



KOREAN SOCIETY FOR INTERNET INFORMATION

The 20th Asia Pacific International Conference on Information Science and Technology (APIC-IST 2025)

July 06-09, 2025, SAii Laguna Resorts, Phuket, Thailand

<http://www.apicist.org>

Proceedings of APIC-IST 2025

| Organized by |

Korean Society for Internet Information (KSII)

Contents



2-1	An Applied Practice on Software Quality Measurement Mechanism based on Non-Caching Iteration-Augmented Generation Jinmo Yang (Hongik Univ., ROK), Chansol Park (Wisenut Inc., ROK), R. Young Chul Kim (Hongik Univ., ROK)	26-31
2-2	Automatic Requirements Registration Mechanism Yejin Jin, R. Young Chul Kim (Hongik Univ., ROK)	32-36
2-3	Developing a RAG-based Intelligent Chatbot using Dify and Ollama: Focusing on educating Developers on the LMS Environment Jaeho Kim, Ji Hoon Kong, Ki Du Kim, R. Young Chul Kim (Hongik Univ., ROK)	37-40
2-4	Generating C3Tree Model with Non-Conditional Korean Requirements Specification for Cause-Effect Graph Woosung Jang, R. Young Chul Kim (Hongik Univ., ROK)	41-46
2-5	Scenario-based Modeling in AI Software Validation Janghwan Kim (Hongik Univ., ROK), Kidu Kim (TTA, ROK), Hyun Seung Son (Mokpo National Univ., ROK), R. Young Chul Kim (Hongik Univ., ROK)	47-52
2-6	Best Practices in Designing a Multi-Persona AI Avatar Platform for Solving Creative Problems Chaeyun Seo, Sanggyoon Kim, Dongnyeon Kim, Chaeyoung Yong, Jungmin Shon, Jihoon Kong, Janghwan Kim, R. Young Chul Kim (Hongik Univ., ROK)	53-56
3-1	Relationship between Frontend and Backend for Web-based Fishing Vessel Design Platform Juhyoung Sung, Kyoungwon Park, Kiwon Kwon, Byoungchul Song (KETI, ROK)	57-58
3-2	An Automated Water Flow Control System for Aquaculture Tanks Juhyoung Sung, Sungyoon Cho, Yangseob Kim, Kiwon Kwon (KETI, ROK)	59-60

Best Practices in Designing a Multi-Persona AI Avatar Platform for Solving Creative Problems

**Chaeyun Seo, Sanggyoon Kim, Dongnyeon Kim, Chaeyoung Yong, Jungmin Shon,
Jihoon Kong, Janghwan Kim, R. Young Chul Kim***

Metaverse Convergence SW Academy, Hongik University
Sejong, South Korea

[e-mail: chaeyun@hongik.ac.kr, {sangreal99, qwert884, happy7yong, 1sonjungmin}@naver.com,
go400s@gmail.com, {lentoconstante, bob}@hongik.ac.kr]

*Corresponding author: R. Young Chul Kim

Abstract

Recently, many applications have incorporated Conversational Artificial Intelligence (CAI) technologies, extending beyond the provision of everyday information to support creative thinking and problem-solving. While AI systems perform efficient decision-making based on large-scale training data, the centralization of information may inadvertently limit creative thinking. Most researchers analyze the impact of AI-provided information availability on creative problem-solving capabilities. To enhance creative thinking in CAI technology, we propose a novel approach utilizing four AI avatars on the platform. This system comprises AI avatars with diverse personas, each offering a distinct perspective in response to user queries. By presenting multiple and simultaneous viewpoints, users are encouraged to analyze problems from various angles and derive innovative solutions. Rather than engaging in a one-sided, answer-oriented dialogue, users experience an immersive interaction characterized by divergent and convergent thinking processes, thereby deepening their cognitive engagement. This platform leverages multi-agent AI dialogues to reflect a plurality of perspectives and fosters user-driven ideation. By doing so, it aims to overcome the limitations of conventional AI interactions and to enhance the creative potential of users.

Keywords: Conversational AI, Persona-based Avatar, Creative Problem Solving, Immersive Interface, AI Collaboration Platform

1. Introduction

With the rapid advancement of natural language processing technology, conversational artificial intelligence (chatbots) has been widely adopted across various industries for applications such as customer service, information delivery, and personal assistant tasks. However, most existing AI chatbots are primarily designed to provide users with quick and singular responses, which limits their ability to support multifaceted problem analysis or the free expression of

creative ideas. Such response-centered dialogue structures can guide or constrain users' thinking in specific directions, making them unsuitable for fostering critical thinking or creative problem-solving skills. Meanwhile, contemporary society increasingly values diversity, inclusivity, and creativity as core principles, and artificial intelligence technologies must evolve accordingly to meet these societal demands. There is a growing need for conversational AI platforms that move beyond providing singular responses and instead promote broader thinking and the acceptance of

This research was conducted with the support of the Korea Creative Content Agency (Project Name: Artificial Intelligence-Based Interactive Multimodal Interactive Storytelling 3D Scene Authoring Technology Development, Project Number: RS-2023-00227917, Contribution Rate: 100%) and the Korea Research Foundation's four, Brain Korea 21 (Project Name: Ultra-Distributed Autonomous Computing Service Technology Research Team, Project Number: 202003520005).

