysis.

Thesis: Statistical Learning to Model Stratospheric Variability.

https://refubium.fu-berlin.de/handle/fub188/13901

Oct 05 - Jan 09 Master's degree in physics from Technical University Munich, Germany.

Specialized in particle and computational physics. Develop software in C++ for simulations and data analysis.

Thesis: Simulation of Frictional Cooling.

https://bloomen.github.io/pub/simulation\_of\_frictional\_cooling.pdf

Feb 05 - Aug 05 **Study abroad** at Universitat de València, Spain. Majoring in physics.

Apr 03 - Feb 05 Intermediate diploma in physics from the University of Bonn, Germany.

#### Technical Profile

Languages English (fluent), German (native), Spanish (basic), Mandarin (elementary)

Mach. Learning Linear Models, Neural Networks, Support Vector Machines, Decision Trees, Clustering, Model

Selection, Ensemble Techniques, Feature Engineering

Operat. Systems Linux/Unix, MacOSX, Windows

Programming C++, C, Python, Rust, JavaScript, Java, Go, CUDA, Bash, UML, SQL, QML, Matlab

Libraries BOOST, Armadillo, Eigen, NetCDF4, HDF5, Qt, React, OpenMP, NumPy, Scikit, SciPy,

Pandas, TensorFlow, Keras, IntelMKL, ROOT, LIBSVM, OpenCV, FFTW, etc.

Databases PostgreSQL, SQLite, EXASOL, MySQL, Redis

Networking HTTP, Sockets, REST, SSH, XML

Tools Eclipse, Xcode, Visual Studio, GDB, LLDB, Emacs, GCC, Clang, GIT, SVN, LaTeX

Miscellaneous Low-Latency, High Performance, Unit Testing, Solid Presentation Skills

### Recent Talks

- Dec 2019 A quick intro to Mega's open-source SDK at Auckland C++ Meetup https://github.com/bloomen/talks
- Oct 2017 **Using tasks to simplify concurrency in modern C++** at Pacific++ conference https://youtu.be/xuL7rfkcWus
- May 2017 transwarp a header-only C++ library for task concurrency at Auckland C++ Meetup https://github.com/bloomen/talks

# Selected Authored Open-Source Projects

Hosted at https://github.com/bloomen

- o cxxpool A header-only thread pool for C++
- o densitas A C++ library for density estimation of regression problems
- o featureimpact A Python package for estimating the impact of features on machine learning models
- o gcl A tiny graph concurrent library for C++
- o libpca A C++ library for principal component analysis
- libunittest A portable C++ library for unit testing
- o rsgrep A simple version of grep implemented in Rust
- o transwarp A header-only C++ library for task concurrency

#### Publications

- Jul 2012 Blume, C., 2012: Statistical Learning To Model Stratospheric Variability. Doctoral thesis, Institute for Meteorology, Freie Universität Berlin. https://refubium.fu-berlin.de/handle/fub188/13901
- Jul 2012 **Blume**, C. and K. Matthes, 2012: *Understanding and forecasting polar stratospheric variability with statistical models*. Atmos. Chem. Phys., 12, 5691–5701. https://www.atmos-chem-phys.net/12/5691/2012
- Jun 2012 **Blume**, C., K. Matthes and I. Horenko, 2012: Supervised Learning Approaches to Classify Sudden Stratospheric Warming Events. J. Atmos. Sci., 69 (9), 1824–1840. https://journals.ametsoc.org/doi/full/10.1175/JAS-D-11-0194.1
- Jul 2010 SPARC CCMVal, SPARC CCMVal Report on the Evaluation of Chemistry-Climate Models. V. Eyring, T. G. Shepherd, D. W. Waugh (Eds.), SPARC Report No. 5, WCRP-X, WMO/TD-No. X, 2010, C. Blume contributed to chapter 8. https://www.sparc-climate.org/activities/previous-activities/ccmval
- Aug 2009 Bao, Y., A. Caldwell, D. Greenwald and C. **Blume**, 2009: Frictional Cooling Demonstration at MPP. Proceedings of COOL 2009, TUM1MCCO03, Lanzhou, China. http://epaper.kek.jp/COOL2009/papers/tum1mcco03.pdf
- Feb 2009 **Blume**, C., 2009: Simulation of Frictional Cooling. Master's thesis, Max-Planck-Institute for Physics, Technical University of Munich. https://bloomen.github.io/pub/simulation\_of\_frictional\_cooling.pdf

### Hobbies

- Working out and hiking
- Surfing, currently riding a 6'3 fish
- Volleyball, in particular beach volleyball
- o Data science and open-source projects
- Learning Mandarin

Please contact me for any further information or references.