

# PRASANNA KULAL

Full Stack Software Engineer (React / Node.js) — Backend & Distributed Systems

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## SUMMARY

Full stack engineer building React frontends and Node.js/Express backends for production AI systems, with hands-on experience across distributed processing pipelines, AWS, Docker, RabbitMQ, Redis, REST/WebSocket APIs, and observability (Prometheus, Grafana, Loki). Track record of owning features end to end — from React dashboards down to the messaging and reliability layer underneath them.

## EXPERIENCE

### Associate Software Engineer — Zynthora AI

Sep 2025 – Present

- Manage cloud infrastructure for production AI systems: credentials via AWS Secrets Manager, health monitoring via CloudWatch, and EC2 lifecycle for deployment and incident recovery.

#### On-premise AI-powered healthcare claims platform

- Designed a 3-stage backend pipeline (validation/normalization → LLM-based denial root-cause analysis → atomic commit/notification) with idempotency guards and a dead-letter queue, keeping the AI processing stage reliable under failure.
- Root-caused message loss in RabbitMQ by redesigning exchanges, queues, retry-with-backoff, persistent delivery, and manual acknowledgements — eliminated context loss even on mid-inference worker crashes.
- Built a Redis caching layer and a MinIO storage layer with role-based, pre-signed URLs and streaming uploads to move documents through the pipeline securely at scale.
- Built the claim-status dashboard in React, surfacing real-time claim states, AI-generated denial root causes, and audit history for internal reviewers.

#### PRISM — Multi-Tenant Sentiment Intelligence Platform

- Owned the React dashboard (TypeScript, Zustand, TanStack Query, Tailwind, Recharts) and the Express/Prisma backend (pg-boss job queues, PostgreSQL) for a platform monitoring YouTube, X, Reddit, and web sources through a 5-stage AI pipeline.
- Built JWT-authenticated REST APIs and pg-boss-driven crawler/batch-AI orchestration, consumed via a centralized Axios client with auth interceptors and response normalizers, powering role-based dashboard views for sentiment trends, crisis detection, and competitive benchmarking.

#### WebRTC video conferencing platform with real-time AI translation

- Built REST and WebSocket integration layers across auth, room management, and admin operations with role-based authorization and standardized error handling.
- Designed a 3-layer rate-limiting and failure-recovery system (Redis sliding-window IP limits, WebSocket-specific limits, IP allow/deny lists) with automatic in-memory fallback; added JWT auth at the Socket.io handshake to close unauthenticated transport access.
- Deployed an observability stack across 4 subsystems (HTTP, WebSocket, mediasoup, Redis) — Prometheus metrics, 4 Grafana dashboards, Pino structured logging with request-ID correlation, and Loki/Promtail aggregation — cutting production root-cause diagnosis time.

## PROJECTS

### CodexMemory — Distributed Document Processing & Monitoring System

Node.js · BullMQ · Redis · LanceDB · Ollama Embeddings · Prometheus · Grafana · Pino · MCP SDK

- Built a queue-based ingestion pipeline (retry/backoff, DLQ, live file-watching) exposing a local RAG index to AI coding assistants via the Model Context Protocol (MCP), with Prometheus/Grafana tracking queue depth, retrieval latency, and DLQ counts.

### MeetLingo — Real-Time Translation Chrome Extension

Chrome Extension (Manifest V3) · JavaScript · Shadow DOM · MutationObserver · DeepL & Google Cloud Translation APIs

- Built a Manifest V3 extension that translates live captions in real time on Google Meet and Microsoft Teams, using MutationObserver-based caption detection and a Shadow DOM-isolated overlay.
- Cut translation API quota usage 30–40% via a 500-entry LRU cache, exponential backoff, and a sliding-window rate limiter; diagnosed and fixed 10+ production issues (service-worker lifecycle bugs, DOM selector mismatches, API auth errors).

## TECHNICAL SKILLS

**Languages:** JavaScript, TypeScript, Python, Java (Core, OOP), SQL

**Frontend:** React, TypeScript, Zustand, TanStack Query, TailwindCSS, Vite, CSS

**Backend & APIs:** Node.js, Express, REST APIs, WebSockets

**Distributed Systems:** RabbitMQ, Redis, BullMQ, pg-boss, retry/backoff, idempotency, dead-letter queues

**Cloud & Infra:** AWS (EC2, Secrets Manager, CloudWatch), Docker, Docker Compose, Nginx, Railway, Vercel

**Observability:** Prometheus, Grafana, Loki, Promtail, Pino

**Databases & Storage:** PostgreSQL, Prisma, Redis, pgvector, MongoDB, LanceDB, MinIO/S3

**AI/ML:** RAG pipelines, vLLM, OpenAI embeddings, Anthropic Claude, prompt engineering

**Security:** JWT, Helmet, Joi, role-based authorization

## EDUCATION

**B.E., Computer Science (AI/ML) — Sahyadri College of Engineering and Management**

2021 – 2025

CGPA: 8.1 | Certification: Core Java & Object-Oriented Programming, QSpiders Software Training Institute