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Quantum Computing in the Industry 4.0: A Review and Applications

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Since the birth of quantum computing around 1982, when Richard Feynman envisioned a quantum computer that could mimic quantum physics using quantum mechanics laws to work and function, quantum computers have offered numerous powerful possibilities in solving complex problems. In particular, quantum computers take advantage of quantum mechanical properties such as entanglement and superposition to provide massive computational power for simulations of complex quantum systems. Quantum computing can outperform any modern supercomputer in terms of computational capability, raising the interest of both the computer science industry and academics to create the world's first quantum computer. Quantum computing has demonstrated numerous applications in the 4.0 industry, such as artificial intelligence and machine learning, computational chemistry, cybersecurity and cryptography, drug design and development, financial modelling, and weather forecasting. However, in all these technologies and applications, Africa has not been fully participating. Considering that technology is potentially a potent tool for economic development, this work unveils the challenges and opportunities faced by African research institutions and industries in using AI and ML techniques in Industry 4.0. Moreover, we review the progress in these areas especially relating to Africa and provide instances where these techniques have been applied. Lastly, we provide a roadmap on how these techniques can be used by stakeholders such as start-ups, research institutions, and industries for economic development.

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Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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