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Transforming the energy future: The application of AI and Big Data in infrastructure operation at ITER

By

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Transforming the energy future involves leveraging cutting-edge technologies like AI and Big Data to optimize infrastructure operations at ITER (Instituto Tecnológico y de Energías Renovables) in Spain. ITER's mission is to advance renewable energy technologies, and the integration of AI and Big Data plays a crucial role in achieving this goal. AI algorithms can analyze vast amounts of data generated by various sensors and systems within the infrastructure, enabling predictive maintenance, efficient energy management, and real-time decision-making. For instance, AI can predict equipment failures before they occur, allowing for timely interventions that minimize downtime and enhance operational efficiency. Big Data, on the other hand, provides the foundation for these AI applications by collecting, storing, and processing large volumes of data from diverse sources. This data includes information on energy consumption patterns, weather conditions, and equipment performance, which can be used to optimize energy production and distribution. The collaboration between AI and Big Data at ITER also facilitates the development of smart grids, which are essential for integrating renewable energy sources into the existing power infrastructure. Smart grids use AI to balance supply and demand, reduce energy losses, and improve the reliability of the power system³. Additionally, AI-driven analytics can help identify trends and anomalies in energy usage, providing valuable insights for policymakers and researchers to develop more effective energy strategies³. Overall, the application of AI and Big Data at ITER represents a significant step towards a sustainable energy future, where advanced technologies drive efficiency, reliability, and innovation in renewable energy infrastructure.

Short biography of Jorge Ballesteros Ruíz-Benítez de Lugo



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Master's degree in Telecommunications Engineering with experience in research projects in Robotics, Artificial Intelligence, and Data Visualization and Simulation.

He currently works as Head of the Robotics Unit at ITER, applying robotic solutions in the field of renewable energy: development of solar-powered unmanned aerial vehicles, inspection and surveillance robots, and machine learning processes applied to energy management using artificial intelligence algorithms.

Member of the advisory board of the Cajasiete Chair in Big Data, Open Data, and Blockchain (BOB) at the University of La Laguna.

Former member of the Chair of Medical Technologies at the University of Las Palmas de Gran Canaria and the Motiva project, collaborating on educational activities using healthcare simulation technologies for undergraduate and graduate students and healthcare professionals.