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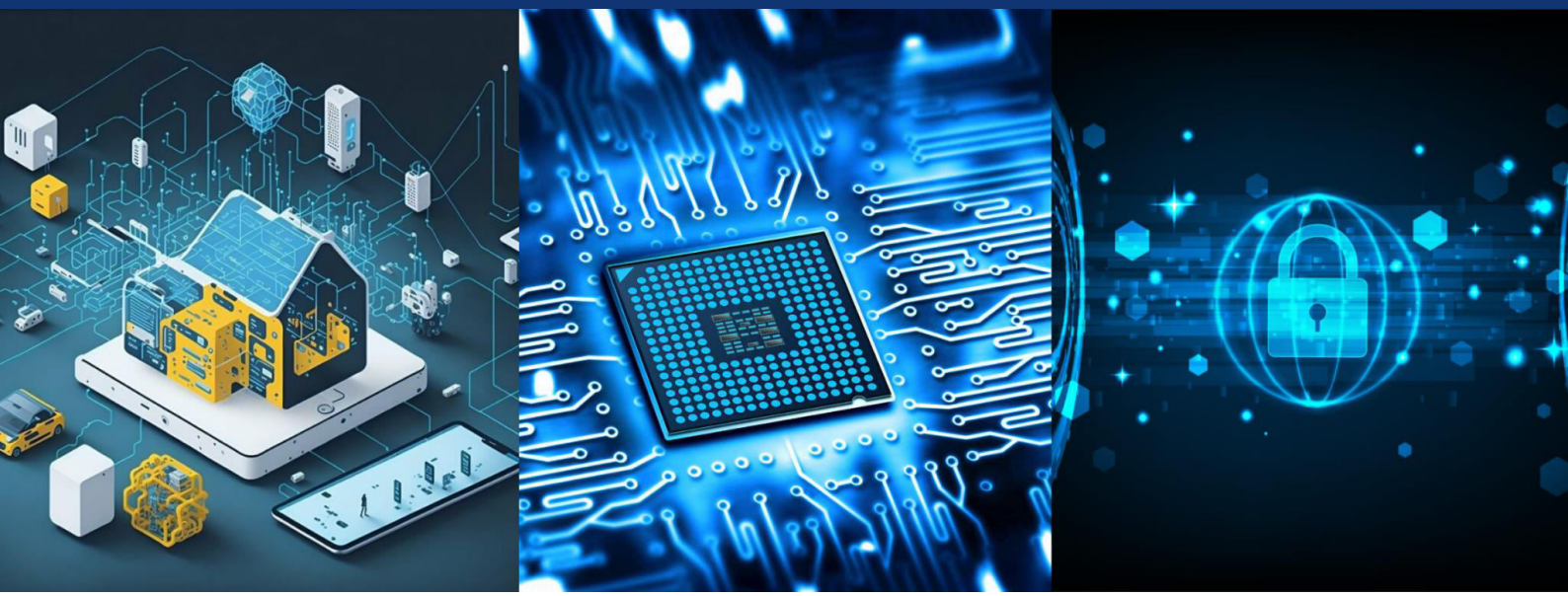

