

RAG Based Freelancer Assistant System

Under The Supervision of: Dr Safa Elaskary

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1. Abstract

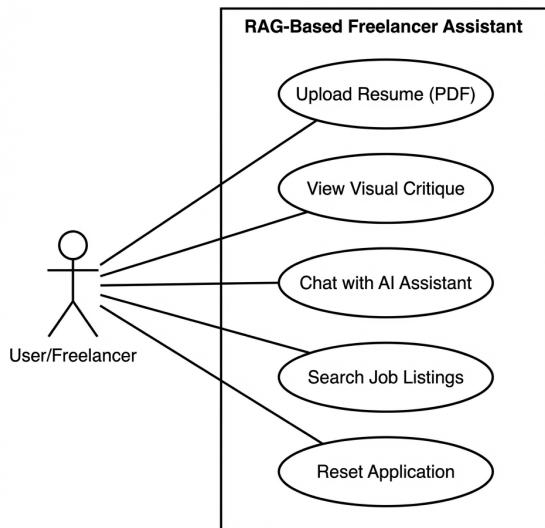
The **Smart Freelance Platform** is an AI-powered career tool designed to provide multi-modal resume feedback. By utilizing **Google Gemini 1.5 Flash**, the system offers a visual "red pen" critique and an interactive career agent. It transforms static PDF resumes into actionable data through vision analysis and agentic workflows.

2. Problem Statement

1. **Static Layout Feedback:** Most AI tools only analyze text, failing to identify layout issues like poor whitespace usage or lack of visual hierarchy.
2. **API Stability:** Processing diverse PDF encodings often leads to "surrogate character" errors that crash LLM APIs.
3. **Service Reliability:** High-demand vision models often trigger rate-limiting ("Quota Exceeded") errors.

3. Introduction

The platform is built as a single-page Streamlit application that integrates vision and text processing. It serves as a bridge between high-level recruitment expertise and automated software, allowing users to interact with their professional documents in real-time.



4. Challenges

- **JSON Parsing:** Ensuring the LLM returns valid JSON without Markdown formatting (e.g., Json blocks) required strict prompt constraints and string cleaning.
- **Safety Filters:** Resume content can occasionally trigger safety filters; the engine handles these as specific "Safety Block" errors rather than generic crashes.
- **Dependency Management:** Ensuring complex system dependencies like poppler (for pdf2image) are available in the deployment environment.

5. Methodology

A. The Pipeline

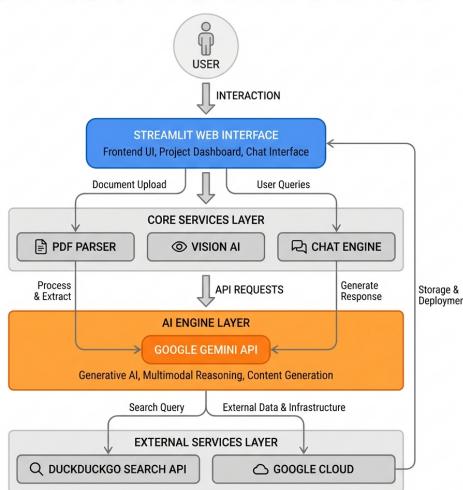
1. **File Ingestion:** PDF upload via Streamlit sidebar.
2. **Visual Conversion:** Conversion of PDF to a 200 DPI JPEG using pdf2image.

3. Text Sanitization: Extraction and cleaning of text to ensure UTF-8 compatibility.

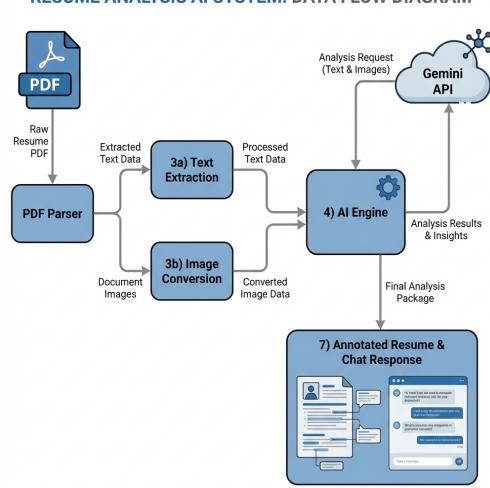
4. Vision Analysis: Gemini 1.5 Flash identifies flaws and returns spatial JSON data.

