

# Kai Wolf

Computer Scientist, M.Sc.

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## Short profile

### Expertise

Computer Vision, Image Processing, Machine Learning, Software Performance and Optimization, Software Architecture, Design Patterns, SOLID, OOP, TDD, DDD, Build Systems, DevOps, Continuous Integration (CI), Continuous Deployment (CD), Mobile Computing

### Programming languages, Markup and Frameworks

C, C++, Kotlin/Native, Java, Python, Lua, HTML, CSS, XML, XSL(T), Doxygen, Git, SVN, Bash, Vim, Bazel, Gradle, Make, CMake, Jenkins, GitLab, GitHub, Conan, Docker, AWS, Azure, DevOps, Firebase, TravisCI, CircleCI, AppVeyor, Team Foundation Server (TFS), HALCON, Qt, OpenCV, OpenGL, ITK, VTK, Android, SIMD, SSE, AVX, NEON, OpenMP, OpenCL, CUDA, Yocto, RenderScript, Halide, Jekyll, Buildbot, Caffe, TensorFlow

### Language skills

German: Mother tongue. English: fluent

## Work Experience

since 01.2018 **Software Consultant, Kai Wolf - SW Consulting, Wiesbaden**

- Optimization of the software development process with regard to architecture, design patterns and dependency management for time-of-flight cameras

🕒 03.2021-10.2023 > **SICK AG**

C++ Qt5 CMake Bazel Conan Docker Jenkins Computer Vision Machine Learning Halide

- Refactoring of a software component to read and convert a proprietary sensor data container format in the context of autonomous driving

🕒 05.2022-03.2023 > **Continental AG**

C++ Python CMake Computer Vision Docker Eigen OpenCV

- Development of a Proof-of-Concept for high performance, resource efficient signal processing filters for the calibration of hearing aids on mobile devices

🕒 09.2020-12.2020 > **OpenDialog GmbH**

C++ Android iOS Flutter Dart CMake GPGPU Gradle Java NEON RenderScript

- Refactoring of a 100k+ codebase and performance optimization of core image processing algorithms for a variety of target platforms and devices

🕒 02.2020-03.2022 > **pmdtechnologies ag**

C++ Qt6 Python CMake Bazel Android Docker Jenkins NEON GPGPU Halide

- Cross-platform port of an existing codebase and numerical validation of the AI inference used for

🕒 12.2019-03.2020 > **HearingAI Limited UK, Chatable AI**

C++ Kotlin Python CMake Android

- Development of a Machine Learning framework for mobile/edge devices used for AR/VR applications

🕒 04.2019-08.2019 > **AGT Group (R&D) GmbH**

Android iOS ARCore ARKit Kotlin/Native C/C++ Python Computer Vision Machine Learning TensorFlow

- Development of a software application used to segment, measure and visualize structures in 3D medical images (CT)

🕒 07.2019-12.2020 > **MITOS GmbH**

C++ VTK ITK Boost QT5 CMake Conan OpenCV

- Conducting of Computer Vision workshops with a focus on object detection and measurement, image segmentation, multiple-view 3D reconstruction, structure-from-motion, camera calibration and photometric-stereo

🕒 03.2019 > **lexoro GmbH**

Android iOS ARKit OpenCV Python PCL VTK Eigen OpenMVG COLMAP

- Development of a prototype for the detection of inclusions and dirt in translucent gemstones using an uncalibrated camera  
🕒 05.2018-07.2018 > Aark Innotech Pvt Ltd.  
🔗 Docker Python OpenCV Voxel-Carving Marching-Cubes
- Creation of a dependency management system for R&D projects in the automotive environment  
🕒 12.2018-06.2019 > Continental Teves AG & Co. oHG  
🔗 C++ Python CMake Jenkins Conan Docker
- High performance, concurrent implementation of signal processing and artificial intelligence algorithms on mobile devices  
🕒 04.2018-12.2019 > HearingAI Limited UK  
🔗 Android Espresso C++ C RenderScript Gradle NEON Java OpenCL
- Mentoring and training clients in Python and machine learning technologies for text clustering and classification tasks  
🔗 Python Machine Learning Deep Learning
- Consolidation of the software architecture and the build system for a biomedical software  
🕒 03.2018-07.2018 > BioDataAnalysis GmbH  
🔗 C++ CMake Jenkins OpenCL OpenCV Qt5 VTK
- Modernization of the software architecture and the build system of a calibration software for a camera system, as well as runtime optimization of the image processing algorithms used  
🕒 01.2018-04.2019 > Instrument Systems GmbH  
🔗 C++ Jenkins Image Processing SIMD SSE CMake LLVM Gradle Groovy Python MS Azure