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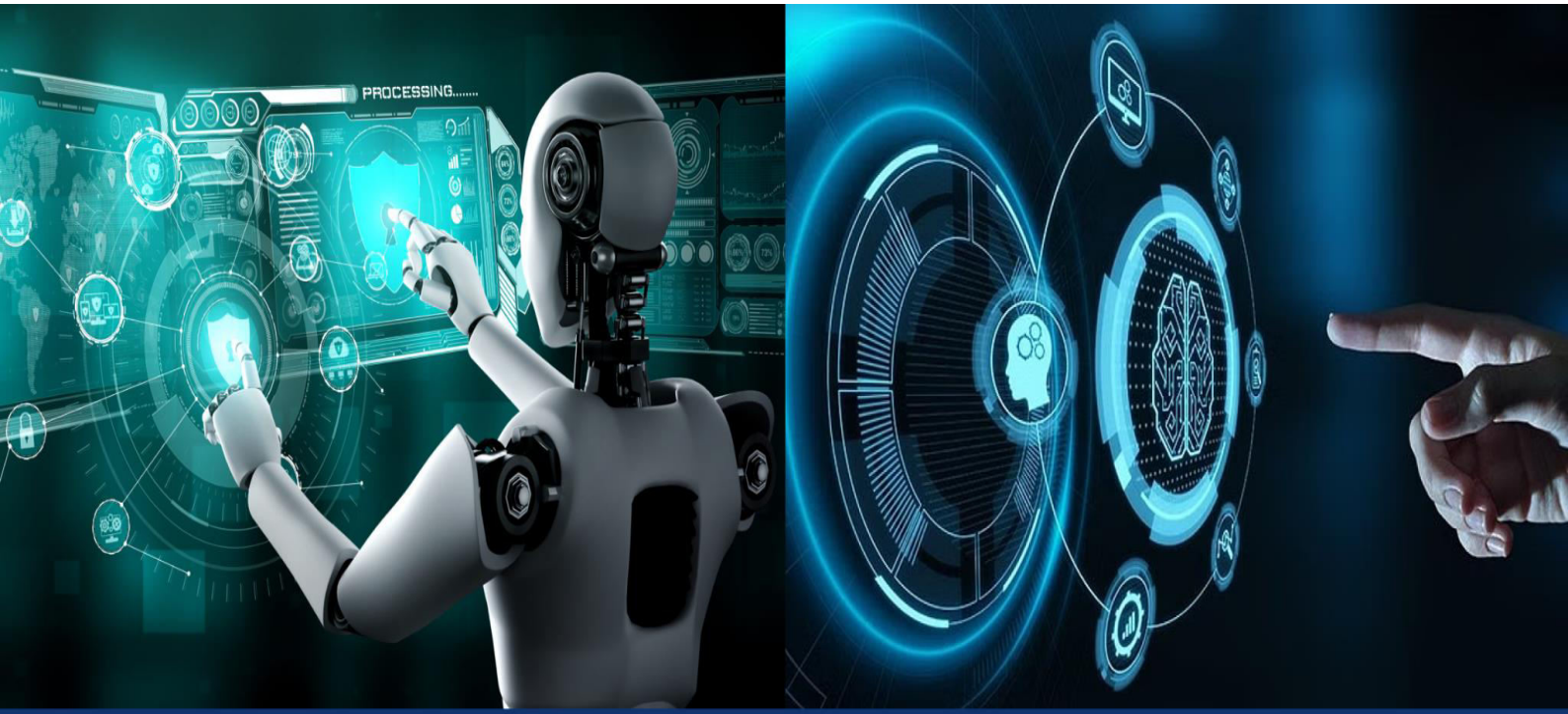

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AI Powered Business Idea Generator & Feasibility Analyzer

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ABSTRACT: Entrepreneurs often struggle with two major challenges—coming up with viable business ideas and validating them with real-world data. This research presents an AI-powered platform that leverages transformer-based large language models (LLMs) and intelligent API integration to assist with both tasks. The system accepts user-defined inputs such as domain, skills, and budget via a Streamlit interface, and uses a language model (via OpenRouter) to generate relevant business ideas. It then enriches the generated idea using semantic search to match and query real-time APIs for market data, competition levels, and financial feasibility. The results are compiled into a structured feasibility report, downloadable as a PDF. Integrated with Firebase for secure authentication and user history tracking, the system provides a low-cost, intelligent assistant for aspiring entrepreneurs. The solution aims to democratize early-stage startup planning by offering AI-powered creativity and validation in a unified platform.

KEYWORDS: Generative AI, Business Idea, Feasibility Analysis, Large Language Models, API Integration, Semantic Search, Firebase, Streamlit, Startup Planning, Feasibility Report, Transformer Models, Market Data, Competition Levels, Financial Feasibility

I. INTRODUCTION

In today's rapidly evolving business landscape, entrepreneurs face both vast opportunities and significant challenges. The integration of artificial intelligence (AI) has transformed entrepreneurship by offering powerful tools for business idea generation, market research, and feasibility analysis—key steps in the early stages of business development. Historically, business ideation relied on human creativity and market insights, but the process was often time-consuming, resource-intensive, and influenced by biases. AI, particularly through natural language processing (NLP) and generative models, offers new ways to streamline these processes, enabling faster and more objective decision-making.

A significant challenge for entrepreneurs, especially during the initial stages, is validating the feasibility of a business idea. Traditionally, feasibility analysis required extensive research and expert consultations, a process that could be slow and costly, especially for startups with limited resources. AI can address this by automating data collection and analysis, providing entrepreneurs with data-driven insights to assess the viability of their ideas in real time. This approach not only accelerates the decision-making process but also enhances the quality of the ideas generated [6].

AI's role in business ideation extends beyond idea generation. Tools powered by large language models (LLMs) like OpenAI's GPT-3 and GPT-4, as well as Google's BERT, are capable of analyzing market data, identifying emerging trends, and suggesting innovative ideas with minimal input [1], [5]. AI systems can also filter out low-potential ideas by evaluating parameters such as market demand, competition, and scalability, making the ideation process more efficient and reliable [3]. Furthermore, these AI tools help democratize entrepreneurship, making essential resources more accessible to individuals, regardless of financial or geographical constraints [8].

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Despite the promise of AI, many existing platforms only address one aspect of the entrepreneurial process—either ideation or feasibility analysis. There is a need for integrated solutions that combine both, offering entrepreneurs a comprehensive platform to generate and validate business ideas simultaneously. Such a system would empower entrepreneurs to not only create innovative ideas but also assess their feasibility quickly and objectively, increasing the chances of business success [6].

