Message from the Chairs

MAS-GAIN 2025

Welcome to MAS-GAIN 2025, the 1st International Workshop on Multi-Agent Systems using Generative Artificial INtelligence for Automated Software Engineering. This first edition of the MAS-GAIN workshop was held in Seoul, the capital of South Korea.

The MAS-GAIN 2025 workshop focused on the intersection of Multi-Agent Systems (MAS) and Generative Artificial Intelligence (GAIN), particularly Large Language Models (LLMs), for advancing automated software engineering. The workshop addressed several interconnected themes across this emerging domain. We explored agent-based software automation through frameworks, methodologies, and architectures that leveraged multi-agent systems for automating various aspects of the software development lifecycle, including requirements engineering, design, implementation, testing, deployment, and maintenance. The integration of LLM-powered software engineering investigated how multi-agent systems with LLMs enhanced software engineering practices through code generation, program synthesis, documentation creation, bug detection, and automated refactoring. Collaborative multi-agent approaches examined how collections of specialized agents collaborated to solve complex software engineering tasks through the division of labor, negotiation, consensus-building, and coordinated problem-solving. The workshop also addressed human-agent collaboration, focusing on mixed-initiative approaches, explainable AI techniques, and trust-building mechanisms. Verification and validation were crucial aspects of developing methods to ensure the correctness, security, and reliability of software produced or modified by AI agents, including formal verification, testing strategies, and quality assurance approaches. Finally, domain-specific applications showcased real-world implementations of MAS-GAIN approaches in areas such as cyber-physical systems, embedded software, web applications, mobile development, and enterprise systems.

The primary goal of the MAS-GAIN 2025 workshop was to create a vibrant forum for researchers and practitioners to exchange ideas, methodologies, and results related to the integration of multi-agent systems and generative AI in software engineering. We aimed to identify and articulate the current challenges and opportunities in leveraging AI-powered multi-agent systems for automating software engineering tasks. The workshop sought to establish a community of researchers and practitioners interested in advancing the state-of-the-art in agent-based software automation while exploring the potential of multi-agent approaches to address the limitations of current automated software engineering tools and techniques. Through our collective efforts, we developed a research agenda that outlined promising directions for future work in this field, considering both theoretical foundations and practical applications.

Automated software engineering at that time faced the critical challenge of managing the increasing complexity of modern software systems, and the integration of multi-agent systems with generative AI held significant transformative potential. Recent advances in generative models, particularly using LLMs, had offered unprecedented capabilities in automating creative

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and decision-making processes, while the distributed and collaborative nature of multi-agent systems enabled efficient and scalable solutions to complex challenges. This synergy paved the way for new approaches to automating the software development process, addressing the needs for adaptability and resilience inherent in contemporary projects. The workshop aligned perfectly with the mission of the 40th IEEE/ACM International Conference on Automated Software Engineering (ASE 2025) by advancing the state-of-the-art through innovative research that bridged theory and practice and by stimulating constructive dialogue between academia and industry to guide the future of software engineering.

For this first edition, we received 10 submissions, of which 6 were accepted for presentation, ensuring a high-quality technical program. The accepted contributions spanned a diverse range of topics, ranging from frameworks that align agents with agile roles for end-to-end software lifecycle support to graph-based retrieval strategies that improved repository-aware code generation. They also included systems that restructured notebooks into production-ready architectures as well as novel approaches for bridging prototyping and maintainability through role-specialized agents. Collectively, these works highlighted both the promise and the open challenges of deploying generative multi-agent intelligence in practical development environments. In addition to these contributions, the workshop featured a keynote talk that discussed how LLMs and multi-agent systems collaborated to design, implement, and validate software under human supervision, with particular attention to reliability, transparency, and governance. The keynote further illustrated how platforms for orchestrating and supervising AI agents supported the future of AI-driven software engineering.

The program featured research papers, presentations, and discussions that brought together academic and industrial perspectives. We were confident that this unique mix fostered stimulating exchanges, generated new collaborations, and charted research directions that shaped the next generation of intelligent software engineering. Such an event was only possible thanks to the dedicated efforts of many people. We warmly thanked the authors for their innovative contributions, the program committee for their careful and constructive reviews, and the ASE community for hosting MAS-GAIN within its long-standing tradition of excellence. A special acknowledgment went to the Steering Committee, whose guidance and support were invaluable in shaping the workshop and ensuring its success.

We invited participants to engage with the program, available on the official MAS-GAIN 2025 website (https://masgain.github.io/masgain2025/), exchange ideas with colleagues, and enjoy the vibrant setting of Seoul, a city that combined rich cultural heritage with technological dynamism. We hoped MAS-GAIN 2025 offered both an inspiring scientific experience and an enjoyable personal one.

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