Keynote Speech

Revolutionizing R&D Creativity: The Synergy of TRIZ and AI

Speaker Name,

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Speaker Biography: Former President and cofounder of European TRIZ Association (ETRIA), Head of AIARD (Artificial Intelligence Assisted R&D) Industrial Chair, Professor Cavallucci is heading research activities in Engineering Design. His major current topic of interest is using Artificial Intelligence techniques to boost inventive practices in industry.

Abstract: Artificial Intelligence, though relatively old, has experienced an unprecedented surge in the past three years, surpassing even the most ambitious expert predictions. Today, there is hardly a single profession unaffected by AI, forcing businesses and individuals alike to reconsider their operations and, in some cases, their survival strategies. The industrial sector is no exception. While Industry 4.0 already compelled companies to integrate digitalization into their processes, AI introduces an even more profound shift: intelligent reasoning capabilities.

We are no longer merely automating tasks with robots or managing vast data streams from sensors. Instead, the challenge now is to rethink how AI can support human creativity and problem-solving within cognitive tasks traditionally seen as purely human domains.

Our research team has been actively exploring this subject since 2009, initially focusing on TRIZ theory, its potential for digitalization, and algorithmic inventive design. With the rise of AI and the prevalence of Large Language Models (LLMs) in computer science research, our methods have significantly evolved to integrate these advanced scientific developments.

This conference presents these latest innovations and their objectives: enhancing upstream R&D activities through an effective combination of TRIZ and various AI techniques.

This talk will provide a global overview on how AI can be translated into an assistant for R&D when in inventive logics and summarize recent developments and future outlook in:

- **Knowledge extraction using LLM to formulate problems**
- **Contradictions extractions from patents using GANs to populate a problem graph**
- **Question Answering from contradictions to scientific literature or patents to inspire solution concepts**

Our goal is to boost the relevance and efficiency of inventive activities while alleviating tedious preliminary tasks such as analyzing patents and scientific literature. We will also discuss information extraction from these sources, particularly in identifying and understanding underlying technical contradictions in targeted inventive systems. Finally, we will address how AI can facilitate generating interdisciplinary ideas to resolve the primary contradictions identified during studies, supported by recent findings from our research.