Solution Framework Document

Problem Statement: Researchers all around the world face some serious hurdles while doing research. The main component that overwhelms a researcher is the sheer magnitude of literature. Summarizing dense papers is laborious and time-consuming. The labor-intensive and error-prone task of comparing papers to methods, results, and limitations is a very slow and pain-staking process. Writing papers in various formats such as IEEE or Springer is even more complicated and slower. Maintaining the level of novelty is also difficult owing to plagiarism checks or AI detections. Collaborative works or discussions among co-authors and peers tend to feel very rigid and disconnected. These issues slow the research process, enhance less productivity opportunities, and provide fewer avenues for innovative activities and collaborations, hence showing the need for a comprehensive tool elseworth amalgamating these processes.

Target Audience & Context: ResearcHub AI serves professors, PhD scholars, research and development teams of various institutions and students. Professors in universities are required to quickly follow the literature and put papers together. PhD students want help in writing the thesis to collaborate with their advisors. R&D teams in prestigious organizations need quick delivery of research insights. Students new to research require simple paper analysis. The overall process of literature survey, analysis, writing, and collaboration are currently difficult and painstaking. This slows down innovation and progress.Thus, there is an urgent need for some mechanism that can enhance this process and improve the quality of research.

Relevance of Problem: This problem is relevant due to the rapid growth of academic literature, which overwhelms every researcher. Although they would like to analyze deeply, this is not feasible because of time constraints while managing several tasks. Such tasks demand original and quality too to implemenet foolproof researchl, yet the existing ones are inadequate. Collaboration options also fall short on the set criteria. These issues are being addressed in our solution. This will help save time, improve research quality, and promote innovation. Hence, an all-in-one research tool is required for any academic and R&D professional who strives for excellence.

Use of Gen-AI: Generative AI helps in tackling research difficulties effectively. Models like GPT-4 Turbo are advanced enough to comprehend enormous datasets in fewer learning hours and to generate very direct text. AI search repositories use keywords to identify potentially relevant papers and then brief them, thus, to saving time in reading. It creates visual tables to compare methods and results among studies. In the drafting stage, the AI will help organise the content in the required IEEE or APA format. The humanization feature will makes the text sound natural and avoid AI detection while plagiarism checks ensure originality by scanning databases. Gen-AI helps automate repetitive and tiring low-level tasks with impeccable precision and speed so that researchers are free to innovate and do highest-quality work.

Solution Structure: ResearcHub AI is an AI-powered research assistant. Its process begins with:

- **Literature Discovery**, where inputs are entered by users, and AI searches arXiv, PubMed, and Semantic Scholar, filtering by relevance or year.
- **Summarization & Annotation** employs GenAI tools to produce summaries in simple language or bullet points, flowcharts for ease of understanding.
- **Paper Comparison** produces tables comparing methods and results.
- **AI-Assisted Drafting** provides templates (IEEE, Springer) and generates exportable outputs (DOCX, LaTeX).

- **The Humanization Engine** guarantees text originality, evading AI detectors.
- **Plagiarism Checks** search databases, offering similarity scores.
- **Community Collaboration** enables researchers to connect for messaging and live editing.

Developed with React.js (frontend), Python/FastAPI (backend), GROBID for parsing PDF, and CrossRef for citations, it employs PostgreSQL and ElasticSearch for database management, facilitating research from discovery to publication.

Feasibility & Execution: ResearcHub AI can be used with APIs for arXiv and PubMed, GPT-4 Turbo for AI operations, GROBID for PDF parsing, and CrossRef for citations. The technology stack: React.js, Python/FastAPI, PostgreSQL, ElasticSearch facilitates strong development. Execution begins with discovery and summarization, scaling to drafting and collaboration. A professional AI and web development team can implement a phased rollout, leveraging open-source data and fine-tuned models for cost-saving implementation.

Scalability & Impact: ResearcHub AI scales by incorporating repositories and journals. Better AI models enable better features like dataset analysis. Zotero or Slack integrations further enhance functionality. It recovers up to 50% of research time, accelerating innovation. Global research networks are created through collaboration tools, accelerating breakthroughs. By providing assistance to students and poorly funded institutions, it makes research more accessible, enhancing quality and output throughout academia.

Conclusion & Minimum lovable Product: ResearcHub AI applies generative AI to literature discovery, summarization, drafting, humanization, and collaboration. By simplifying research and promoting collaboration, it revolutionizes academic productivity, providing a scalable solution for researchers globally.

The sample prototype of our screen is shown below:
It provides discovery, summarization, and initial drafting, providing value on the spot.