Arman Nik Khah

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Summary. Systems-minded engineer focused on **real-time audio/video** and **low-latency streaming**. Experience with **WebRTC**, **FFmpeg/GStreamer**, **HLS/DASH/ABR**, and **QoE** measurement; strong in **C/C++ & Python**, Linux, networking, and concurrency. Built **spatial-audio** and **viewport** prediction pipelines; exploring **MoQ** vs WebRTC trade-offs. Seeking **Summer '26 SWE (Realtime/Systems)** roles (remote/hybrid OK).

Skills

Languages: C/C++, Python **Systems:** Linux, networking, concurrency, Docker, Git; profiling/observability (p95/p99)
Realtime/Streaming: WebRTC, RTP/RTCP, HLS/DASH, MPEG-OMAF, ABR, QoE (VMAF/SSIM/PSNR)
Media Tooling: FFmpeg, GStreamer; codecs: H.264/AVC, H.265/HEVC, AV1; **CUDA/NVENC (foundational)**
ML (applied): PyTorch, TensorFlow; VAEs/CVAEs, LSTM/Seq2Seq; calibration (ECE/NLL), CVaR

Selected Projects

MARC: Risk-Aware ABR for 360° Streaming (Video + Spatial Audio) — *UKF entropy → CVaR; realtime control*

- Implemented uncertainty-aware ABR controller fusing **video + FOA spatial audio**; optimized for **tail QoE** under volatile networks.
- Vectorized candidate search; integrated entropy-gated saliency and optional per-tile risk micro-actuation for throughput/quality balance.
- *Engineering metrics (to confirm):* $\sim$**A%** 1st-pct QoE improvement; $\sim$**B%** bandwidth efficiency; decision latency $\leq$**C ms**.

Spatiotemporal Attentive Entropy (SAE) for Viewport Prediction — *SO(3)-invariant loss; low-latency LSTM*

- Built **low-latency** viewport forecaster with spherical cross-entropy on S^2; emphasized **deterministic** inference and **CPU/GPU** portability.
- Shaped accuracy–latency trade-offs; validated calibration and robustness to rate shifts and synthetic dropouts.
- *Engineering metrics (to confirm):* $\sim$**X%** MAE reduction at $\leq$**Y ms** end-to-end latency; containerized reproducibility (Docker, LUTs).

Spatial-Audio Surprise Detection (Published) — *CVAE–LSTM; real-time feature extraction*

- Implemented online feature extraction (16 kHz, STFT, mel-spec) and **AEM** localization; integrated latency-aware batching and IO.
- Achieved scenario **F1=100%**; planned artifacts for easy repro + benchmarking.

Experience

Teaching Assistant — Computer Networks University of Texas at Dallas *Fall 2025*

- Delivered **multiple lectures**; led labs on RTP/RTCP/WebRTC; coached **latency/jitter** measurement & **QoE** for $\sim$**50** students.

Teaching Assistant — Advanced Operating Systems University of Texas at Dallas *Fall 2024*

- Guided projects on distributed systems, synchronization, and kernel subsystems; instrumentation, profiling, and debugging.

Teaching Assistant — Programming Language Paradigms University of Texas at Dallas *Spring 2024; Fall 2023*

- Supported functional/OO paradigms, type systems, runtime models; office hours and assessments.

Supervisor — Undergraduate Research Project Course University of Texas at Dallas *Ongoing*

– Supervise undergraduate research; mentor design/implementation, performance measurement, and technical writing.

Education

M.S. in Intelligent Systems, University of Texas at Dallas *May 2025*
PhD in Intelligent Systems (in progress) — Computer Science *Expected Aug 2028*
GPA: 3.8/4.0 Advisor: Dr. Ravi Prakash

Publications

– **IMX Workshops '24:** Unsupervised Bayesian Surprise Detection in Spatial Audio (CVAE–LSTM). DOI: 10.1145/3672406.3672422
– **Submitted (2025):** Spatiotemporal Attentive Entropy (SAE); Self-Aware Streaming for 360° ABR (MARC).
– **Submitted (2025):** *Spatiotemporal Attentive Entropy: A Geometry-Correct Cross-Entropy on S^2 for Calibrated, Low-Latency Viewport Prediction.*

Selected Open Source

– Spatial-audio surprise detection — planned artifact release; GitHub.
– SAE reference implementation — release aligned with review cycle.
– MARC (risk-aware ABR) controller — CVaR policy; audio-visual fusion.

Selected Coursework

Advanced Machine Learning, Deep Learning, Computer Vision, Natural Language Processing, Probabilistic Modeling, **Computer Networks**