

L-CHAT: A MULTI-AGENT CHAT APPLICATION INTEGRATING DIVERSE LANGUAGE MODELS**Lokesh. T,**

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ABSTRACT:

In the day-to-day world, the need for Artificial Intelligence has increased, and people all over the globe have started using these Artificial Intelligence tools. They make work simpler and relieve people from hard work. To enhance this feature, we have come up with the idea of creating a chat application using Artificial Intelligence, which utilizes various large language models, generally known as LLMs. The users of this chat application will be allowed to select their own large language models, such as Gemma from Gemini, GPT-3.0, 3.5, 4.0 from OpenAI, and Llama from Ollama, Mistral, etc., by providing their API keys. This chat application includes a marketplace that hosts many assistant agents specialized in particular domains to help the users and satisfy them by providing appropriate responses.

KEYWORDS:

Large Language Model (LLM), Artificial Intelligence (AI).

1. INTRODUCTION:

L-Chat is an innovative AI chat application designed to provide users with an enriched and dynamic conversational experience by leveraging multiple language models (LLMs). It stands out in the field of AI-driven communication tools by integrating various LLMs, such as Mixtral, Lemma, and Gemma, each contributing unique capabilities to enhance user interactions.

Existing AI chatbot systems face several notable disadvantages. They primarily offer text-based interactions, lacking the ability to generate or interpret visual content, which limits the richness of user interactions. Additionally, these systems often rely on a single, generalized AI model, leading to suboptimal performance in specialized domains such as healthcare or technical support where domain-specific knowledge is crucial. The architecture of many current chatbots is inflexible, making it difficult to integrate new features or updates, thereby restricting their adaptability to evolving user needs. Moreover, personalization in existing chatbots is typically basic, failing to tailor interactions based on individual user preferences and past interactions, which can diminish user engagement and satisfaction. In the Proposed System, the Chat Application offers significant advantages by addressing these limitations. It integrates text and image generation capabilities, providing richer and more engaging user interactions. Chat Application employs specialized agents tailored to different domains, ensuring that responses are accurate and relevant to specific user needs. Its modular and extensible architecture allows for easy integration of new features and updates, enhancing the system's adaptability and scalability. Furthermore, the Chat Application offers advanced personalization, adapting interactions based on user preferences, behavior, and past interactions, which enhances user engagement and satisfaction. This comprehensive approach makes Chat Applications a superior alternative to existing AI chatbot systems.

2. RELATED WORKS:

Trusted AI in Multiagent Systems: An Overview of Privacy and Security - This paper discusses the privacy and security challenges in distributed AI systems, providing insights into how to handle data and computations across multiple agents securely [1].

On the Control of Multi-Agent Systems: A Survey – This survey covers the fundamental control strategies used in multi-agent systems, highlighting their applications in various fields and the challenges faced in their coordination [2].

Comprehensive Overview of Multi-Agent Systems for Controlling Smart Grids - This paper reviews the use of multi-agent systems in the control of smart grids, demonstrating the applicability of MAS in managing complex and dynamic environments [3].

Intelligent Multi-Agent Systems for Decision Support in Insurance - The paper explores how multi-agent systems can be used for decision support in insurance, providing a practical application of MAS in a business context [4].

Multi-Agent Systems: A Survey - This extensive survey discusses the evolution, current state, and future directions of multi-agent systems, offering a comprehensive understanding of the field [5].

"Building a Chatbot Using Natural Language Processing" - This paper discusses the methodologies and technologies involved in building chatbots, focusing on NLP techniques to enhance human-computer interaction [6].

3. PROBLEM STATEMENT:

The Literature reviews that have been done till now show that no chat application allows users to use language models like GPT, mistral, llama, etc. in a single chatbot, and also no chat application has the facility of speech-to-text search option. These are the problems that are noticed in the currently deployed AI chat applications. To Overcome these problems, this L-Chat is discovered.

4.IMPLEMENTATION OF MULTI CHAT AGENT AI-CHAT APPLICATION:

The implementation of the L-Chat, Multi Chat agent AI-Chat application is described in detail below using the flow diagram.

Figure 1 shows the workflow diagram that performs tasks that take place to run the multi-chat AI-Chat application.