multiple perspectives through interactive engagement with users. In particular, as AI technologies play an increasingly central role in human decision-making processes, there is a rising tendency for users to accept AI-generated information uncritically. This phenomenon, in which AI responses are perceived as definitive “correct answers,” may paradoxically limit information accessibility and weaken the ability to approach problems from diverse viewpoints. Consequently, concerns have been raised about the potential negative impact on creative problem-solving. This study emerges from such concerns and proposes a novel AI avatar-based system that facilitates creative thinking by presenting users with simultaneous responses from multiple AI avatars, each embodying a distinct persona. Through this multi-perspective approach, users are encouraged to engage with diverse viewpoints and expand their cognitive processes. This study aims to move beyond conventional, answer-centered one-way dialogue by providing an immersive interface that supports creative problem solving through processes of divergent and convergent thinking. The structure of this paper is as follows: Section 2 reviews related work; Section 3 describes the design and implementation of the proposed platform; and Section 4 presents the conclusions of this study along with a discussion of future research directions.

2. Related Works

Traditional conversational AI (chatbot) systems have primarily evolved to support functions such as information retrieval, customer service, and simple question-answering tasks [1]. More recently, research efforts have focused on providing more refined and personalized responses by analyzing users’ emotional states and preferences. However, most systems still focus on delivering singular, definitive answers, which limits their ability to support users in engaging in creative thinking or exploring problems from multiple perspectives [2][7]. In a study on learning support avatars using generative AI within metaverse environments, a learning assistant avatar was developed using the Roblox platform and ChatGPT, aiming to enhance educational engagement and user experience. The study also employed the Scrum methodology to evaluate the development

process and identify areas for improvement [3]. This serves as a representative case demonstrating the applicability and effectiveness of immersive interfaces in educational contexts. Furthermore, persona-based interfaces have been actively used in domains such as gaming, education, and counseling to increase user immersion and emotional connection [3]. By eliciting varied responses based on users’ psychological characteristics and interaction preferences, these interfaces can enhance the naturalness and relatability of conversational AI systems. In another line of research, personalized healthcare content design using AI avatars focuses on mobile app development, where AI avatars analyze users’ health data and provide tailored content and recommendations [4]. This suggests that AI avatars can function not only as information providers but also as personalized advisors and motivational tools. From a technical standpoint, the combination of text-to-speech (TTS) technology and 3D lip-sync has gained attention as a means to enhance the immersive quality of user interactions. The real-time synchronization of voice and mouth movements allows for more realistic communication with AI avatars [5]. Building upon this body of research, the present study proposes a collaborative AI platform that enables simultaneous dialogue with multiple persona-based AI avatars. This system is designed to present diverse perspectives, thereby encouraging user-driven ideation and creative thinking. By overcoming the limitations of conventional single-response AI systems, this approach aims to expand the role of AI in the creative problem-solving process.

2.1 AI Decision-Making Processes and the Constraints on Creative Thinking

Although artificial intelligence (AI) leverages large-scale training data to make rapid and accurate decisions, it still exhibits the following limitations. Centralization of Information [6].

AI systems are trained predominantly on large-scale historical datasets, which inherently reflect existing knowledge structures and dominant viewpoints. As a result, they often struggle to generate novel perspectives or propose truly innovative ideas, limiting their capacity to foster creativity [8].

Lack of Peripheral Knowledge Expansion:

While AI is optimized for delivering goal-oriented and precise information, it cannot often provide broader, contextual, or peripheral knowledge. This constraint can limit users' opportunities to explore diverse lines of thinking, thereby reducing their cognitive flexibility.

Perception of AI Outputs as Definitive Answers: Users tend to perceive AI-generated information as objective and authoritative, which can inadvertently discourage critical thinking and alternative interpretations. This perception may hinder flexible thinking and diminish the openness required for effective creative problem-solving.

3. An Avatar-Based Creative Thinking Mechanism

The study on avatar-based support for creative thinking utilizes multiple AI avatars to overcome the limitations of artificial intelligence. Users can select AI avatars with various personality types, such as logical, emotional, or critical, and engage in simultaneous conversations with them. This enables the exploration of diverse perspectives on a single issue. The platform includes the following key features:

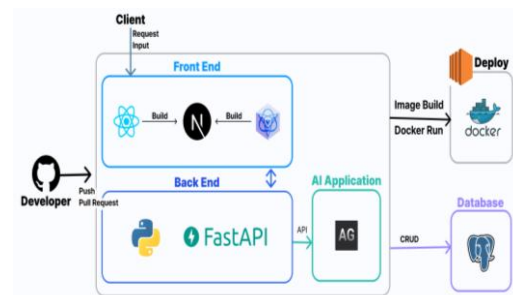


Fig. 1. System Architecture

Fig. 1 illustrates the architecture of an Avatar-Based Creative Thinking system.

-Multi-AI Dialogue System: By employing multiple AI avatars, each offering distinct perspectives, the system supports users in broadening their thinking and engaging with diverse viewpoints.