This study aims to explore the application of AI in business ideation and feasibility analysis, focusing on the development of a platform that leverages AI to generate and assess business ideas. By providing a data-driven approach to both ideation and feasibility analysis, this platform promises to save time, reduce costs, and improve decision-making for entrepreneurs, particularly those with limited resources or expertise. The real-world implications of this research could revolutionize entrepreneurial ecosystems, aiding startups, academic institutions, and entrepreneurs globally [10], [11].

II. MOTIVATION

Starting a business today requires more than just an idea—it demands validation, data-driven planning, and timely execution. However, many aspiring entrepreneurs, especially students and individuals without prior business experience, find it difficult to bridge the gap between idea and execution. Traditional feasibility studies are expensive and time-consuming. While tools exist for either ideation or business planning, an integrated system that combines AI-powered creativity with practical validation is largely missing in the ecosystem. Our motivation stems from this gap: to create a user-friendly, intelligent platform that uses modern AI techniques—LLMs and APIs—to generate customized business ideas and assess their feasibility instantly. This approach significantly lowers the entry barrier and fosters a more inclusive entrepreneurial environment.

III. RELATED WORK

Recent advancements in Artificial Intelligence (AI), particularly in the field of Natural Language Processing (NLP), have significantly reshaped the landscape of entrepreneurship and early-stage business development. One of the most impactful innovations has been the use of Large Language Models (LLMs) to support and enhance business idea generation. Wang et al. [1] provide a detailed survey of how models such as GPT and BERT interpret structured prompts to produce domain-specific ideas, illustrating their utility in generating high-quality, innovative business concepts. These capabilities are central to our system, where user inputs are converted into natural language templates and passed to a transformer-based LLM to generate personalized startup ideas.

Complementing the generative aspect of LLMs is their growing role in structured ideation workflows. Shaer et al. [5] explore how AI systems can co-create ideas alongside users, promoting creative expansion while still relying on human judgment for validation. This notion of human-AI collaboration is embedded in our platform, where the user is empowered to iterate on AI-generated suggestions, leveraging both machine creativity and personal insight.

To move beyond ideation and into implementation, the feasibility of business ideas must be assessed. Traditional feasibility studies are often expensive and time-consuming, which poses a significant barrier for early-stage entrepreneurs. To address this, researchers like Jiang and Luo [6] have proposed automated frameworks that analyze startup ideas based on key factors such as market size, risk, scalability, and resource alignment. Their approach supports our system's feasibility module, which uses APIs to retrieve contextual data—such as cost estimates, competition levels, and customer demand—and feeds that into an LLM for feasibility reasoning.

Building on this, Shaik et al. [7] introduced a market-centric AI system that scrapes real-time data and performs sentiment and competitive analysis to generate feasibility reports. Their results, which showed close alignment with professional business consultants, reinforce the reliability of using APIs as external data sources for entrepreneurial decision-making. Our system employs a similar strategy by using semantic search (FAISS) to match business ideas with appropriate APIs, ensuring data relevance and insight accuracy.

At the architectural level, Reddy Ganuthula [4] outlined a modular framework that integrates NLP-driven idea generation with viability scoring engines and external data pipelines. This modularity is mirrored in our design, where the system is

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organized into distinct layers—frontend UI, LLM-based reasoning, API integration, and user data storage—ensuring scalability and maintainability.

Moreover, recent studies highlight how LLMs and intelligent automation are reshaping entrepreneurial education and access. Koti and Jagannathan [8] demonstrate that AI-powered ideation tools like GPT are democratizing business creation by providing support to rural entrepreneurs who lack access to traditional resources. Similarly, Gindert and Müller [9] report how business schools are integrating AI tools into their curricula to enhance student engagement and innovation. These studies reinforce the broader societal potential of platforms like ours, which aim to make intelligent business planning accessible to diverse populations.

Finally, Schröder et al. [13] emphasize the strategic value of AI in startup decision-making, noting improvements in time-to-market and funding success rates when founders are supported by predictive AI tools. Our system embraces this approach by acting not only as a creative engine but also as a data-driven advisor, helping users refine, validate, and act on business ideas in a seamless workflow.

In summary, the reviewed literature confirms the viability and necessity of a platform that unites generative AI and real-time feasibility analysis. By synthesizing capabilities from transformer-based LLMs, dynamic API querying, and modular system design, our project stands at the intersection of cutting-edge research and practical application in AI-assisted entrepreneurship.

IV. PROPOSED SYSTEM

The proposed system is a comprehensive, AI-driven platform built to assist aspiring entrepreneurs in both generating innovative business ideas and evaluating their feasibility using real-time contextual data. By integrating Large Language Models (LLMs), intelligent prompt engineering, semantic search, API enrichment, and cloud-based storage, the system delivers a streamlined solution for early-stage business planning.