02.2016-12.2017 **Vision Algorithms Engineer, MVTec Software GmbH, München**

- Development and optimization of computer vision algorithms for the HALCON machine vision library  
🔗 C Doxygen Image Processing HALCON Qt5 Python Caffe Windows macOS Linux
- Deep-Learning based Text recognition (OCR)  
🔗 C Python Caffe
- Complete rewrite of the build system infrastructure  
🔗 Make CMake Jenkins Perl
- Parallelization and optimization of (existing) image processing algorithms  
🔗 OpenMP OpenCL SIMD SSE AVX
- Cross-platform development for Windows, Linux, macOS and embedded devices
- 3rd-Level customer support for a wide range of complex vision problems

03.2015-01.2016 **Technical Manager, MAS Software GmbH, München**

- Research and development of a process for secure and unique detection of craquelure patterns based on image features (2D) and surface patterns (3D)  
🔗 C++ Boost CMake Qt5 OpenGL VTK OpenCV Doxygen FlyCapture libdc1394 OpenMP
- Implementation and deployment of an in-house C++ library for recurring software patterns in embedded development  
🔗 C++ Python Doxygen CMake GTest Linux
- Application management and training of new employees

10.2013-03.2015 **Software Engineering, MAS Software GmbH, München**

- Specification and implementation of an application software for a IEC61850 compliant interface to control transformer stations  
🔗 C++ Boost CMake PIS10 pugixml Unittest++ NetSNMP Crypt Doxygen Yocto Linux
- Setup and deployment of several continuous integration server  
🔗 Jenkins Buildbot
- Supervision and support of apprentices

08.2010-12.2012 **Research Assistant, Computer Vision und Mixed Reality, Hochschule RheinMain, Wiesbaden**

- Design and implementation of an easy-to-use structured-light 3D scanner for CNC-Step  
🔗 C++ CMake Qt4 VTK OpenCV libdc1394 FlyCap Doxygen PCL Eigen LapackBLASVelMar
- Implementation of a realtime structured-light based reconstruction algorithm for an intraoral scanner for a.atron3D GmbH  
🔗 C++ CMake Qt4 VTK OpenCV libdc1394 OpenCL Doxygen
- Port of a 3D computer vision application for Android smartphones, setup and evaluation of an optical chroma splitter  
🔗 Java Android Python

## Projects

since 02.2017 **Effective CMake, Book**

- Practical advice to write better CMake in heterogeneous software projects. Current progress can be followed at: <https://leanpub.com/effective-cmake>  
🔗 CMake Markdown CircleCI

- 12.2016-04.2017 **Delano, Furniture Recognition with CNNs and Gradient-based Learning**  
 ○ Development of a proof-of-concept for recognizing furnitures based on a few images using Transfer Learning on a pre-trained FFN  
 C++ CMake TensorFlow
- 01.2017-02.2017 **Toco - Toy C Compiler, Open-Source project**  
 ○ Implementation of a minimal C compiler using Flex (Lexer), Bison (Parser) and LLVM for generating the Assembly: <https://github.com/NewProggie/Toco>  
 C++ CMake LLVM Flex Bison
- 11.2013-02.2014 **Uncalibrated Photometric-Stereo, Open-Source project**  
 ○ Implementation of an uncalibrated Photometric-Stereo procedure with the exclusive use of a monitor display as a lighting source and a web camera: <https://github.com/NewProggie/Uncalibrated-Photometric-Stereo>  
 C++ CMake OpenCV
- 08.2011-03.2012 **Objectify - Mobile 3D scanner, Android App**  
 ○ Development of a mobile 3D face scanner for mobile devices (Android) using shading information and the smartphone display for illumination  
 Java EJML Android RenderScript
- 05.2011-11.2012 **SparkleShare-Android, Open-Source Project**  
 ○ Development of an Android app for the free online data storage SparkleShare  
 ○ Coordination of pull-requests and bugfixing management using the code hosting platform GitHub <https://github.com/NewProggie/SparkleShare-Android>  
 Java Android

