

Ali Can Demiralp

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Experience

RWTH Aachen, Virtual Reality and Immersive Visualization Group

Aachen, Germany

SCIENTIFIC STAFF AND PH.D. CANDIDATE

January 2017 - December 2022

- Assisted and performed independent research on the topics of scientific visualization, high-performance computing and numerical analysis, under the supervision of Prof. Torsten Wolfgang Kuhlen.
- Contributed peer-reviewed publications & software to the *Human Brain Project (HBP)* and the *Nationales Hochleistungsrechnen (NHR)* program. (See the *Publications* section, github.com/vrgroupwath, and git-ce.rwth-aachen.de/vr-vis for detail.)
- Modernized the software infrastructure of *AixCAVE at RWTH Aachen*, a room-mounted virtual reality environment, transitioning it from the Vista Virtual Reality Toolkit to Unreal Engine.
- Developed immersive visualization applications targeting the *AixCAVE* and standard head-mounted displays using Unreal Engine, in collaboration with the *Institute for Combustion Technology* and the *Ophthalmology Clinic of the University Hospital*.
- Developed distributed, hybrid-parallel visualization applications using MPI and CUDA/OMP/TBB, focusing on particle and relativistic ray tracing, targeting the *CLAIX Compute Cluster of RWTH Aachen* and the *JURECA of Jülich Supercomputing Center*.
- Developed scientific visualization applications targeting standard desktops using Qt and VTK(m), focusing on visualization of nerve fibers within the brain, in collaboration with the *Jülich Research Center Institute of Neurosciences and Medicine*.
- Contributed to various open-source projects including Bluebrain HighFive, Cppcheck, Eigen, Nvidia VkHLF, Unreal Engine nDisplay Plugin, and many others.
- Supervised the *Data Analysis and Visualization* practical course, the *Current Topics in the Field of Immersive Visualization* seminar, and the theses of 2 B.Sc. and 4 M.Sc. students.

RWTH Aachen, Virtual Reality and Immersive Visualization Group

Aachen, Germany

C++ DEVELOPER - SCIENTIFIC VISUALIZATION

February 2016 - December 2016

- Developed the graphical and statistical features of *Performance Visualization Toolkit (PVT)*, an open-source C++ library for visualizing the performance of MPI applications.
- Developed a CUDA library for spherical harmonics operations, and an accompanying C++ application to convert vector fields into orientation distribution fields.

Fraunhofer Institute for Applied Information Technology (FIT)

Sankt Augustin, Germany

C++ AND JAVA DEVELOPER - INTERNET OF THINGS (IoT)

February 2014 - June 2015

- Developed a mobile ad-hoc emergency notification system, and the firmware of a Bluetooth low energy pulse detection bracelet, for the *Bridging Resource and Agencies in Large-Scale Emergency Management (BRIDGE)* European Union project.
- Developed an automotive construction pipeline demo for the *Enabling Business-Based Internet of Things and Services (EBBITS)* European Union project.

Tart New Media

Istanbul, Turkey

UNITY DEVELOPER

February 2013 - August 2013

- Developed the multiplayer features and user interface of *Kixel*, a football game for Facebook.

Chyron

Melville, New York, USA

INTERN C++ DEVELOPER - COMPUTER GRAPHICS

May 2012 - August 2012

- Developed the Alembic and Collada asset importers of *Chyron Lyric PRO*, a broadcast graphics creation tool.

Grupanya

Istanbul, Turkey

INTERN WEB DEVELOPER

June 2011 - August 2011

- Developed a typographical error checker, and a tool for matching users to potential offers for *Grupanya*, a local e-commerce website.

Education

RWTH Aachen

Aachen, Germany

M.Sc. IN MEDIA INFORMATICS (*Applied Computer Science*)

September 2013 - November 2016

Overall GPA: 2.1/5.0. Thesis GPA: 1.3/5.0. (*Maximum grade: 1.0*)

Stony Brook University

Stony Brook, New York, USA

B.Sc. IN COMPUTER SCIENCE

September 2009 - December 2012

Overall GPA: 3.64/4.00. Graduation with honor (Cum Laude). (*Maximum grade: 4.00*)

Programming Languages

- C++** 08 years of professional, 14 years total experience. Important libraries: Boost, STL 03/11/14/17/20/23.
- CUDA** 07 years of professional, 08 years total experience. Important libraries: Nvidia cuSolver, Nvidia OptiX, Nvidia Thrust.
- C#** Important libraries: Unity SDK, Unreal Build System.
- Java** Important libraries: Android SDK, Arduino SDK.
- JavaScript** Important libraries: AWS SDK, D3.js, Three.js, WebGL.
- Python** Important libraries: Matplotlib, NumPy, Pandas, SciPy.

Technologies

- Game Engines** Unity, Unreal Engine
- Graphics APIs** ANARI, Intel OSPRay, Nvidia OptiX, Nvidia VkHLLF, OpenGL, Vulkan
- Numerics APIs** Boost uBLAS, Eigen, GNU GSL, Intel MKL, Nvidia cuBLAS, Nvidia cuSolver
- Parallelization APIs** Intel TBB, MPI, Nvidia CUDA, Nvidia Thrust, OpenCL, OpenMP, Taskflow
- User Interface APIs** ImGui, Qt
- Virtual Reality APIs** OpenVR, OpenXR
- Visualization APIs** ParaView API, VTK, VTK-m
- Windowing APIs** GLFW, GLUT, SDL, Windows SDK

Software (Select)

- HID.HPP** C++23
GITHUB.COM/ACDEMIRALP/HID.HPP June 2023 - Present
Single header C++23 wrapper for libusb/hidapi.
- FD** C++20, CUDA
GITHUB.COM/ACDEMIRALP/FD August 2022 - Present
Generic finite differences in C++20.
- ACD** C++17, CUDA
GITHUB.COM/ACDEMIRALP/ACD January 2019 - Present
Single file utilities for C++17. 30+ stars.
- FG** C++17
GITHUB.COM/ACDEMIRALP/FG January 2018 - Present
Rendering abstraction describing a frame as a directed acyclic graph of render tasks and resources. 400+ stars, 50+ forks.
- GL** C++17
GITHUB.COM/ACDEMIRALP/GL May 2017 - Present
Header-only C++17 wrapper for OpenGL 4.6 Core Profile. 150+ stars, 10+ forks. Featured in the Khronos Group August 2017 newsletter.

Publications (Select)

- A C++20 Interface for MPI 4.0** Supercomputing 2022
A.C. DEMIRALP, M. KRÜGER, T. GERRITS November 2022
- Astray: A Performance-Portable Geodesic Ray Tracer** VMV 2022
A.C. DEMIRALP, M. KRÜGER, C. CHAO, T.W. KUHLEN, T. GERRITS September 2022
- MODE: A Modern Ordinary Differential Equation Solver for C++ and CUDA** ICNAAM 2022
A.C. DEMIRALP, M. KRÜGER, T. GERRITS September 2022
- Performance Assessment of Diffusive Load Balancing for Dist. Particle Advection** WSCG 2022
A.C. DEMIRALP, D.N. HELMRICH, J. PROTZE, T.W. KUHLEN, T. GERRITS May 2022
- Parallel Particle Advection and Lagrangian Analysis for 3D-PLI FOMs** IEEE LDAH 2019
A.C. DEMIRALP, D. ZIELASKO, M. AXER, T. VIERJAHN, T.W. KUHLEN October 2019