The application is hosted on a user-friendly web interface developed using Streamlit, which serves as the primary interaction point. Upon logging in, users are prompted to input critical business parameters such as their industry of interest, available budget, and skill sets. These inputs are captured through dedicated input fields, dropdown selectors, and interactive form elements designed for ease of use and guided exploration. Once submitted, the system transforms the user's inputs into a structured natural language prompt. This prompt is optimized for contextual clarity and then sent to a transformer-based Large Language Model (LLM), specifically accessed via OpenRouter. The LLM processes the input and generates a well-aligned, customized business idea tailored to the user's profile. This step leverages the model's language understanding capabilities to simulate human-like reasoning during ideation.

Following idea generation, the platform initiates the feasibility analysis phase. Here, the system uses Facebook AI Similarity Search (FAISS) to semantically map the generated idea to the most relevant data sources listed in an API directory. The similarity matching ensures that the APIs selected offer contextual relevance to the proposed idea, thereby enriching the analysis with actionable insights. Each selected API is dynamically queried to retrieve data such as startup costs, target market demographics, current competition levels, and regional demand trends. This retrieved data is then passed back into the AI pipeline, where the LLM combines it with the original idea to reason about feasibility. The analysis spans multiple dimensions, including technical implementation feasibility, financial viability, operational scalability, and potential market risks. The result is a multi-faceted feasibility report that supports informed decision-making.

To facilitate portability and user reference, the system uses the ReportLab library to compile the feasibility output into a well-structured PDF document. This report is formatted with clear headings, bullet points, visual section dividers, and optional data tables. It includes actionable recommendations and assessment summaries, and is made available for download directly from the user dashboard.

For data persistence and personalized experiences, the system is backed by Firebase Authentication and Firestore. Users can securely sign up, log in, and access their past activity. Firestore is used to store historical business ideas, feasibility results, and session data. A dedicated history section in the interface allows users to search, filter, and

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retrieve previous reports, supporting long-term planning and iteration. Furthermore, the system ensures performance and responsiveness through pagination and session state management, allowing for efficient processing even during extended user sessions. This modular and scalable architecture ensures that the platform remains robust, adaptable, and future-ready, providing a complete AI-assisted experience from ideation to validation.

V. SYSTEM ARCHITECTURE

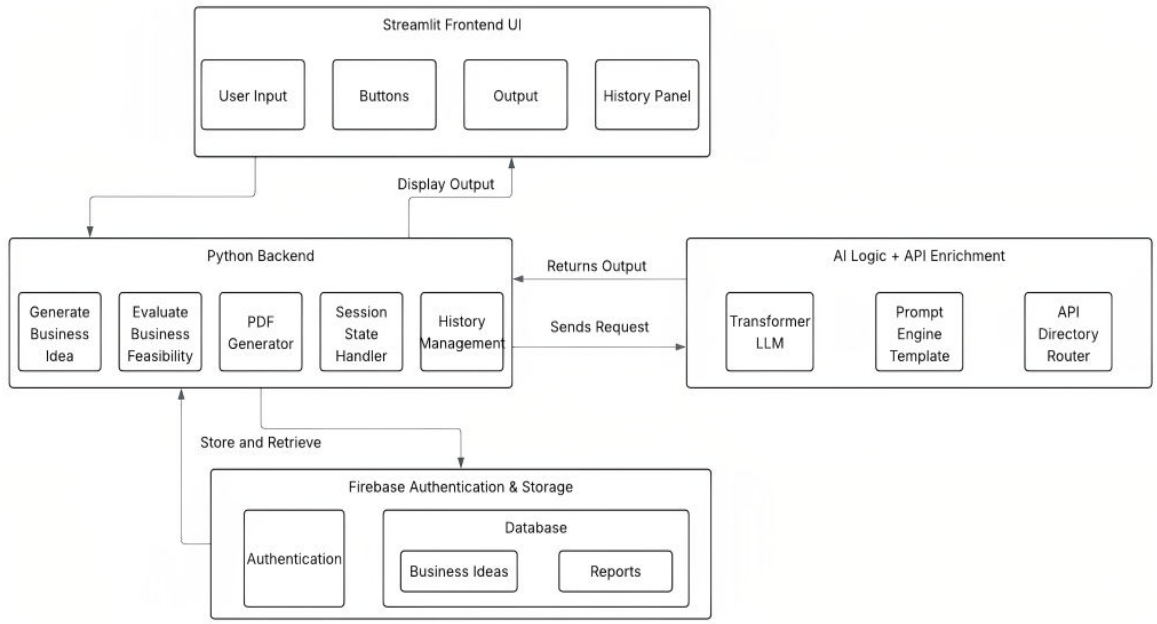

Fig. 1. System Architecture Diagram

The system employs a modular and layered architecture, integrating four primary components: (i) a web-based user interface, (ii) a multi-functional Python backend, (iii) an AI logic module with dynamic API enrichment, and (iv) a secure cloud-based authentication and storage system. The overall architecture ensures smooth user interaction, intelligent decision-making, and persistent data handling. Fig. 1 illustrates the system architecture.

