

# Yifeng (Frank) Huang

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Hello. I'm a developer who is excited about systems engineering, cameras, and video. My goal is to create holistically designed software that provides real value to users. Great products are delivered by great teams, and I hope to help every team I join become just a bit greater. Thanks for reading!

## EXPERIENCE

### Consultant. Computer Vision & Camera Projects. *2020-present*

- **Software platform for real-time computer vision systems.** Consulted on architecture & implementation for platform integrating cameras and sensors for soft real-time CV applications. Hardware-synced capture, minimally-buffered (1 frame time) frame alignment, fully multi-threaded asynchronous C++ code. CMake, thermal cameras, INS systems.
- **Super-resolution high performance image alignment.** Implemented FFT phase-correlation-based image alignment with high performance (> 1000 FPS) and sub-pixel accuracy (0.1 pixels mean) targeting a super-resolution use case. C++, CUDA.
- **Performance optimization on real-time SLAM pipeline.** Fused sensor data from camera, INS, and GPS sensors. OpenCV, C++, CUDA, OpenGL visualization.

### rideOS. Founding Engineer & Tech Lead. *2017-2020*

- **Founding engineer on Java microservices tech stack for autonomous vehicle routing.** A\* routing engine with no-downtime map data updates, supporting overlay layers for traffic and user-generated constraints. Scalable, low-latency map data ingestion from OSM. Vehicle simulation (pure pursuit). Visualizations in Mapbox GL. On-vehicle (ROS) and backend integration with autonomous vehicle partners.
- **Tech lead for Ridehail API team.** Driven by customer demand, led development of ridehail backend and API from scratch, from internal prototype to production service with high availability. Mentored team of 4 engineers to ship significant new features, including API versioning, mixed scheduled and on-demand trips, package delivery, and internal data analytics platform. Technologies: gRPC, GCP, Cloud Spanner, and BigQuery.
- **Cloud and developer infrastructure.** Monorepo build system using Bazel (Java and Protobuf), Kubernetes cluster on GKE, load balancing for gRPC services, Helm, Stackdriver Monitoring & Logging, Terraform.

## Google (Nest). Senior Software Engineer. 2013-2017

- **Tech lead on team that shipped three IoT connected cameras: Nest Cam IQ, Nest Cam, Dropcam Pro.** Led and mentored team of 3 engineers for Nest Cam IQ video stack. Enabled tent pole feature – 24/7 live streaming of 4k video over home Wi-Fi – with extensive video pipeline tuning and long-term bitrate management features. Implemented substantial portion of multi-threaded, async C/C++ firmware code that runs on camera. Technologies: H.264, RTP, Opus, Android/Brillo platform, OpenMAX, multi-threaded C++ with event-driven async I/O.
- **Cloud real-time video & audio transcoding service.** On-demand, low-latency ( $\# \text{ b-frames} + 1$ ) h.264 transcoding to lower bit-rates for adaptive live streaming. Service written in Go; low-level code written in C++ with Cgo bindings. Early adopter of Docker-based build pipeline to streamline development and deployment. Opus to Speex/AAC audio transcoding for wide app compatibility. Demonstrated GPU-powered transcoding using AWS GPU instances. Go, ffmpeg (libavcodec), libx264, Docker.
- **Video pipeline engineering.** Encoder evaluation, integration, and tuning for new 4k video product. Substantially reduced bitrates in static scenes enabled 24/7 live streaming of 4k video. Reduced end-to-end playback latency from >30s to under 2s with improvements on device, cloud, and in mobile apps. Prototyped solutions using advanced encoder features (ROI, HEVC, LTR, SVC-T).
- **Backend services in Scala supporting camera streaming.** Implemented connectivity notification, SPS parsing, JNI Opus and Speex integration, transcoding profile selection, still image capture pipeline, and admin UI in Scala + Akka, Python, and Javascript.

**Prior experience.** Dropcam (acquired by Google/Nest). Stanford SCS research group (distributed filesystem research published in SOSP'13). CS106A section leader at Stanford.

## PERSONAL PROJECTS

**Archive Box.** Personal file organizer with CRDT-based distributed synchronization. Automatic summarization, adaptive video transcoding and streaming. Modern Python 3 with build-time and runtime type checking. [github.com/fyhuang/archive\\_box](https://github.com/fyhuang/archive_box)

## SKILLS

**Cloud Backend:** Google Cloud Platform (GCP), Kubernetes (k8s), Helm, Terraform, Docker, BigQuery, Spanner, PubSub, gRPC, microservices

**Imaging/Computer Vision:** GPU programming (CUDA), OpenCV

**Video/Audio Engineering:** h.264, HEVC (h.265), RTP, Speex, Opus, FFmpeg, x264

**Software Technologies:** C, C++, CUDA, Python, Go, Java, Bazel, CMake, Protobuf