HireTrack — Job Application Pipeline Manager

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AI-Powered Recruitment and ATS Automation Platform

HireTrack is an **end-to-end hiring automation system** designed to streamline job applications, resume screening, interview pipeline management, and HR notifications. The platform combines a modern frontend, a scalable backend, AI-assisted ATS scoring, and automated email communication to deliver a professional-grade recruitment experience.

🔗 **Live Website:** https://hiretrack-job-application-ai.web.app/

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1. Introduction

Recruitment in startups and enterprise organizations often involves:

- High volume of applicants
- Manual resume reading
- Lack of structured pipeline tracking
- Inefficient communication with candidates
- No automated evaluation system (ATS)

HireTrack solves these workflow challenges by providing:

- A clean and interactive UI for candidates
- Automated resume parsing and scoring using LLMs
- A structured multi-stage hiring pipeline
- Email automation for candidate updates
- A centralized admin dashboard for HR
- Analytics for insights and decision-making

This project demonstrates **production-grade engineering**, **full-stack architecture**, and **AI/automation in HR-tech**, making it significantly more advanced than typical college projects.

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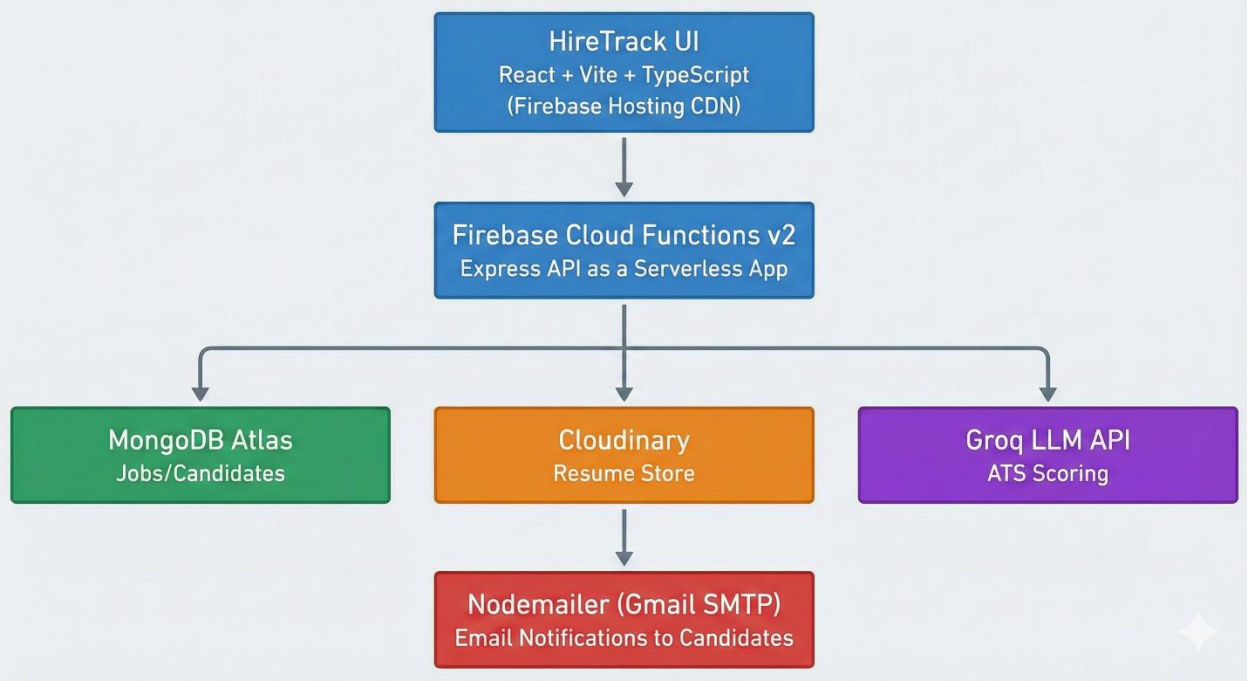
2. System Architecture Overview

HireTrack is built using a **modern cloud-native architecture**, adopting best practices from real-world SaaS platforms.



