AI·PROFICIENT

Artificial *i*ntelligence
for improved *p*roduction e*ffici*ency,
quality and mai*n*tenance

AI-PROFICIENT: Pioneering Advancements in AI Integration for Manufacturing Excellence

AI-PROFICIENT, a groundbreaking project launched in 2020, has successfully demonstrated the transformative potential of advanced Artificial Intelligence (AI) technologies in manufacturing processes. Aimed at enhancing production planning, execution, efficiency and human-machine collaboration, AI-PROFICIENT has made significant strides in addressing challenges related to adaptability and resilience in Cyber Physical Production Systems.

Key Achievements

- AI-PROFICIENT places a human-centered (anthropocentric) approach to AI at its core, adopting an Ethics-by-design philosophy. This emphasis on ethical considerations underscores the project's commitment to responsible AI implementation.
- The project has developed a suite of cutting-edge tools and applications designed to address the specific challenges of manufacturing. These tools, ranging from surrogate data-driven models to natural human-computer interaction systems, are implemented into two remarkable Human-Machine Interface (HMI) applications.
- AI-PROFICIENT showcased its capabilities in three diverse production facilities, partnering with manufacturing enterprises Continental and Ineos. The project meticulously examined potential ethical and legal challenges associated with these environments, providing comprehensive recommendations for addressing them.
- The project's tools include a variety of innovative solutions such as connected worker applications, quality data-analysis tools, process/machine-level anomaly detection, data-driven predictive AI analytics, and more. These tools are implemented into two remarkable HMI applications: the INEOS Augmented Reality (AR) Application and the Continental AI Dashboard.
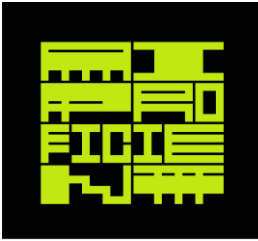
Project Outcomes

Through the implementation of these tools in Continental and Ineos industrial environments, AI-PROFICIENT achieved substantial AI-driven improvements in shop floor operations and production quality. Notable outcomes include the optimisation of machine control settings, reduction in production failures, enhanced model operation, and improved product quality.

Key Innovations

AI-PROFICIENT stands out for its human-centered approach, tailoring AI solutions to the specific challenges of manufacturing. The project's tools offer flexibility and can be combined at different abstraction levels within a manufacturing system, emphasising anticipation, proactivity, and overall performance.

Future Impact

The success of AI-PROFICIENT not only demonstrates the industrial credibility and benefits of AI in manufacturing but also sets a precedent for responsible and innovative AI integration. The project's achievements propel the EU industry forward, by emphasising ethical considerations, application specificity and practical implementation in real-world environments.

Driving Innovation Together: Meet the Collaborators Behind AI-PROFICIENT

AI-PROFICIENT was made possible through the collaboration of ten partners from six European countries, all of them having a distinct role in the project.

1. **Universite de Lorraine (France)**: Coordinator of the project, worked on System Health, self-diagnostics/self-prognostics, predictive AI-Analytics and Proactive maintenance strategies. Also, worked on ethics-by-design and supported standardization activities.
2. **Continental France SNC (France)**: Provided industrial scale pilot installation and Use Cases to develop problem solving solutions.
3. **Tekniker (Spain)**: Worked on field-level automation, self-diagnostics, production process anomaly detection, Predictive AI analytics.
4. **Ineos Services (Belgium)**: Provided two industrial scale pilot installations in two different EU countries and provided three Use Cases to develop and demonstrate problem solving solutions.
5. **Tenforce (Belgium)**: Worked on Semantics, Role-specific human-machine interfaces, XAI and Conversational interfaces at shop floor level.
6. **VTT (Finland)**: Worked on Digital Twins and Hybrid models describing production processes.
7. **Inos Hellas (Greece)**: Worked on component level data acquisition and pre-processing, on proactive maintenance strategies in the Industrial environment and leaded Standardization activities.
8. **Ibermatica (Spain)**: Worked on IIoT environment deployment/setup and Use Case Validation methodology and Analysis.
9. **Institut Mihajlo Pupin (Serbia)**: Worked on IIoT interoperability, Generative optimization, product-level anomaly detection, XAI and transparent AI decision making, System architecture and Platform deployment.
10. **Athens Technology Center (Greece)**: Worked on Optical character recognition (OCR) and Speech-to-text technologies in production environment and on machine/process-level Anomaly detection, followed by Root-cause analysis and AI reinforcement learning algorithms. Leaded also the dissemination, communication, exploitation, and clustering activities of the project.

For more information on the AI-PROFICIENT project, visit: https://ai-proficient.eu/.