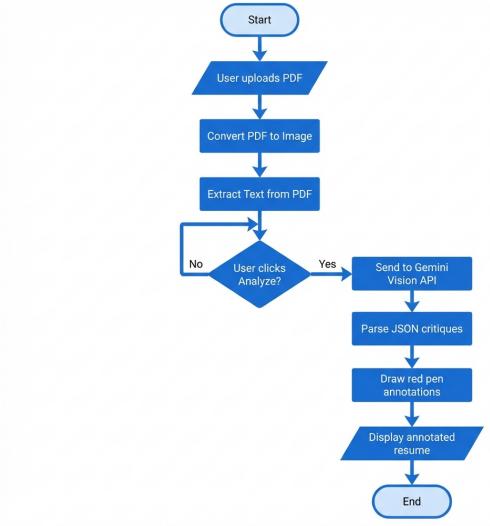
5. Interactive Chat: A stateful chat session initialized with the resume text as the system prompt.

AI-POWERED FREELANCER ASSISTANT PLATFORM ARCHITECTURE



RESUME ANALYSIS AI SYSTEM: DATA FLOW DIAGRAM





B. Tools and Technologies

- **LLM:** Gemini 1.5 Flash (Vision and Chat).
- **Frameworks:** Streamlit, LangChain (early version), and Native Google Generative AI SDK.
- **Libraries:** Pillow for image drawing, DuckDuckGo Search for live job data.

Upload Resume

Upload PDF

Drag and drop file here
Limit 200MB per file • PDF

Browse files

Reset App

Smart Freelance Platform

Connected: models/gemini-2.5-flash

Upload a PDF to start.

Upload Resume

Upload PDF

Drag and drop file here
Limit 200MB per file • PDF

Browse files

Test.pdf 121.3KB

Loaded!

Reset App

Smart Freelance Platform

Visual Critique

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EDUCATION
Ain Elzheria, Galala University Oct 2022 – June 2026 Bachelor's Degree of Computer Science, Specializing in Artificial Intelligence Sciences, Faculty of Computer Science and Engineering | CGPA:Excellent

ACHIEVEMENTS AND AWARDS

- Top 10 Finalist in the Egypt Pioneers Initiative - Selected to be honored by top 10 projects out of 15,000+ students award ceremony attended by senior officials from the Ministry of Communications.
- Ideal Student Award, Artificial Intelligence Science Program, 2025-Winner at the program level, one of five finalists across the university.
- Qualified for the Pre-Final Round, International Astronomy and Astrophysics Competition (IAC) 2025 - Selected among top participants worldwide after successfully passing the Qualification Round, solving 4 out of 5 physics and mathematics problems.
- CAISAI2025 AI International Conference, Galala University (Dec 8, 2025) - Presented my research paper "A Flash of Insight: Real-Time Meteor Shower Classification with Machine Learning", [\[link\]](#)

PUBLICATIONS

1. Y. Maaoed, "A Flash of Insight: Real-Time Meteor Shower Classification with Machine Learning," IEEE CAISAI2025— presented at CAISAI2025.
2. Y. Maaoed, "Automated Detection and Classification of Solar Radio Bursts Using e-CALLISTO Spectrum Data and YOLO v7 Model," IEEE ITC 2025 Link [\[link\]](#)—Published September 2025.
3. Y. Maaoed, "Explainable AI-Based Enhanced Classification of Gravitational Wave Anomalies Using Vision Transformers," IEEE ITC 2025 Link [\[link\]](#)—Published September 2025.
4. Y. Maaoed, "Transformer-Based Anomaly Detection in Satellite IoT: A Hybrid Approach with Rotary Embedding and Attention Mechanism," IEEE ITC 2025 Link [\[link\]](#)—Published July 2025.
5. Y. Maaoed, "Transformer-Based Anomaly Detection in Satellite IoT: A Hybrid Approach with Rotary Embedding and Attention Mechanism," IEEE ITC 2025 Link [\[link\]](#)—Published July 2025.
6. Y. Maaoed, "Advancing Real-Time Military Aircraft Detection: A Comprehensive Comparative Benchmark of Object Detection Frameworks," IEEE ITC 2025, Link [\[link\]](#)—Published July 2025.
7. Y. Maaoed, "Leveraging Large Language Models for Security Systems: Enhancing Drug Safety and Operational Efficiency," IEEE ITC 2025, Link [\[link\]](#)—Published July 2025.