A. Streamlit-Based Frontend Interface

The frontend of the system is implemented using Streamlit, chosen for its simplicity, responsiveness, and real-time interactivity. This interface allows users to input context-specific parameters that guide business idea generation and feasibility evaluation. Key frontend elements include:

- User Input Section: This module captures critical user preferences, including the industry domain (e.g., healthcare, edtech), available budget range, and skill set or technical background. These inputs are collected through intuitive dropdowns, sliders, and text fields.
- Interactive Buttons: Functional buttons streamline the user journey. The Generate Idea button initiates the business ideation process, while Analyze Feasibility evaluates the practicality of the idea using market data. Download Report enables users to export their results in PDF format, and View History allows users to revisit and retrieve previous reports.
- Output Display: Once a business idea is generated, the output panel renders both the conceptual description and feasibility breakdown, including factors such as operational cost, market demand, and risk projections.
- History Panel: A dynamic, scrollable interface section presents previously generated ideas and analysis reports. Users can view timestamps, summaries, and initiate downloads for archival purposes.

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B. Python Backend Modules

The backend of the application, developed in Python, orchestrates the flow of data, manages computation, and serves as the integration hub between the frontend, LLM, and cloud services. The backend includes the following core modules:

- Business Idea Generation: This module transforms structured user inputs into a prompt suitable for processing by a transformer-based large language model (LLM). The result is a business idea aligned with user-defined constraints.
- Feasibility Evaluation: Following ideation, this module connects with relevant APIs—selected based on semantic similarity to the business idea—and passes the retrieved data to the LLM for enriched feasibility reasoning.
- PDF Generation: Using the ReportLab library, this module formats the output—including the business concept, feasibility metrics, and visual highlights—into a downloadable PDF report.
- Session State Handling: Manages the continuity of user interaction during a session by storing transient data such as inputs, outputs, and selected API results, enhancing user experience without requiring reprocessing.
- History Management: Facilitates access to prior business ideas and reports by communicating with the cloud database to fetch user-specific content, organized chronologically.

C. AI Logic and API Enrichment

The intelligence backbone of the system consists of a language model (LLaMA via OpenRouter), a dynamic prompt engine, and a semantic API selector. This module performs the following tasks:

- Transformer-Based LLM: The LLM generates personalized business ideas and later evaluates feasibility, utilizing both the user's inputs and context-relevant data fetched from APIs.
- Prompt Engine Template: To improve the effectiveness of LLM responses, user inputs are transformed into a natural language prompt that retains structure and semantic clarity.
- API Directory Router: Employing semantic similarity (via FAISS), the system identifies external APIs relevant to the generated idea. These APIs provide critical market indicators such as competitor analysis, cost benchmarks, and customer demand estimates. The API responses are then relayed to the LLM to guide a context-aware feasibility assessment.

D. Firebase Authentication and Cloud Storage

For secure and scalable storage, the system integrates Firebase services. This component ensures data persistence and individualized access through the following mechanisms:

- User Authentication: Users authenticate via email-password or OAuth (e.g., Google sign-in), enabling private and secure sessions.
- Cloud Firestore Database: The database stores structured documents under two primary collections:
  - BusinessIdeas: Contains input parameters and generated ideas indexed by user ID and timestamps.
  - Reports: Stores the corresponding PDF feasibility reports for archival and download.

This ensures that all data, once generated, can be securely accessed in future sessions through the history panel.

E. End-to-End Workflow

The system follows a seamless end-to-end pipeline. Once the user submits their preferences through the frontend interface, the backend formats these inputs and forwards them to the AI logic module. The LLM processes the prompt and returns a context-specific business idea. Relevant APIs are then queried for supporting data, which the LLM uses again to generate a detailed feasibility report. This report is visualized on-screen and can be downloaded as a PDF. All data is concurrently stored in Firebase, enabling personalized history management. This architecture ensures that the system is scalable, secure, and responsive while maintaining intelligent output generation and assessment capabilities.

