NIKLAS HAAS

Staff Software Engineer — Multimedia Systems & Video Processing Expert

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Professional Summary

Multimedia systems engineer with nearly 20 years of programming experience and 7+ years developing video processing infrastructure used by billions. Technical committee member for FFmpeg (2600+ companies including Meta, Google, Netflix) and VideoLAN (5B+ downloads), directly shaping the technology behind modern video delivery, streaming platforms, and media playback. Author and maintainer of libplacebo, the industry-leading open-source GPU color management and video processing library. Deep expertise spanning video codecs (H.264, HEVC, AV1, VP9), HDR workflows (Dolby Vision, HDR10+), color science, GPU-accelerated media processing, and real-time video rendering. Proven track record implementing novel algorithms for tone mapping, upscaling, and color management that balance perceptual quality with computational efficiency.

Core Competencies

- **Video Processing & Codecs:** Expert-level knowledge of modern video codecs (H.264, HEVC, AV1, VP9) and processing pipelines; developed first open-source implementations of Dolby Vision, ITU-R H.274, SMPTE RDD5, and MV-HEVC; deep understanding of video compression, filtering, and transcoding workflows

- **Color Management & HDR:** Comprehensive expertise in color science, HDR workflows (Dolby Vision, HDR10+, HDR Vivid), tone mapping algorithms, and color space transformations; implemented production-grade color management systems used by millions

- **GPU-Accelerated Media Processing:** Vulkan and OpenGL expert; designed and implemented GPU compute pipelines for real-time video processing, achieving 10x+ performance improvements; author of libplacebo, industry-leading GPU video processing framework

- **Multimedia Algorithm Design:** Developed novel perceptually-motivated algorithms for tone mapping, upscaling, and image enhancement; expertise in signal processing, psychovisual modeling, and balancing quality vs. computational efficiency

- **Real-Time Video Systems:** Architecture and optimization of real-time video rendering pipelines for media players and streaming applications; experience with playback synchronization, frame timing, and low-latency processing

- **Performance Optimization:** Achieved 5x-10x improvements through SIMD programming (SSE, AVX2, AVX512, RISC-V), GPU acceleration, and algorithmic innovation; expert in profiling and tuning multimedia workloads

- **Technical Leadership:** FFmpeg and VideoLAN technical committee member; mentorship, design reviews, cross-company collaboration with Meta, Google, Dolby, Comcast; technical decision-making for projects processing billions of videos daily

Professional Experience

Independent Consultant   *January 2024 — Present*
Self-employed · Full Time

- Specialized consulting on video processing systems, codec integration, color management pipelines, and multimedia algorithm development
- Led complete rewrite of FFmpeg's pixel format conversion system (libswscale), a critical component for video transcoding and format conversion used by every major streaming platform; achieved 4-5x average speedup through novel approach combining SIMD optimization with runtime code generation

Senior Software Engineer *2021 — Present*
FFlabs SAS · Remote

- Core developer for FFmpeg, the foundational video processing library used by 2600+ companies including Meta, Google, Netflix, Spotify; direct impact on infrastructure processing billions of videos daily across streaming, social media, and video platforms
- Authored first open-source implementations of critical video technologies: Dolby Vision (HDR metadata and tone mapping), ITU-R H.274 (film grain synthesis), SMPTE RDD5 (closed captions), and MV-HEVC (multiview video codec), enabling widespread industry adoption
- Developed and published novel perceptually-motivated tone-mapping algorithm combining real-time HDR frame analysis with psychovisual models; algorithm adopted by VLC, mpv, and other major media players
- Led architectural redesign of FFmpeg's format negotiation system to support advanced color spaces, pixel formats, and HDR metadata propagation across complex filtering pipelines
- Debugged and resolved critical video processing bugs affecting major streaming platforms, including race conditions in multi-threaded transcoding and color space conversion accuracy issues
- Technical mentorship through code reviews focusing on video processing correctness, codec compliance, and multimedia best practices; 50+ substantial reviews annually

