



HARALD REINGRUBER

Visual Computing Expert and Software Craftsman
(Unity3D/C#/C++/JavaScript)

Name: Harald Reingruber

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Areas of Expertise

Professional:

- > Augmented reality
- > Real-time Graphics
- > Information visualization
- > Volume rendering
- > Image processing, medical image processing

University:

- > Computer vision
- > Pattern recognition and machine learning
- > Object/feature detection and tracking

What I like

- > Simple but clever solutions to complicated or complex problems
- > Profiling performance and memory consumption
- > Continuous improvement
- > Clean, readable code
- > [The boy scout rule](#)
- > Working as a team
- > Hands-on attitude
- > Fixing root causes instead of symptoms

PROFESSIONAL EXPERIENCE

1. three10, Vienna

Software Engineer, Unity3D/C#/C++/TypeScript/JavaScript

2016-present

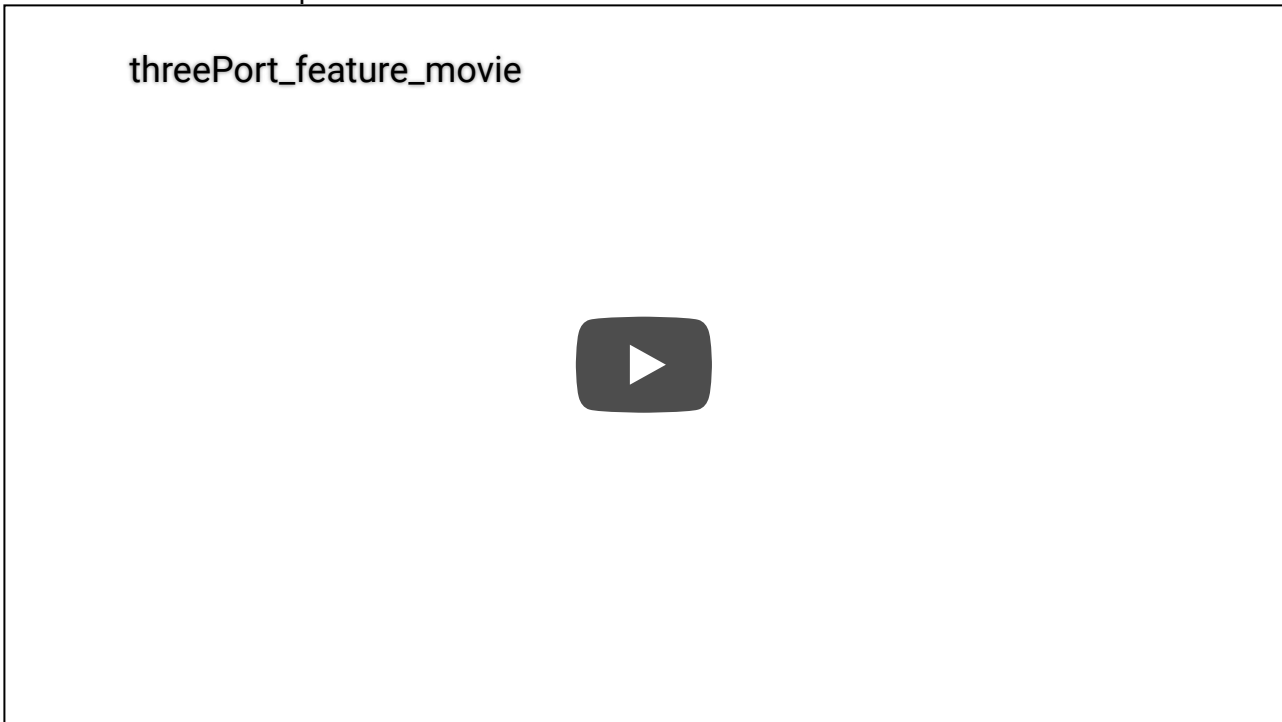
The three10 software allows delivering presentations including 2D and 3D media content synchronized across multiple devices. For example, a mobile device can be used for remote-controlling the presentation while a high-end graphics device is visualizing the presentation on a high-resolution video wall.

As one of two principal engineers in a team of 6 developers, I am the main responsible engineer for the secure communication and file transfer between the Unity 3D application and the on-premise backend server. The architecture of the TypeScript/React/Node.js backend software is also one of my responsibilities.

Most notable achievements:

- > Implemented a JavaScript library for streaming server-side Unity 3D graphics in real-time from a cloud server to an HTML5 browser using a low-latency video codec.
- > Implemented HTML5 Server-Sent-Events for pushing data updates from the backend server to the Unity 3D client software (C# client implementation, as well as Node.js server implementation).
- > Implemented a Docker deployment pipeline for our on-premise backend software, in order to minimize the impact of running the software on various operating systems and versions.
- > Implemented screen capturing and streaming over the network.
- > Became the go-to guy for Git, Docker, Gitlab, Gitlab CI and Unity Cloud Build.
- > Principal technical contact during the Audi software security certification process.