AI Red Pen Analysis

Analyze Resume

Ex: 'What skills am I missing?' >

Upload Resume

Upload PDF

Drag and drop file here
Limit 200MB per file • PDF

Browse files

Test.pdf 121.3KB

Reset App

Ain Elsokha, Galala University Oct 2022 - June 2026 Bachelor's Degree of Computer Science, Specializing in Artificial Intelligence Science, Faculty of Computer Sciences and Engineering | CGPA:Excellent

ACHIEVEMENTS AND AWARDS

- Top Graduation Project: Digital Egypt Pioneers Initiative - Selected to be between the top 10 projects out of 15,000+ submitted by students and service officials from the Ministry of Communications.
- Ideal Student Award, Artificial Intelligence Science Program, 2025-Winner at the program level: one of five finalists across the university, nominated by the program director for outstanding academic performance and significant contributions.
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- Y. Maad, A Flash of Insight: Real-Time Meteor Shower Classification with Machine Learning. IEEE CAISAI2025—published in IEEE CAISAI2025.
- Y. Maad, Automated Detection and Classification of Solar Radio Bursts Using e-CALLISTO Spectrum Data and YOLO v1 deep learning model. IAF IAC2025 Link: [\[Link\]](#)—Published September 2025.
- Y. Maad, Expansible AI-Based Enhanced Classification of Gravitational Wave Anomalies Using Vision Transformers. IEEE SRCC2025 Link: [\[Link\]](#)—Published September 2025.
- Y. Maad, Gain Transformer for Bone Metastasis Classification: A Comparative Study with Transfer Learning Models. IEEE ITC 2025 Link: [\[Link\]](#)—Published July 2025.
- Y. Maad, Transformer-Based Anomaly Detection in Satellite IoT: A Hybrid Approach with Rotary Embedding and Kernelized Attention. IEEE ITC 2025 Link: [\[Link\]](#)—Published July 2025.
- Y. Maad, A Flash of Insight: Real-Time Meteor Shower Classification with Machine Learning. IEEE ICOM 2025 Link: [\[Link\]](#)—Published Feb 2025.

RESEARCH AND TECHNICAL EXPERIENCE

AI Security Academy, Full-time Deepfake Researcher August 2025 - Present

- Develop Python scripts to automate and accelerate deepfake research workflows.
- Produce educational videos to raise public awareness about the dangers of deepfakes in scams.
- Write investigative articles on real-world deepfake scams and cyber incidents.
- Implement and maintain Deepfake Labs within the AI Security Academy platform.
- Test and evaluate new labs and courses to ensure quality and impact before release.

AI Security Academy, Deepfake Security Research Intern June 2025 - August 2025

- Designed realistic deepfake attack scenarios for training and research.
- Developed detection challenges and awareness materials for healthcare, finance, and corporate sectors.
- Investigated real-world incidents and their technical attack methods.

Galala University, Part Time Software developer May 2025 - September 2025

- Automated the university's clinical operations by developing automation clinical system, improving efficiency and reducing manual data entry by approximately 90%.
- Developed Python scripts to automate and accelerate deepfake research workflows.
- Created data pipelines for web-scraping, pre-processing, and noise reduction.
- Trained YOLOv5 and YOLOv7 models with cross-validation.
- Deployed YOLOv5/YOLOv7 for real-time classification and automated sorting.

Ex: 'What skills am I missing?'

Career Assistant

 Hello! Ask me about your resume, salary estimates, or missing skills.