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VI. RESULTS

The following chapter presents the results derived at the end of the flow

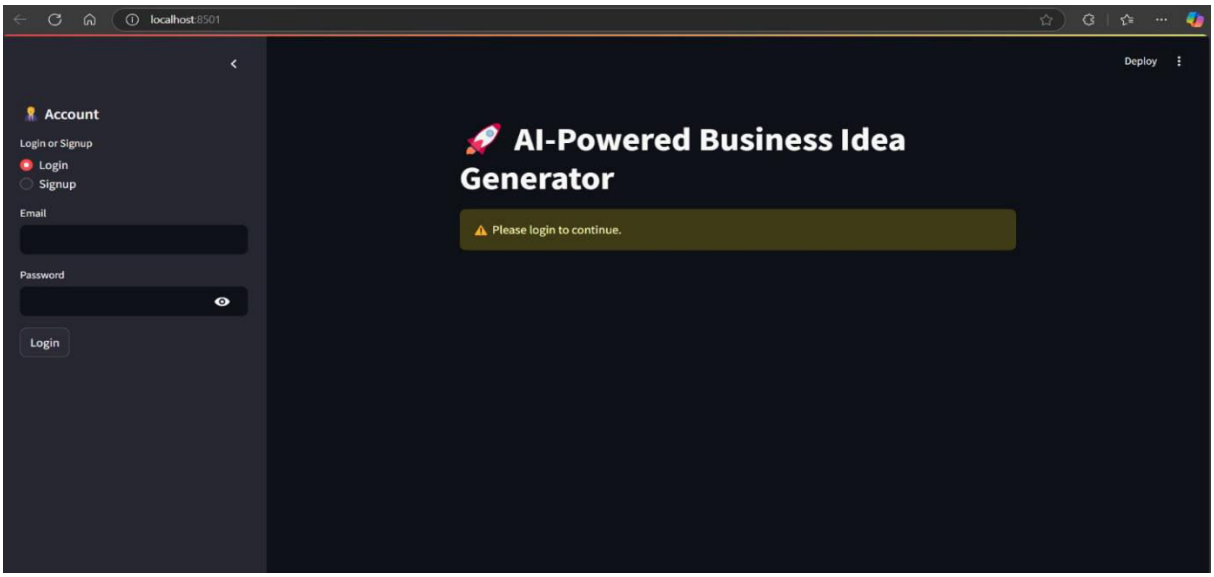

Fig. 2. Login and Signup Page

This is the first screen users interact with. Users can either sign up for a new account or log into an existing one. The interface is connected to Firebase Authentication, ensuring secure and authenticated access.

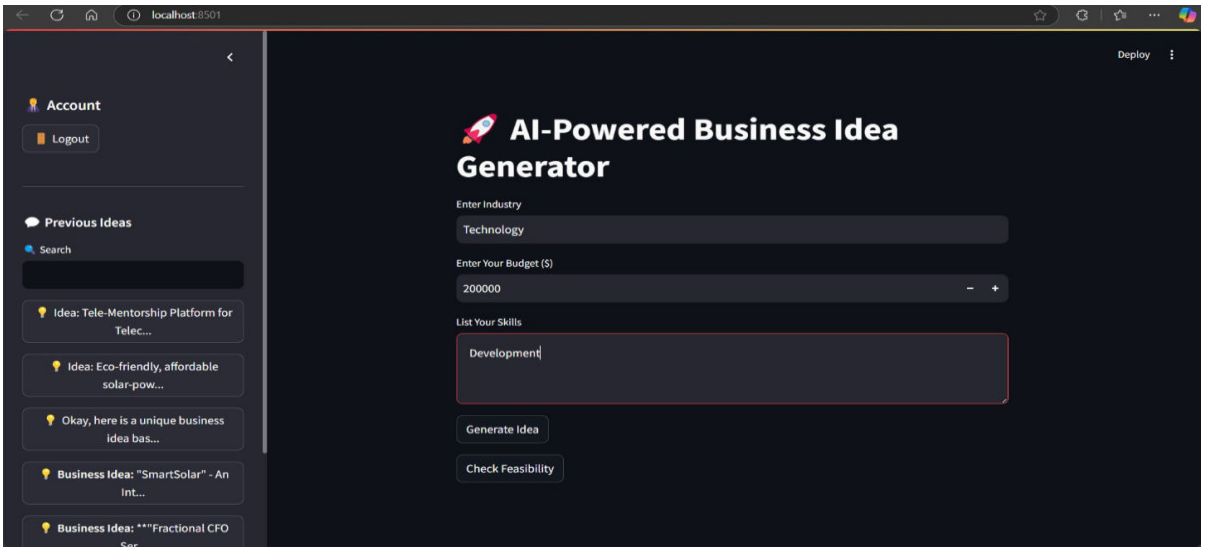

Fig. 3. Home Page

Upon successful login, users are directed to the home interface, where they provide the core inputs necessary for generating business ideas

