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HUB TECH IA

Deliverable report 50

AI and IAGEN Application Use Case

Real-Time Monitoring, Pressure, Temperature and Flow Analysis for Minimizing Failures in the Vaca Muerta Industry: A Comprehensive Approach

Executive Summary – IAGEN Application for Predictive Monitoring in Drilling and Extraction in Vaca Muerta

This executive summary presents a strategic application of artificial intelligence (AI) and generative artificial intelligence (IAGEN) in the energy sector, specifically oriented to real-time monitoring, analysis of pressure, temperature and flow for minimize failures in extraction wells in the Vaca Muerta formation. This is a significant opportunity to increase operational efficiency, safety and profitability in one of the world's largest unconventional reserves.

Use case classification

The report classifies this application according to four key axes:

1. By main resource: oil and gas.
2. By activity: optimization of production processes.
3. By AI technology: machine learning, generative models, agents smart, big data and integration platforms, and computer vision.
4. By strategic impact: optimization of production and infrastructure

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criticism.

1. Opportunities for using AI and IAGEN in the sector

Among the most relevant opportunities are: prediction of equipment failures rotary, early detection of corrosion, drilling optimization in geological data function, intelligent production management, and monitoring environmental. AI integration makes it possible to convert large volumes of data into real-time operational information, overcoming the limitations of monitoring traditional. IAGEN adds the ability to generate autonomous reports, arguments and possible scenarios for decision-making.

2. Expected benefits

The implementation of these technologies contributes to:

- Reduce failures and interruptions in operations.
- Increase well productivity and efficiency.
- Reduce operating costs through predictive maintenance.
- Improve operational safety of personnel and the environment.
- Increase the capacity for evidence-based decision-making.
- Promote more sustainable practices by reducing emissions.

3. Application of AI

AI allows for real-time analysis of critical variables (pressure, temperature and flow), detect deviations, predict failures and propose operational adjustments automated. It is based on sensors, telemetry, SCADA, IoT platforms and processing in big data environments. Machine learning models and Generatives process this data to anticipate anomalies and continuously optimize production. The information is presented in dashboards that feed into decision-making technical and strategic decisions.

4. Proposed AI Agent

The report proposes the development of an intelligent agent powered by IAGEN with

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ability to execute autonomous tasks based on real-time data. This agent Performs predictive analysis, generates automated alerts, builds visual reports and recommends operational actions based on detected patterns. The design includes modules of memory, planning, contextual interpretation and connection with external tools.

Its main function is to facilitate operational decision-making in environments complex, integrating with existing systems through low-code workflows or no-code. The key advantage lies in its scalability, low implementation cost and accessibility for technical and non-technical staff. In addition, this agent is capable of compare current conditions with historical bases, generate decision arguments and issue automated recommendations that significantly reduce dependency manual analysis and increase the speed of response to critical events.

5. Conclusion

The implementation of AI and IAGEN in Vaca Muerta represents a transformation disruptive for the oil and gas industry. This comprehensive approach allows for a transition from a reactive logic to a proactive, data-driven, adaptable strategy to the geological and technological challenges of the deposit. Its adoption is essential to consolidate a more efficient, safe and sustainable exploitation of resources country's energy.