See the three10 multi-client presentation and collaboration software in action:



2. ViewAR, Vienna

2015-2016

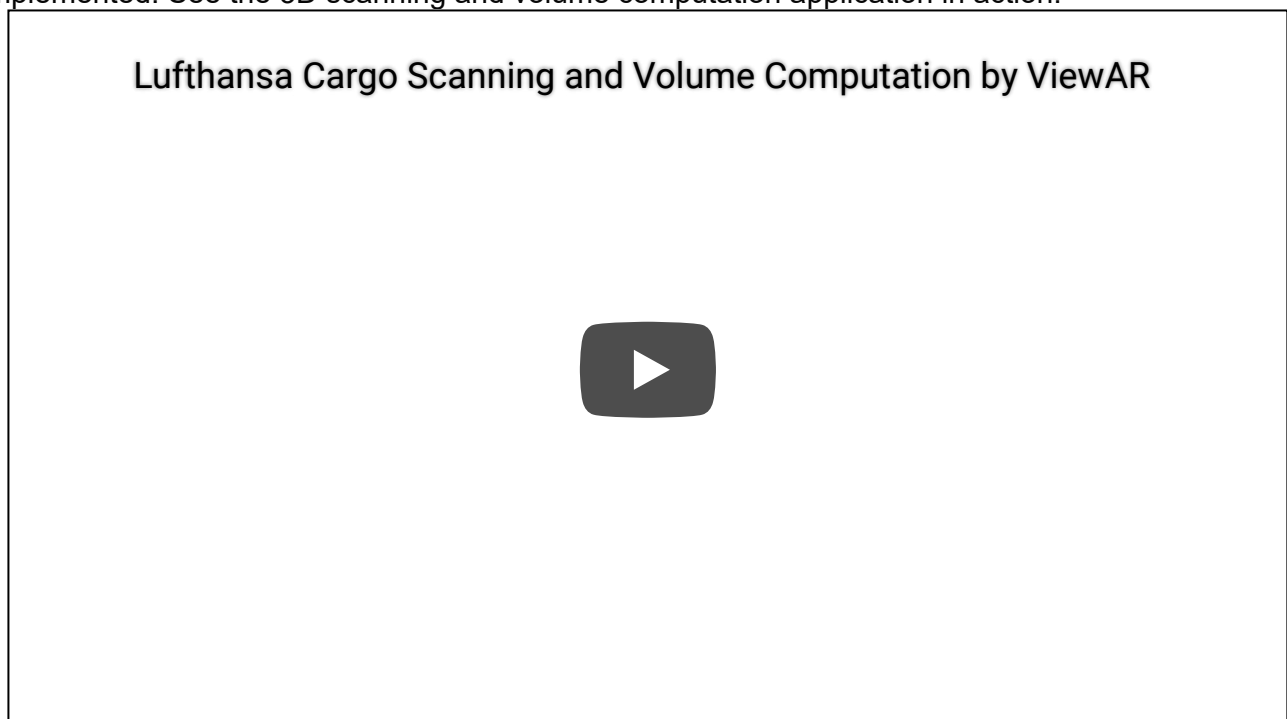
Software Engineer, C++/Objective-C/Java

The ViewAR application framework combines a native C++ core, with an HTML5 User Interface allowing low-effort User Interface customization and supports multiple platforms (iOS, Android, Windows).

As the principal engineer in the C++ team, I was responsible for extending and improving the ViewAR core module and integrating the latest third-party Augmented and Virtual Reality SDKs.

Most notable achievements:

- › Computing watertight (hole-free) 3D triangle mesh from 3D models captured with depth-sensing cameras. Furthermore, an algorithm for computing the volume of the scanned objects has been implemented. See the 3D scanning and volume computation application in action:



- › Cross-compiling the ViewAR C++ core using Emscripten/WebAssembly to JavaScript and WebGL

- › Integrated video decoding in order to support video textures in 3D

3. Agfa Healthcare, Vienna

2013-2015

3D Volume Rendering Engineer, C++

I have been the main engineer responsible for extending and maintaining Agfa's volume rendering engine, in a team of 8 engineers located in Austria, Belgium, and Canada. The engine supports GPU and CPU rendering, the CPU version heavily uses SIMD instructions for boosting the CPU rendering performance.

Most notable achievements:

- › Implemented bi-cubic filtering for improving the resampling quality of low-resolution images using WebGL
- › Implemented a CMake build system, in order to replace the separate build scripts for several platforms

See the volume rendering engine in action:

Agfa HealthCare video: Training IMPAX Volume Viewing - 3D Viewing ...



4. Agfa Healthcare, Vienna

2010-2013

Software Engineer, 3D Visualization, Java

In a team of 22 people, I was responsible for implementing and maintaining 3D visualization features and the loading of volume image data.