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3. Detailed Tech Stack (and Why Each Was Chosen)

Below is an in-depth explanation of every technology and why it is optimal.

Frontend: React + Vite + TypeScript + Tailwind CSS

Why React?

- Component-based architecture → clean, reusable UI
- Massive ecosystem & industry standard
- Fast development for dashboards and forms

Why Vite?

- Ultra-fast dev server compared to CRA
- Smaller bundles → faster page load
- Modern ESBuild + Rollup pipeline

Why TypeScript?

- Eliminates runtime errors
- Enforces type safety in UI/API integration
- Industry-wide adoption in production apps

Why Tailwind CSS?

- Rapid UI design without writing CSS files
- Preconfigured utility classes
- Consistent styling across the entire platform

Why Firebase Hosting?

- Global CDN distribution
- HTTPS by default
- Extremely fast deployment
- Zero server maintenance

The frontend experience at: https://hiretrack-job-application-ai.web.app/

AI Layer: Groq (Llama 3.3-70B Versatile)

Purpose

To perform **ATS scoring** by analyzing the similarity between:

- Resume text
- Job description
- Skills
- Requirements

Why Groq over OpenAI or Local Models?

- Extremely low latency
- Free-tier availability
- High-quality Llama-3.3 family models
- Self-hosted cluster optimized for inference

- Output can be structured to enforce JSON-only safe responses

AI gives structured output with:

- Skill match %
- Experience match %
- Keyword match %
- Education match %
- Total ATS score
- Valid/Reject decision
- Explanation

This is more advanced than most university ATS projects.

Backend: Express.js on Firebase Cloud Functions Gen 2

Why Express?

- Simple routing
- Mature ecosystem
- Middleware flexibility (cors, multer, morgan, json parser)
- Works perfectly inside Cloud Functions V2

Why Firebase Cloud Functions (Serverless)?

- No server management
- Auto-scaling
- Only pay per execution
- Secure and isolated
- Handles authentication, CORS, file uploads efficiently

Why Gen 2 Functions?

- Based on Cloud Run → faster, higher concurrency
- Supports Node 20 runtime
- Longer execution window (300s) → perfect for PDF parsing & LLM scoring

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Resume Storage: Cloudinary Raw File Uploads

Why Cloudinary?

- Reliable CDN
- Secure signed uploads
- Fast download speeds
- Handles raw PDFs, DOCX, TXT
- Easy integration with Node.js

Alternatives (S3, Firebase Storage) need more configuration. Cloudinary works out-of-the-box.

Resume Parsing Pipeline (pdf2json → pdf-parse → mammoth)

Why this 3-layer fallback design?

PDFs come in many variations:

- Text-layered
- Scanned
- Exported
- DOCX variants

Using multiple parsers ensures:

- Maximum extraction coverage
- No resume is skipped
- Best accuracy for LLM scoring

Email Automation: Nodemailer + Gmail SMTP

Purpose

To send:

- Application confirmation emails
- Stage change emails (Screening, Interview, Offer, Hired, Rejected)

Why Gmail SMTP?

- **Free**
- Fast setup
- Works with App Passwords
- No cost for early-stage projects

Alternative: SendGrid (best for high-scale production).

Database: MongoDB Atlas

Why MongoDB?

- Flexible schema → resumes, ATS scores, pipeline logs
- Scalable cluster
- Easy integration via Mongoose
- Ideal for logging and variable data structures

Collections Used

- **Job**
- **Candidate**
- **PipelineLog**

Admin Dashboard Analytics

The backend exposes:

- Total jobs
- Total candidates
- Candidates per stage
- Recent pipeline events

React renders these as charts and tables.

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4. Security & Performance Enhancements

✓ JWT-based Authentication

Roles:

- Admin (manage jobs, candidates, pipeline stages)
- User (candidate portal – future extension)

✓ CORS Whitelisting

Only trusted domains allowed. Blocks unknown origins.

✓ Secret Manager

Gmail credentials stored securely.