-Avatar Selection and Configuration: Users can select combinations of avatars tailored to their specific goals or problem-solving needs,

allowing for a personalized interactive experience.

User-Driven Idea Expansion: The platform is designed not only to provide information but also to stimulate ideation actively. It does so by prompting questions and facilitating discussions, thereby encouraging users to engage more deeply and creatively.

-Custom Persona AI Avatars: Users can select and utilize AI avatars with specific thematic roles or subject expertise, enabling the generation of more multifaceted and nuanced opinions.

-Conversation History Save/Load Functionality: A record-keeping feature allows users to save and retrieve past dialogues, supporting iterative learning and the continuous development of ideas. Fig. 2 is a conversation with Avatar.



Fig. 2. Conversation with Avatar

4. A Case Study

We designed this platform based on user flow diagrams, system architecture, and API design documentation. Its structure follows a process consisting of avatar selection → multi-avatar conversation, → dialogue analysis. Prompt engineering tailored to each avatar is used to distinguish their personality traits clearly. Additionally, an AutoGen-based question

refinement mechanism is integrated to enhance the quality of AI responses. **Fig. 3** is Multi Avatar.

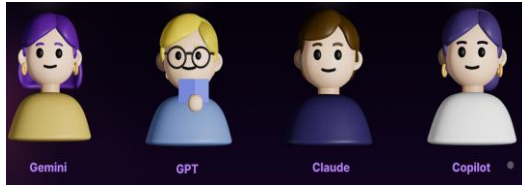


Fig. 3. Multi Avatar

Natural language understanding and generation within the platform are powered by OpenAI's GPT models and Google's Gemini API. For 3D modeling and rendering, avatar models created in Blender are rendered in real time on the web using the React-based library @react-three/fiber. The backend is built on the FastAPI framework, incorporating a PostgreSQL database and JWT (JSON Web Token) authentication to ensure both lightweight performance and robust security. The front end is developed using the Next.js framework, combined with React and TypeScript, to provide an intuitive and user-friendly interface. **Fig. 4** is Orchestrator.

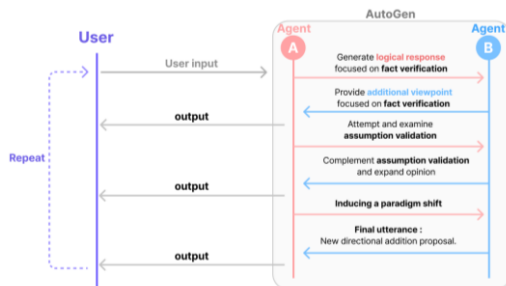


Fig. 4. Orchestrator

5. Conclusions

Currently, there is a growing concern about the impact of artificial intelligence (AI) on human creative thinking. Therefore, we propose an avatar-based creative thinking platform to complement existing limitations. The proposed platform enables users to analyze problems from multiple perspectives and engage in both divergent and convergent thinking through simultaneous interactions with various AI avatars, each exhibiting distinct personality traits. To validate its effectiveness, an experimental study was conducted using creative problem-solving tasks. The performance of users

who engaged with the avatar-based AI system was compared to that of users who used a conventional AI system. The results demonstrate that the group using the avatar-based system generated more diverse solutions and exhibited greater improvement in creative thinking. We suggest this platform to facilitate cognitive expansion and enhance user creativity effectively. We offer a novel approach to developing dialog-based AI systems, aiming to support creative problem-solving. In future research, we will focus on applying the platform across various domains and contexts to assess further its efficacy, as well as refine the avatars' characteristics—such as personality, linguistic style, and visual representation—to enhance personalized cognitive support.

References

- [1] The ScienceTimes, A Study on AI's Creative Thinking Ability, Sep. 15, 2023. [Online]. Available: <https://www.sciencetimes.co.kr/nscvrg/view/menu/249?searchCategory=221&nscvrgSn=253193>
- [2] J. Kim, "Reconsidering the Concept of Creativity in the Age of Artificial Intelligence," *Journal of Gifted Education in Arts*, vol.6, pp.97-120, 2021.
- [3] H. Lee and S. Kim, "Development of a Generative AI-based Learning Support Avatar Prototype in the Metaverse Environment," *Journal of The Korean Association of Computer Education*, vol.27, no.6, 2024.
- [4] T. Kim, Design of Personalized Healthcare Content Using A.I. Avatars, *Ph.D. dissertation, Techno Design Graduate School, Kookmin University*, 2017.
- [5] G. Lee and S. Kwon, "A Mechanism for Enhancing Personal Digital Creativity in the Work Environment," *Journal of Business Administration Research*, vol.38, no.2, pp.457-481, 2009.
- [6] M. Boden, "Creativity and Artificial Intelligence," *Routledge*, 2010.
- [7] N. Davis et al., "Creative Cognition and AI: A Survey," *Computational Creativity*, vol.13, no.1, pp.1-15, 2023.
- [8] L. Floridi, "AI and the Limits of Meaningful Interaction," *AI & Society*, vol.34, no.2, pp.255-266, 2019.