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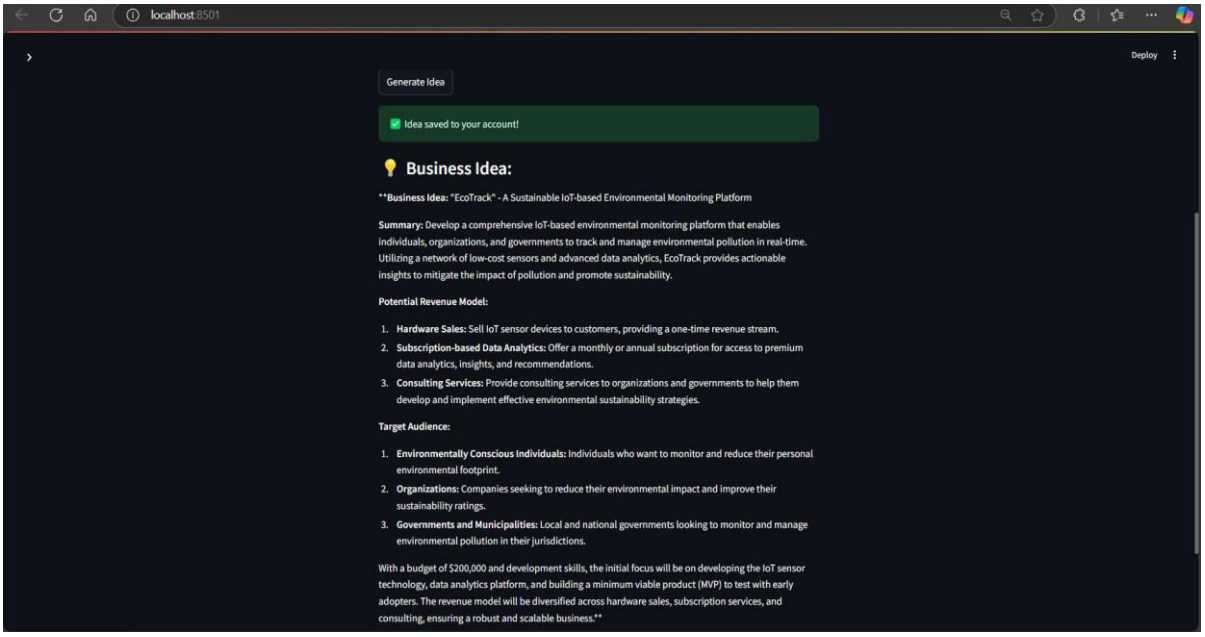

Fig. 4. Business Idea Generation

After input submission, users click the “Generate Idea” button. The backend uses a transformer-based LLM to analyze the inputs and generate a contextual business idea. The model is accessed through OpenRouter integrated with the LLaMA language model.

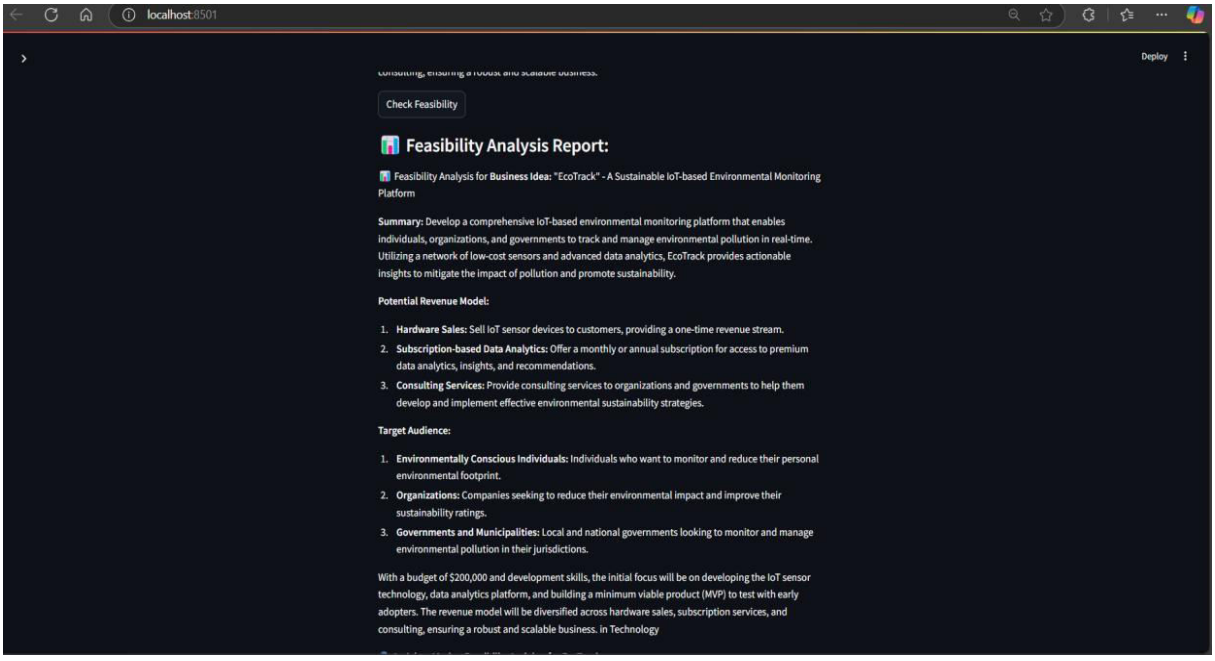

Fig. 5. Feasibility Analysis Report Generation

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Once an idea is generated, users can trigger feasibility analysis. This invokes backend logic which routes the idea through FAISS to find relevant APIs. Data such as market demand, cost estimation, and competition are retrieved and processed