Most notable achievements:

- › Implemented progressive loading of volume image data (patent granted)
- › Visualization of the normal plane in the unfolded blood vessel view
- › Improved visualization of the intersection of 2D annotations with the current view plane (semi-transparent rendering of the part overlapping with the adjacent slice)

5. Austrian Institute of Technology (AIT), Vienna

2009-2010

Master thesis, Computer Vision, Matlab

An asynchronous Data Interface for Event-based Stereo Vision Systems

The aim of my master thesis was to improve 3D reconstruction accuracy of a stereo camera system using special image sensors which only transmits data for the pixels sensing light intensity changes (for example movements).

Most notable achievement:

- › Improved image quality/sharpness by adjusting the retention time of pixel events depending on the event density, which is an indicator for the movement velocity

6. Computer Vision Center, Universitat Autònoma de Barcelona, Spain

2009-2009

Final year project, Feature Detection, Matlab

Intestinal Content Detection in Capsule Endoscopy using Robust Features

The aim of this project was to develop a method supporting the automatic analysis of capsule endoscopy studies in order to handle the large amount of image data in the daily clinical routine.

Most notable achievement:

- › Implemented a Support Vector Machines (SVM) detector for detecting intestinal content (71 % accuracy)

COMPETITION

1. Catalysts Coding Contest

Biggest programming contest in the German-speaking countries (Germany, Austria and Switzerland).

- › October 19, 2012, Vienna:
 - › 26th place (250 participants)
- › October 21, 2011, Vienna:
 - › 26th place (130 participants)

The goal was to be the first finishing all levels of the assignment.

EDUCATION

1. Vienna University of Technology

2007-2011

MSc in Computer Science, Visual Computing

http://www.tuwien.ac.at/en/tuwien_home/

- › Image processing
- › (Real-time) computer graphics
- › Machine learning
- › Pattern recognition
- › Computer vision
- › Augmented reality

- 2. Universitat Autònoma de Barcelona, Spain** 2009-2009
University exchange program, Computer Vision
<http://www.cvc.uab.es/>
- › Feature detection (SIFT, SURF) › Machine learning (e.g. SVM)
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- 3. Upper Austria University of Applied Sciences, Hagenberg** 2005-2007
BSc in Computer Science, Medical Software Engineering
<http://www.fh-ooe.at/en/hagenberg-campus/>
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- 4. High School/Junior College, Leonding** 1999-2004
Electroinc Data Processing and Business Administration
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VOLUNTARY WORK

- 1. Jugend Umwelt Platform (environmental youth organization), Vienna** 2014-2017
Member of the advisory board
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- 2. Green Team, Frequency Festival, St. Pölten** 2013-2016
Team leader

I was leading a group of volunteers performing an anti-littering campaign on the camping site at the Frequency Festival (approx. 50,000 daily attendees).

- 3. Kulturprojekt Inzersdorfer Freundeskreis (cultural association)** 2003-2012
Cultural event management

I was one of the main organizers of open-air festivals (approx. 1,200 attendees), concerts and cultural events. I was responsible for the artist booking, music line-up and the communication bridge between the artists and the audio/light engineers.

- 4. Austrian Red Cross, Ebensee** 2004-2010
Emergency Medical Responder & Ambulance Driver

Alternative civilian service (full time) for 1 year and volunteer (approx. 1-2 twelve-hour shifts per month) for 5 years.

SKILLS

PROGRAMMING LANGUAGES

C++



C#



TypeScript(JavaScript)



Emscripten/WebAssembly



Java



3D PROGRAMMING

Unity 3D



Ogre



OpenGL/WebGL



DirectX



COMPUTER VISION

OpenCV



Matlab



Point Cloud Library



AUGMENTED REALITY/DEPTH SENSING SDKS

Vuforia, Kudan, Structure, Intel RealSense

HIGH PERFORMANCE COMPUTING

SIMD (SSE/AVX/Neon), OpenCL, Cuda

SCM & CONTINUOUS INTEGRATION

CMake, GIT, GitHub, GitLab, Jenkins, Teamcity, Docker, Yarn/NPM, Maven, SonarQube

SOFTWARE ENGINEERING

Unit Testing/TDD, Agile Software Development (Scrum, Kanban), Clean Code, Continuous Improvement

CONFERENCE VISITS

[Socrates Austria](#), Linz
October 4-5, 2019

[Unity Unite](#), Amsterdam
June 27-29, 2017

[Meeting C++](#), Berlin
December 5-6, 2014

[Agile Tour](#), Vienna
2013, 2014, 2018

[DevFest](#), Vienna
2013, 2015, 2016, 2017, 2019

Winter Augmented Reality Meeting, Graz 2016

MEETUPS

[Unity Meetup Vienna](#), Vienna (Organizer)
[Vienna Computer Vision Meetup](#), Vienna (Co-organizer)

LANGUAGES

German



English



Spanish



HOBBIES

Basketball, snowboarding, cycling, surfing