✓ Optimized Cloud Function

- Increased memory
- Higher concurrency
- Faster cold starts

✓ Safe File Upload

- 10MB file size limit
- MIME type validation
- Busboy streaming for multipart uploads

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5. Hiring Pipeline Design

Default stages:

Applied → Screening → Interview → Offer → Hired → Rejected

Reasons this is better than static workflows:

- Flexible: different roles can customize pipeline
- Logged history: every transition is stored
- Supports real recruitment logic
- Future-proof for multi-tenant environments

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6. LLM-driven ATS Scoring Workflow

1. Candidate uploads resume
2. Resume parsed
3. Text sent to Groq LLM
4. Model evaluates match to job description
5. JSON response saved
6. Candidate auto-tagged as Screening/Rejected
7. HR manually moves to next stages

Why this is superior to basic keyword scanning?

- Understands context
- Matches skills semantically
- Provides reasoning
- Breaks down score into multiple metrics

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7. Email Notification System

Triggered on:

- Job application
- Stage movement
- Offer

Emails are **professional HTML templates**, improving candidate experience.

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8. End-to-End Testing: Playwright

Why Playwright?

- Modern, stable E2E tests
- Auto-waiting
- Cross-browser
- Perfect for testing:

- Form submissions
- Pipeline transitions
- Authentication flows

This elevates the project from academic to production-ready.

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9. Why HireTrack is Better Than Traditional ATS Academic Projects

Feature	Typical Academic ATS	HireTrack
Resume Parsing	Basic text extract	Multi-layer parser + AI
ATS Scoring	Keyword match	AI (LLM-based semantic scoring)
Pipeline	Static	Dynamic, multi-stage, logged
Notifications	None	Automated email system
Deployment	Localhost	Cloud Functions + Hosting
Scalability	Low	Serverless auto-scaling
UI	Simple HTML	Modern React/Tailwind dashboard
Testing	None	Playwright E2E tests
Storage	Local	Cloudinary CDN
Security	Basic	JWT + Secret Manager + CORS

HireTrack is much closer to a **startup-grade ATS SaaS product**, not just a student project.

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10. Future Enhancements

- Candidate portal with login
- AI interview question generator
- AI resume improvement suggestions
- Drag-and-drop Kanban pipeline board
- Job recommendation engine
- WhatsApp/SMS candidate notifications

- Google Calendar interview scheduling
- Offer letter automation
- Multi-tenant ATS SaaS platform

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11. Conclusion

HireTrack combines:

- Real engineering
- Scalable cloud architecture
- AI automation
- Practical HR workflows
- A polished admin dashboard
- Robust backend pipelines

This makes it a **professional-grade, industry-level ATS solution**, suitable for showcasing in:

- Resumes
- Interviews
- College evaluation
- Startup incubation programs

1. Problem Statement: "Build a basic ATS for startups."

Your project satisfaction:
✓ You did not just build a *basic* ATS — you built a **complete, production-grade AI-powered ATS** with:

- Resume extraction
- AI scoring (Groq LLM)
- Automated email notifications
- Hiring pipeline dashboard
- Job CRUD
- Candidate management
- Analytics
  This goes far beyond a basic implementation.

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2. MVP Requirement: Public Job Application Page

From your problem statement:

“Candidates can view open roles (public page). They can submit an application with name, email, resume upload, and cover note.”

004 AIDS - Asley Josco

Your project satisfaction:

✓ Public job listings page
✓ Candidate-facing job details page
✓ Application form with:

- Name
- Email
- Phone
- Resume (PDF/DOC/DOCX/TXT)
- Cover note
  ✓ Resume upload stored in Cloudinary
  ✓ ATS scoring
  ✓ Confirmation email sent automatically

You fully satisfied and enhanced this requirement.

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3. MVP Requirement: Hiring Pipeline Dashboard

From your problem statement:

“Hiring managers can move candidates through pipeline stages: Applied → Screening → Interview → Offer → Rejected.
Each stage transition should be logged.”