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## Talks

- 07.2021 **Signal Processing and ML Inference on the Edge, C++ User Group Karlsruhe, Karlsruhe**  
 Aufzeichnung: <https://www.youtube.com/watch?v=VbuChpX5OAc>
- 01.2021 **(Advanced) C++ Design Patterns, C++ User Group Frankfurt, Frankfurt**
- 03.2020 **Dependency Management with CMake and Conan, ConanDays 2020, Madrid, Spain**
- 06.2017 **Effective Dependency Management with CMake, Microsoft Deutschland GmbH, Munich**  
 Recording: <https://youtu.be/Qayyhl-36os>
- 03.2016 **Hands on clang-format, MUC++, Munich**
- 02.2015 **A Short Introduction to OpenCV, MUC++, Munich**
- 12.2014 **RANdom SAmples Consensus, Papers We Love Meetup, Munich**

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## Internships

- 03.2011-06.2011 **Internship project, SIC! Software GmbH, Heilbronn**  
 ○ Incorporating applications and features into Android-based ebooks  
 ○ Testing software, plug-ins and frameworks  
 ○ Performing smoke and release tests of Android and iPhone apps  
 ○ Effort estimation of customer enquiries  
 ○ Brainstorming for game apps based on Android and iPhone  
 Java Android

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## Certificates

- 10.2017 **iSAQB® Certified Professional for Software Architecture, Foundation Level**
- 02.2016 **Zertifikat HALCON Experte**

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## Education

- 10.2011-09.2013 **Computer Science, Master of Science**  
 Title of thesis: Silhouette-based 3D Reconstruction  
 C++ CMake Qt4 VTK OpenCV libdc1394 OpenCL
- 09.2008-10.2011 **Media Computer Science, Bachelor of Science**  
 Title of Thesis: 3D Reconstruction on a smartphone using Photometric-Stereo  
 Java Android Photometric-Stereo OpenGL ES Image processing

# Zertifikat

**M.Sc. Kai Wolf**

geboren am 08.07.83

hat die Prüfung zum

**iSAQB® Certified Professional for  
Software Architecture**

Foundation Level

am 27.10.17 in Stuttgart erfolgreich bestanden.

Folgende Kenntnisse werden attestiert und sind für eine praktische Anwendung beim Entwurf, der Dokumentation und der Kommunikation von Softwarearchitekturen für kleine und mittlere Systeme vorhanden:

- Grundlagen von Software-Architekturen
- Komponenten/Bausteine
- Schnittstellen/Beziehungen
- Architekturziele
- Qualitätsziele
- Werkzeuge



Stephan Goericke, CEO  
iSQI GmbH

Zertifikatsnummer: 1701-CPSAFL-123643-DE



Certified according to  
**DIN EN ISO 9001:2008**  
Audited according to  
**EN ISO/IEC 17024:2003**

**iSQI GmbH**  
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# CERTIFICATE of ATTENDANCE

**Herr Kai Wolf**

attended the HALCON training course:

## Experte für HALCON

(2-Tages-Seminar)

### Kursinhalt im theoretischen Teil:

- Interne Datenstrukturen in der HALCON-Bibliothek
- Übersicht über die von HALCON unterstützten Verfahren
- Ableiten modellbasierter BV-Abläufe aus der Aufgabenstellung

### Übungen zur Programmierung mit HALCON:

- Effizientes Arbeiten mit der Entwicklungsumgebung HDevelop
- Programmieren von BV-Algorithmen mittels Analysewerkzeugen
- Einbindung von Kameras in ein Prüfprogramm zur Blobanalyse

Obersulm, 17.02.2016

Place, Date



Signature