Software Engineer *2018 — 2021*
Videolabs SAS · Remote

- Created and maintain libplacebo, the industry-leading open-source GPU video processing library integrated into VLC (5B+ downloads), mpv, and FFmpeg; powers real-time HDR video playback and color-accurate rendering for millions of users worldwide
- Designed and implemented complete GPU-accelerated video rendering pipeline using Vulkan, supporting HDR tone mapping, color space conversion, upscaling, and film grain synthesis; achieved 10x+ performance improvements enabling 4K HDR playback on mid-range hardware
- Developed advanced perceptually-motivated algorithms for HDR-to-SDR tone mapping with dynamic scene analysis, high-quality video upscaling, and ICC profile-based color management
- Led end-to-end integration of Vulkan-based GPU video output in VLC, bringing support for HDR10, Dolby Vision, and wide color gamut displays; feature used by 50M+ monthly active users
- Architected flexible, extensible video processing framework supporting modern color spaces (BT.2020, DCI-P3), HDR formats, and custom user shaders for advanced video enhancement
- Contributed GPU driver fixes to Mesa/AMD stack improving video playback stability for Linux users, including Steam Deck platform

Software Engineer *2018*
Pebbles Digital Media · Contract · Remote

- Developed GPU-accelerated Vulkan rendering backend for multimedia applications with real-time video compositing

- Integrated libmpv video player engine providing advanced playback control, format support, and hardware decoding

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 Multimedia Leadership

- **Technical Committee Member:** FFmpeg (foundational video processing library, 2600+ companies) and VideoLAN (VLC media player, 5B+ downloads), shaping the technical direction of open-source multimedia

- Review and approve major video codec integrations, color management changes, and API designs affecting billions of users; resolve technical disputes on quality vs. performance tradeoffs

- **Mentorship:** Guided 10+ first-time contributors on video processing, codec implementation, and color management topics; several became regular multimedia developers

- **Maintainership:** Active maintainer for FFmpeg video processing components, VLC rendering pipeline, and libplacebo; reviewed and merged 1000+ pull requests

Multimedia Project Leadership & Industry Adoption

- **libplacebo:** Created and maintain industry-leading GPU video processing library (3,700+ commits, 50 contributors); adopted by VLC, FFmpeg, mpv, and 100+ multimedia applications (17,700+ GitHub references, 660+ stars); powers HDR video playback for millions worldwide

- **libswscale:** Led complete rewrite of FFmpeg's pixel format conversion system, achieving 4-5x speedup for video transcoding workloads; coordinated testing across 200+ pixel formats and multiple architectures; directly impacts every major streaming platform

- **Video Standards Implementation:** First open-source implementations of Dolby Vision, ITU-R H.274, and MV-HEVC, enabling industry-wide adoption without proprietary dependencies

Technical Influence in Multimedia Community

- **Conference Speaking:** Presented 4+ technical talks at VideoLAN Dev Days on video processing algorithms, GPU optimization, and codec implementation; talks widely referenced in multimedia community

- **Algorithm Publications:** Novel tone-mapping algorithm published and adopted by major media players; technical documentation on color management and HDR workflows cited by industry practitioners

- **Design Documents:** Authored technical proposals for FFmpeg video processing architecture, HDR metadata handling, and color space negotiation

Technical Skills

Video & Multimedia: Video codecs (H.264, HEVC, AV1, VP9), FFmpeg, multimedia processing pipelines, video transcoding, format conversion, codec integration, frame analysis

Color Science: HDR workflows (Dolby Vision, HDR10+, HDR Vivid), tone mapping algorithms, color space transformations (BT.709, BT.2020, DCI-P3), ICC profiles, perceptual color models

GPU Video Processing: Vulkan (expert), OpenGL, compute shaders for video processing, GPU pipeline optimization, real-time rendering, hardware video decode/encode

Signal Processing: Image and video filtering, upscaling algorithms, psychovisual modeling, film grain synthesis, denoising, sharpening

Performance Engineering: SIMD optimization (SSE, AVX2, AVX512, RISC-V RVV), assembly language, profiling and benchmarking, cache optimization

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

Systems: Linux, threading/concurrency for multimedia, memory management, GPU drivers (Mesa/Vulkan)

Tools & Infrastructure: Git, GDB, GCC/LLVM, Meson, FFmpeg tooling, multimedia debugging and analysis tools

Leadership: Technical writing (video processing algorithms, color management), conference speaking, cross-company collaboration, open-source community coordination

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
  Project: Developed a Haskell library using type system metaprogramming to automatically track and verify physical units throughout computations, preventing dimensional analysis errors at compile time

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)