

Artificial Intelligence for Industrie 4.0 at the G20 Conference

Prof. Wolfgang Wahlster, DFKI, Germany (Chair); Prof. Paolo Traverso, FBK-irst, Italy (Co-Chair); Sahin Albayrak, GT-ARC, Turkey; Dr. Philippe Beaudoin, Element AI, Canada; Dr. Satoshi Sekiguchi, AIST, Japan;

The transformative power of Artificial Intelligence (AI) is now recognized by all G20 leaders. But AI is moving at a pace that's beyond imagination of most policy makers. AI transforms our private and professional live radically. AI is a key enabler for the next generation of smart manufacturing in Industrie 4.0. It can lead to a disruption in traditional workflows, supply chains, value creation, and business models in manufacturing and works towards empowering and expanding workforce expertise.

Adapting best practices in AI for internet services to manufacturing will pave the way to the synergistic collaboration between of humans and robots in urban smart factories for mass customization. Common standards and a free flow of industrial data in a secure and safe environment within the G20 countries are a prerequisite for AI applications in Industrie 4.0.

Therefore, the G20 countries should support coordinated research, development and deployment activities on AI for the fourth industrial revolution, in particular in the following nine priority areas:

1. Hybrid Teams of Human Workers and Collaborative Robots in Smart Factories
2. Deep Learning for State-based and Predictive Maintenance of Networked Production Machines and for Understanding Human Behaviors of Shop Floor Workers
3. Semantic Technologies for Worldwide Interoperability of Machine-to-Machine-Communication in Smart Factories and Logistics
4. Human-Aware and Real-Time Production Planning & Scheduling for Multiagent Systems and Dynamic Plan Revision
5. Intelligent Industrial Assistance Systems for Human Workers: Proactive and Situation-Aware On-line Help and Training on the Shop Floor
6. Trusted Industrial Data Exchange Hubs and Machine Learning for Industrial Process Mining
7. Active Digital Product Memories and Digital Twins for Intelligent Asset Tracking and Production Cockpits
8. Security Technologies for Intelligent Intrusion Detection and Penetration Testing for Smart factories
9. Long-Term Autonomy and Self-Learning as well as Self-Healing Capabilities of Industrial Components

International Collaboration among the G20 members can boost the application of AI in manufacturing:

1. There is an urgent need for international collaboration on open standards for AI in Industrie 4.0.
2. An AI on-demand platform and a large-scale AI infrastructure that offers open specifications and example implementations of basic AI components for Industrie 4.0 based on top-notch, cloud-based computing and data services should be supported to provide a framework for the fast adoption of AI technology, also for SMEs in the production sector.
3. Reference Models, Semantic Representation Languages, and Simulation Platforms must integrate the latest AI developments to ensure long-term impact.
4. Open and Secure Data Exchange of Production Data should be supported so that advanced Machine Learning can be applied to these training data sets in order to reach a new level of productivity, efficiency and quality in manufacturing.
5. A consensus on the social, legal, ethical and privacy implications of AI technology in manufacturing will help to increase acceptance and early adoption.