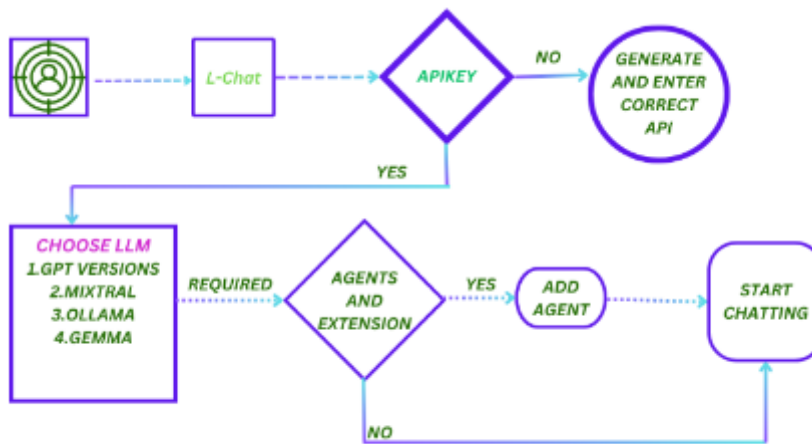


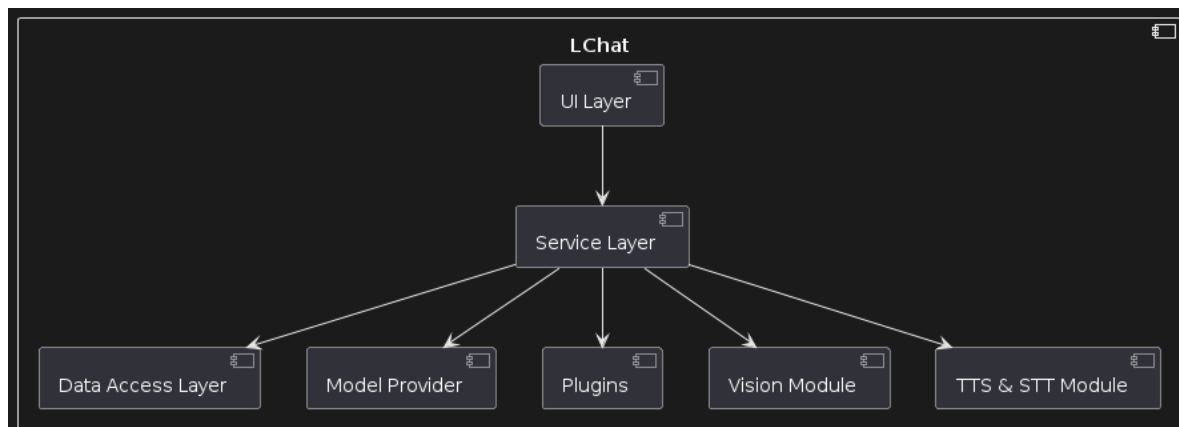
Figure-1

System Architecture:

The System Architecture of the L-Chat is neatly organized and it works smoothly with the key components includes,

i) User Interface (UI):

The user interface i.e. front-end development of L-Chat is made up of a powerful framework library of JavaScript, Next.js. This framework provides attractive and interactive user interface for the front-end developers.



ii) Backend Services:

The server-side rendering of the L-Chat application is also provided by the Next.js. This manages user requests, session management etc.

iii) AI models and Agents:

Incorporates language models like GPT-3, image generation models such as DALL-E, and specialized agents tailored to different domains (e.g., programming, Language support).

2. Front-End Development:**Framework: Next.js**

1. Chat Window: The main interface where users interact with the chatbot. It displays the conversation history and allows users to input their queries.

2. Input Field: A text box where users type their messages. This component also includes a button to send messages and may support features like speech-to-text input.

3. Response Display: This area shows the responses from L-Chat, including text and images. It ensures that the content is displayed clearly and appropriately formatted.

4. User Profile: A section where users can view and edit their profile settings, preferences, and interaction history.

3. Integration with Backend Services

The front-end needs to communicate effectively with the backend to retrieve data, send user inputs, and receive responses.

- **API Requests:** **Axios** or the **Fetch API** is used to make HTTP requests to the backend server. This includes sending user messages, retrieving responses, and managing user profiles.
- **Authentication:** Secure authentication mechanisms, such as **JWT (JSON Web Tokens)**, ensure that user sessions are secure. The front-end handles login, logout, and token refresh processes.

4. Plugins:

The frontend of L-Chat application consists of many plugins like **DALLE-3**, **Shopping Agents**, **SEO Assistants** etc. which helps in user interaction and assist them

5. CONCLUSION AND FUTURE SCOPE:**CONCLUSION:**

L-Chat stands as a pioneering advancement in the realm of conversational AI, marking a substantial leap forward in creating more interactive, versatile, and user-friendly chatbot applications. By integrating multiple AI models, including GPT-3 for natural language processing and DALL-E for image generation, L-Chat delivers a richer and more engaging conversational experience. The system's modular architecture ensures that it can seamlessly incorporate specialized agents to handle domain-specific queries with remarkable accuracy, enhancing its utility across various fields such as healthcare, customer support, and education.

L-Chat addresses several limitations of existing chatbot systems, including the inability to generate images and the lack of specialized agents, thereby setting a new standard for future conversational AI systems. Its successful implementation highlights the potential for further innovations in this space, paving the way for more sophisticated and human-like AI-driven communication technologies.

FUTURE SCOPE:

The future scope of L-Chat is vast and promising, with several avenues for enhancement and expansion:

- 1. Enhanced Multimodal Capabilities:** Future iterations could incorporate more advanced multimodal features, such as video generation and real-time speech synthesis, to further enrich user interactions.
- 2. Improved Personalization:** Leveraging machine learning algorithms to analyse user behaviour more deeply could enable even more precise personalization of responses and recommendations.
- 3. Integration with IoT Devices:** L-Chat could be integrated with Internet of Things (IoT) devices to enable voice-activated interactions in smart home environments, expanding its usability.
- 4. Expanded Language Support:** Incorporating support for more languages and dialects would make L-Chat accessible to a broader global audience, enhancing its inclusivity and reach.
- 5. Enhanced Security and Privacy:** Implementing advanced encryption techniques and compliance with global data protection regulations would further secure user data and build trust.

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