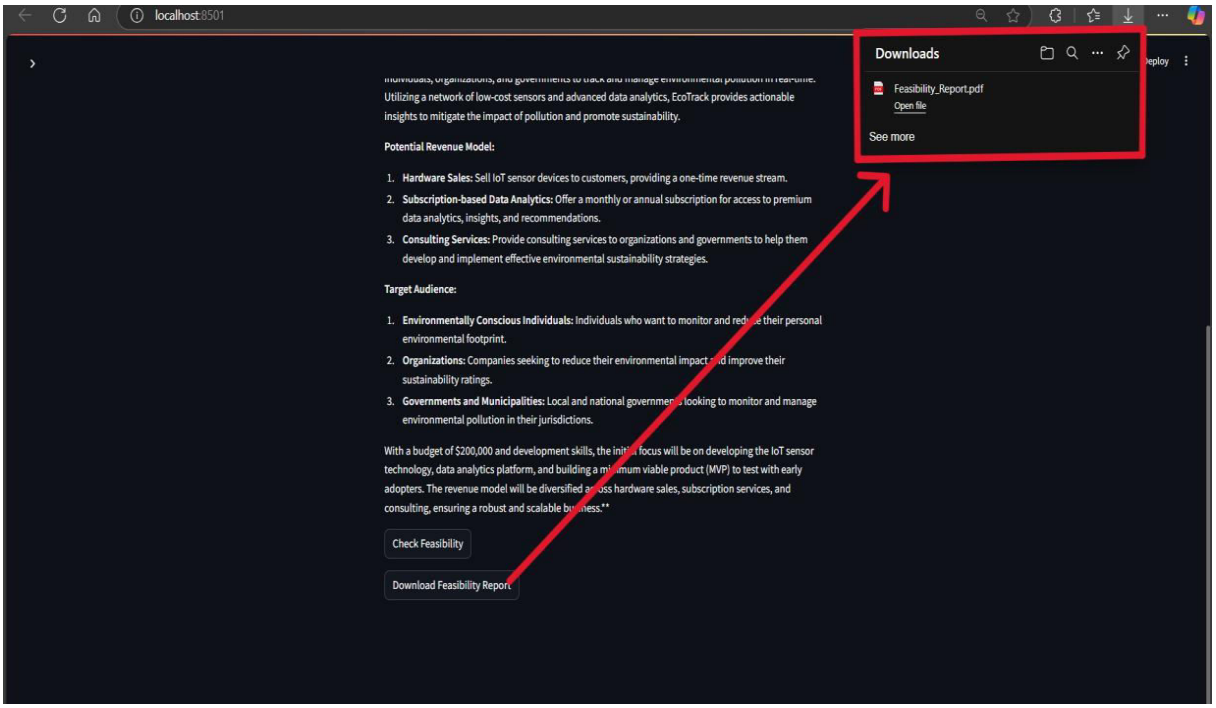

Fig. 6. Download Feasibility Analysis Report in PDF Format

Users have the option to download a formatted PDF containing the full feasibility report. The PDF is generated using the ReportLab library.

VII. CONCLUSION AND FUTURE SCOPE

In conclusion, the project delivers a comprehensive, full-stack solution for AI-powered business ideation and feasibility analysis, specifically designed for aspiring entrepreneurs. Through an intuitive Streamlit interface secured with Firebase authentication, users can input key parameters such as industry domain, budget, and skill set to receive tailored business ideas generated by transformer-based large language models. These ideas undergo feasibility evaluation via a structured API selection framework, which retrieves relevant external data—covering market size, competition, and financial metrics—to enrich the analysis. The API integration significantly enhances the depth and contextual relevance of the output, which is then processed by the LLM to generate a comprehensive feasibility report. This report includes insights into market demand, operational costs, target audience, and strategic outlook. Users can export these results as well-formatted PDF documents, while Firebase ensures secure storage and retrieval of business ideas and previous analyses. Overall, the system exemplifies how generative AI, when combined with a modular, API-driven architecture, can effectively assist in early-stage entrepreneurial decision-making.

The current system lays a strong foundation for AI-powered business ideation, yet there exists significant potential for expansion and refinement. Future iterations of the platform may integrate fine-tuned large language models (LLMs) trained on startup-specific datasets to improve contextual understanding and provide more accurate feasibility assessments. Additionally, implementing dynamic prompt engineering can enable real-time personalization, ensuring that generated ideas align more closely with user needs and evolving market conditions. To enhance accessibility and global outreach, the system can incorporate multilingual support, allowing users to interact in various native languages. A recommendation engine powered by collaborative filtering could further personalize the experience by suggesting

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relevant investors, tools, and strategies based on user preferences and activity history. Lastly, extending the platform to mobile devices through frameworks like Flutter or React Native would support on-the-go innovation and increase engagement. Collectively, these enhancements would transform the platform into a comprehensive, intelligent startup assistant capable of supporting entrepreneurs through the entire ideation-to-launch pipeline.

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