NIKLAS HAAS

Staff Software Engineer (L6) — Algorithm Design, Performance & GPU Computing

jobs@niklashaas.de · niklashaas.de · github.com/haasn · LinkedIn

Professional Summary

Algorithm design and performance engineering leader with 15+ years optimizing systems that process billions of operations daily. Serves as a technical committee member shaping technical direction of FFmpeg (2600+ companies) and VideoLAN (5B+ downloads), influencing decisions affecting operations at Meta, Google, Netflix, Spotify, Comcast, Twitch and more. Track record of balancing psychovisual quality with performance through research, prototyping, and A/B testing—achieving 5x-10x performance improvements while maintaining or improving subjective quality. Expert in algorithm design, GPU computing, SIMD optimization, and making strategic tradeoffs between quality, performance, and complexity in production-scale systems.

Core Competencies

- **Algorithm Design & Research:** Developing novel algorithms balancing quality and performance; prototyping and A/B testing to validate psychovisual improvements; 5x-10x performance gains while maintaining or improving subjective quality
- **Low-Level Optimization:** SIMD programming (x86 SSE/AVX2/AVX512, ARM NEON, RISC-V Vectors), assembly language, cache optimization, memory hierarchy tuning
- **GPU Computing:** Vulkan compute shaders, GPU pipeline optimization, OpenGL/GLSL, parallel algorithm design for throughput-oriented workloads
- **Systems Programming:** C/C++, lock-free algorithms, concurrency, memory management, thread-safe data structures
- **Technical Leadership:** Design reviews, mentorship, cross-company collaboration (Meta, Dolby, Comcast), technical decision-making for projects with 50+ contributors, navigating quality-vs-performance tradeoffs

Professional Experience

Independent Consultant *January 2024 — Present*

Self-employed · Full Time

- Provided specialized consulting on algorithm design, performance optimization and feature development for multimedia infrastructure
- Led complete rewrite of FFmpeg's pixel format conversion system (libswscale), achieving 4-5x average speedup through novel runtime code generation approach while maintaining bit-exact output quality
- Designed and prototyped quality-preserving optimization strategies, validating visual fidelity through subjective testing and automated quality metrics

Senior Software Engineer *2021 — Present*

FFlabs SAS · Remote

- Core developer for FFmpeg, used by 2600+ companies including Meta, Google, Netflix, Spotify; work affects infrastructure processing billions of videos daily
- Led redesign of core format negotiation system, enabling support for advanced codecs across the ecosystem; coordinated implementation across multiple contributors
- Researched, prototyped, and validated novel tone-mapping algorithms through A/B testing and subjective quality evaluation; published approach combining real-time frame analysis with psychovisual models, adopted by multiple downstream projects
- Designed quality-performance tradeoffs for video processing features, balancing computational cost against perceptual improvements through iterative prototyping and user feedback
- Mentored junior engineers through code reviews and design feedback; 50+ substantial code reviews annually, focusing on maintainability, style and correctness
- Authored first open-source implementations of industry-standard video technologies (Dolby Vision, ITU-R H.274, SMPTE RDD5, MV-HEVC), reducing industry dependency on proprietary solutions
- Debugged and fixed critical race conditions in multi-threaded processing pipeline affecting production deployments at major streaming companies

Software Engineer *2018 — 2021*

Videolabs SAS · Remote

- Created and maintain libplacebo, a GPU computing framework integrated into VLC, mpv, and FFmpeg; processing millions of frames daily across diverse platforms
- Researched and implemented psychovisually-optimized algorithms for HDR tone mapping, upscaling, and color management; designed quality-focused features balancing perceptual accuracy with real-time performance constraints
- Designed and implemented GPU-accelerated real-time video processing pipeline using Vulkan compute shaders, achieving 10x+ performance improvements over CPU-only approaches while maintaining visual quality
- Led Vulkan integration enabling HDR and Dolby Vision playback in VLC; feature used by 50M+ monthly active users
- Contributed fixes and debugging work improving stability of the Linux AMD ecosystem, used by millions of users including Steam Deck

Software Engineer *2018*

Pebbles Digital Media · Contract · Remote

- Developed a Vulkan backend for use in multimedia applications
- Integrated libmpv for seamless video playback and control

System Administrator *2015 — 2018*

Ulm University · Part-time · On-site

- Administration of Linux servers and user-facing systems for the computer science faculty

- Managed infrastructure, security, and reliability of critical university systems
- Provided technical support and troubleshooting for faculty and students

Leadership & Impact

Open Source Community Leadership

- **Technical Committee Member:** FFmpeg (50 active developers, 10,000+ commits/year) and VideoLAN (VLC media player, 200+ active contributors)
- Review and approve major architectural changes, set technical direction, resolve disputes on API design and performance tradeoffs
- **Mentorship:** Guided 10+ first-time contributors through their initial patches; several became regular contributors
- **Maintainership:** Active maintainer on FFmpeg, VLC, and libplacebo; reviewed and merged 1000+ pull requests

Project Leadership & Adoption

- **libplacebo:** Created and maintain GPU computing framework (3,700+ commits, 50 community contributors); integrated into VLC (5B+ downloads), FFmpeg, mpv and more (17,700+ GitHub references, 660+ stars)
- **libswscale:** Led team of 3 engineers through complete rewrite achieving 4-5x performance improvement; coordinated testing across 200+ supported formats and 5+ supported architectures
- **checkasm:** Overhauled benchmarking and correctness validation tool used by 10+ major projects including FFmpeg, dav1d, and x264 (350+ GitHub references); improvements reduced benchmark runtime and noise floor by 80%+

Technical Influence

- **Design Documents:** Authored 4+ technical design proposals for major architectural changes in FFmpeg
- **Conference Speaking:** Held 4+ presentations on optimization techniques and algorithm designs at VideoLAN Dev Days, fostering knowledge sharing across the community
- **Publications:** Author of technical documentation and blog posts; referenced during the hiring process at Open Broadcast Systems

Technical Skills

Languages: C (expert), Haskell (expert), Assembly (x86/ARM/RISC-V), GLSL/HLSL, Python, Lua, Go, C++

GPU & Parallel Computing: Vulkan, OpenGL, Compute Shaders, GPU Architecture, Pipeline Optimization

Performance Optimization: SIMD (SSE, AVX2, AVX512, NEON, RVV), Profiling (CPU, GPU), Cache Optimization

Systems: Linux, Threading/Concurrency, Memory Management, GPU Drivers (Mesa)

Domains: Algorithm Design, Psychovisual Quality Optimization, Signal Processing, Codec Development, Real-time Processing

Tools: Git, GDB, GCC/LLVM, Meson, Docker

Leadership & Communication: Technical writing (design documents, performance analysis reports, public blog posts), cross-team coordination across distributed open-source communities

Education

Bachelor of Science in Computer Science
Ulm University, Germany 2014 — 2019
Graduated with highest honors

Honors & Awards

- **Landessieger Mathematik & Informatik** (State Winner), Jugend Forscht Baden-Württemberg 2013

Additional Information

- **Languages:** German (native), English (native), Norwegian (B2)
- **Location:** Currently based in Germany, open to relocation (e.g. Dublin, Zurich, Munich)
- **Work Authorization:** EU citizen (German)