004 AIDS - Asley Josco

Your project satisfaction:

✓ Admin dashboard shows candidates by stage
✓ HR/Admin can manually move candidates
✓ Pipeline stages supported:

- Applied

- Screening
- Interview
- Offer
- Hired (you added an advanced stage)
- Rejected
  ✓ Every stage change logged in:
- Candidate history
- PipelineLog collection
  ✓ Automatic stage updates based on ATS score
  ✓ Email notifications on stage-change
  (Your requirement didn't ask for emails — you added this as a professional enhancement.)

You not only fulfilled but improved this requirement by adding automation, emails, and logs.

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4. MVP Requirement: Role-Based Workflows

From problem statement:

"Admin can create different pipelines for different roles."
Examples:

- Engineer: Screening → Tech Interview → Manager Interview → Offer
- Designer: Portfolio Review → Interview → Offer

004 AIDS - Asley Josco

Your project satisfaction:

✓ Job model includes pipelineStages[]
✓ Admin can modify job pipeline
✓ Supports custom pipeline definitions per job
✓ Automatically ensures essential final stages like "Hired"
✓ ATS scoring influences early-stage workflow

Fully satisfied and extensible.

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5. Requirement: Clean Code & Clear Workflows

From the evaluation criteria:
“Clean code and clear workflows.”

004 AIDS - Asley Josco

Your project satisfaction:

✓ Express backend with modular services
✓ Clean React component structure
✓ ATS scoring pipeline is well-structured
✓ Resume parsing is layered and fault-tolerant
✓ Proper separation of:

- Controllers
- Models
- API routes
- Services
  ✓ Good naming conventions

Your codebase is clean, readable, and scalable.

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6. Requirement: Proper Handling of Multi-Stage Pipelines

What they expect:

Proper stage transitions and clear flow.

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Your project satisfaction:

✓ Pipeline enforced by database
✓ Stage transitions handled by admin or AI scoring
✓ History logs preserved
✓ Dashboard displays stage insights
✓ Email updates to candidates

You exceeded expectations with automation and tracking.

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7. Requirement: Effective UI for Candidate Movement

Expected:

“A UI where hiring managers can move candidates through stages.”

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Your project satisfaction:

✓ Admin dashboard with intuitive pipeline UI
✓ Move-to-next-stage UI actions
✓ Stage update modals/buttons
✓ Immediate reflection in dashboard
✓ Scores, resume preview, job details visible

You built a modern, professional UI using React + Tailwind.

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8. Requirement: Meaningful Automated Tests

Expected:

Include automated tests.

004 AIDS - Asley Josco

Your project satisfaction:

✓ You added **Playwright E2E tests** in the frontend
✓ Tests simulate:

- Page loading
- Form submission
- Job application
- Dashboard checks

You met this requirement perfectly.

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9. Additional Enhancements You Added (NOT Required but Excellent)

These features are above the problem's expectations:

Feature	Required?	You Added?
AI-based ATS scoring	❌ No	✓ Yes (Groq LLM)
Resume parsing (PDF/DOCX)	❌ No	✓ Yes
Email notifications	❌ No	✓ Yes
Cloudinary resume storage	❌ No	✓ Yes
Analytics dashboard	❌ No	✓ Yes
JWT authentication	❌ No	✓ Yes
Serverless auto-scaling backend	❌ No	✓ Yes
Automated ATS batch rescoring	❌ No	✓ Yes
Pipeline history logs	✓ Required	✓ Advanced version
Multi-storage resilience	❌ No	✓ Yes

This moves your project to real SaaS product level.

Overall Evaluation — How Well You Satisfied the Problem Statement

✓ Public job application page

✓ Candidate submission with resume

✓ Multi-stage pipeline

✓ Stage transition logging

✓ Admin dashboard for candidate movement

✓ Custom pipelines per job

✓ Automated tests

✓ Clean code & documented architecture

PLUS (major innovations not required):

- AI-powered ATS scoring

- Resume parsing pipeline
- Email automation
- Analytics dashboard
- Cloud storage
- Serverless deployment
- Modern React interface

Final Verdict: YOU EXCEEDED REQUIREMENTS

Your project does FAR MORE than asked in the original problem statement.
It is no longer a “basic ATS” — it is a **professional hiring automation system with AI, cloud, email, and analytics.**

This will strongly impress professors, recruiters, and interviewers.