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# Using AI and Hash-graph Technology for Smart and Traceable Quality Control

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## Abstract

In the era of Industry X.0, defect prediction and product quality management have become critical issues for optimizing costs, reducing waste, and improving the efficiency of production chains. Integrating advanced technologies such as artificial intelligence (AI), Distributed ledger technologies (DLT), and the Internet of Things (IoT) offers a unique opportunity to transform these processes, enabling real-time monitoring, proactive decision-making, and full traceability. Agentic AI is a breakthrough in artificial intelligence where autonomous agents become the key players in intelligent systems. These agents, empowered with the ability to perceive their environment, make informed decisions and act independently, are pushing back the limits of traditional automation and traditional AI systems, which are often centralized and reactive. This paper proposes an innovative architecture that combines agentic AI, Hash graph DLT, and IoT to quality control in production time and ensure optimal product quality management in the context of a smart factory. By exploiting the power of intelligent agents for data analysis and prediction, in addition to a Hash graph for information security and transparency, this solution aims to improve industrial performance by reducing the risks and costs associated with production defects. A scalable and adaptable approach that opens the way to a new era in industrial quality management.

## Keywords
Industry X.0, Agentic AI, Hash graph, IoT, Quality control

## Biographies

**Zineb Ihrouchen** is a PhD researcher at the National Institute of Posts and Telecommunications (INPT) in Morocco. She has three years of experience in technology as an IT engineer, specializing in Blockchain, Hashgraph, and IoT solutions for Industry 4.0. Her research focuses on integrating decentralized ledger technologies and AI-driven approaches to enhance logistics and supply chain management. Zineb has participated in international conferences and programs.

**Dr. Omar Souissi is** an engineer of Supmeca PARIS and Polytechnic of Montréal in applied mathematics and a Ph.D. in Operations Research from the University Polytechnique Haut de France. He is currently a qualified professor at the National Institute of Posts and Telecommunications (INPT) in Rabat. His research field extends to the following areas: optimization and machine learning applied for Industry, Healthcare, and the sharing economy. He is also engaged on scientific event organization, and he is the founder of 'IWSIF', the International Workshop of Services and Industry of the Future.