 suggest the roles that match my CV

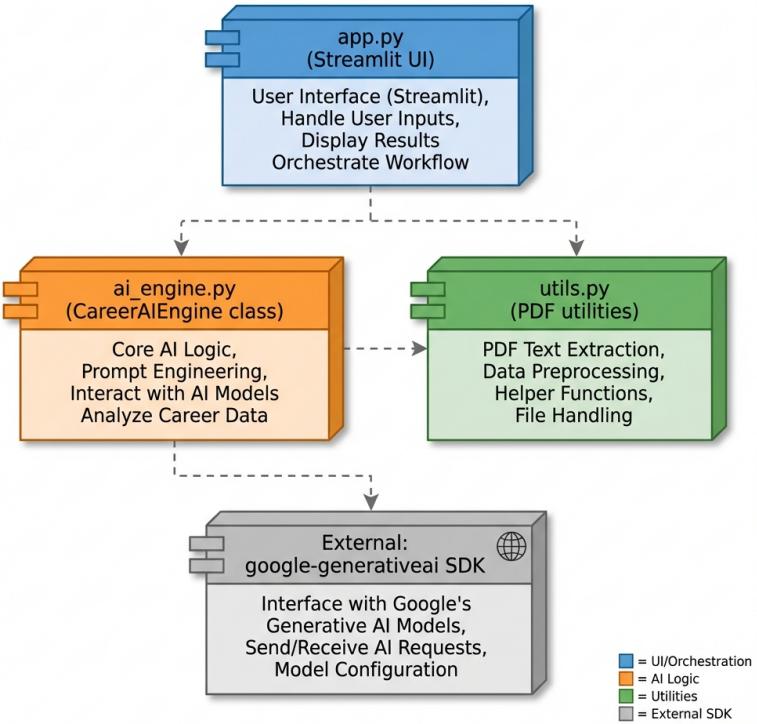
 Based on your impressive CV, Youssef, you are an exceptional candidate with a strong foundation in Artificial Intelligence and Machine Learning, coupled with practical research and development experience across diverse domains. Your extensive publications and hands-on project work highlight a clear aptitude for both cutting-edge research and practical application.

Here are the top roles that align well with your skills and experience:

- AI/ML Engineer:** This is a broad but highly fitting category. Your experience in developing and deploying various AI/ML models, from deep learning architectures to object detection systems, makes you an ideal candidate for roles focused on building and integrating AI solutions.
- Deep Learning Engineer:** Given your specialization in deep learning, extensive work with models like CNNs, Vision Transformers (ViT, Swin), YOLO, GANs, and recurrent neural networks (BiLSTM/BiGRU), this role perfectly leverages your core expertise.
- Computer Vision Engineer:** Your projects involving real-time meteor shower classification, automated radio-burst detection from spectrograms, military aircraft detection, and bone metastasis classification, alongside skills in OpenCV and YOLO, strongly position you for computer vision-focused roles.

Ex: 'What skills am I missing?'

Python AI Application - UML Component Diagram

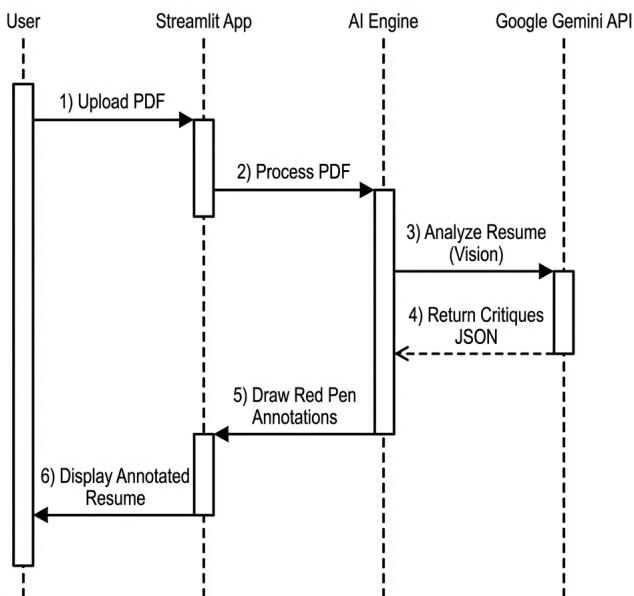


6. Solutions

The following technical solutions were implemented to ensure platform stability and utility:

- **Robust Text Extraction:** To prevent crashes during API calls, the system implements a sanitization cycle: `text.encode('utf-8', 'ignore').decode('utf-8')` to strip incompatible surrogate characters¹¹.
- **Automated Rate-Limit Handling:** The engine includes a **Retry Logic** wrapper that detects Resource Exhausted errors and pauses execution for 10 seconds before re-attempting analysis.

- **Visual Collision Logic:** To ensure readability of "red pen" critiques, the system tracks "occupied zones." If a new comment label overlaps an existing one, the coordinate \$ty\$ is incremented until a clear space is found.
- **Dynamic Model Discovery:** The engine automatically queries the user's API environment to find the most capable available model (prioritizing gemini-1.5-flash), preventing "model not found" errors.



7. conclusion

The **Smart Freelance Platform** provides a comprehensive solution for job seekers by combining vision-based layout analysis with agentic career coaching. Through specific technical fixes for data sanitization and rate-limiting, the platform offers a stable and expert-level user experience.

8. References

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<https://github.com/theskumar/python-dotenv>.