

Chapter 7

Integrated Quantum Computing and Machine Intelligence for Sustainable Energy Solutions

Muthuraman Subbiah

University of Technology and Applied Sciences, Oman

R. V. V. Krishna

*Aditya College of Engineering and Technology, Jawaharlal Nehru Technological University,
Kakinada, India*

V. Satyanarayana

*Aditya College of Engineering and Technology, Jawaharlal Nehru Technological University,
Kakinada, India*

Abhinav Kataria

Christ University, India

ABSTRACT

The synergistic integration of amount computing and machine intelligence to address challenges in sustainable energy results. By using the computational power of amount computing and the adaptive literacy capabilities of machine intelligence, the study aims to optimize energy product, distribution, and application in a sustainable manner. Through advanced algorithms and optimisation ways, the exploration explores how intertwined amount computing and machine intelligence can enhance the effectiveness, trustability, and environmental sustainability of energy systems. The findings offer perceptivity into the eventuality of this interdisciplinary approach to revise the energy sector, paving the way for the development of innovative results for renewable energy integration, smart grid operation, and energy-effective technologies. Eventually, the exploration contributes to the advancement of sustainable energy results by employing the combined power of amount computing and machine intelligence to address complex challenges in energy optimisation and resource operation.

DOI: 10.4018/979-8-3693-4001-1.ch007

INTRODUCTION

The pursuit of sustainable energy results has become increasingly imperative in the face of growing enterprises over climate change, energy security, and environmental decline. As societies worldwide transition towards a more sustainable energy future, the integration of advanced technologies similar to amount computing and machine intelligence holds a tremendous pledge for optimizing energy products, distribution, and consumption. This exploration paper explores the synergistic eventuality of integrating amount computing and machine intelligence to address the complex challenges associated with sustainable energy results. X. Wang and Y. Li. (2018), Quantum computing, with its capability to harness the principles of amount mechanics to perform calculations exponentially more briskly pets than classical computers, offers a paradigm shift in how we approach complex optimization and decision-making problems in the energy sector. By using amount algorithms and amount-inspired optimization ways, experimenters can explore vast result spaces and identify optimal configurations for energy systems with unknown effectiveness and delicacy.

In parallel, machine intelligence, including ways similar to machine literacy, neural networks, and artificial intelligence, offers adaptive and data-driven approaches to energy operation, demand sooth-saying, and system optimization. By assaying vast quantities of data generated by energy structure, machine intelligence algorithms can uncover perceptivity, patterns, and trends that mortal drivers may overlook, enabling visionary decision- timber and resource allocation. P.S. Ranjit & Mukesh Saxena. (2018), states thatThe integration of amount computing and machine intelligence provides an important toolkit for addressing the multifaceted challenges of sustainable energy results. This interdisciplinary approach enables experimenters to optimize energy products from renewable sources, enhance the effectiveness of energy storehouse and distribution systems, and optimize energy consumption patterns to minimize waste and maximize resource application. also, the integration of amount computing and machine intelligence holds the implicit to revise smart grid operation, enabling real-time monitoring, control, and optimization of energy networks at unknown situations of granularity and effectiveness. By using amount-enhanced optimization algorithms and adaptive literacy ways, smart grids can autonomously acclimatize to shifting energy force and demand dynamics, optimize energy inflow, and ensure grid stability and adaptability.

The integration of amount computing and machine intelligence represents a transformative approach to addressing the complex challenges of sustainable energy results. Christo Ananth, B.Sri Revathi, I. Poonguzhali, A. Anitha, and T. Ananth Kumar. (2022) argues that, By employing the combined power of amount algorithms and adaptive literacy ways, experimenters can unleash new openings for optimizing energy systems, advancing renewable energy integration, and erecting flexible and sustainable energy structure for the future. This exploration paper explores the implicit operations, benefits, and challenges of this interdisciplinary approach and provides perceptivity into its counteraccusations for the future of sustainable energy.

RELATED WORK

The disquisition of integrated amount computing and machine intelligence for sustainable energy results builds upon a foundation of exploration at the crossroad of amount computing, artificial intelligence, and energy systems optimisation (Ranjit, 2014). Several studies have laid the root for this interdisciplinary

10 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/integrated-quantum-computing-and-machine-intelligence-for-sustainable-energy-solutions/353100

Related Content

Theoretical Overview of Quantum Machine Learning Applications in Enhancing Demand Forecasting for Supply Chain Management

Kamaluddin Mandal, Tathagata Chatterjee, Abhijit Sarkar, Joyita Ghosh and Subir Gupta (2024). *Quantum Computing and Supply Chain Management: A New Era of Optimization* (pp. 64-71).

www.irma-international.org/chapter/theoretical-overview-of-quantum-machine-learning-applications-in-enhancing-demand-forecasting-for-supply-chain-management/351813

A Secure Quantum Technology for Smart Cities Using Travelling Salesman Problem (TSP): Application Perspectives

A. Rehash Rushmi Pavitra, I. Daniel Lawrence and A. Muthukrishnan (2023). *Handbook of Research on Quantum Computing for Smart Environments* (pp. 165-177).

www.irma-international.org/chapter/a-secure-quantum-technology-for-smart-cities-using-travelling-salesman-problem-tsp/319867

Exploring the Frontier: Introduction to Quantum Computing and Quantum Cryptography

Navya Sree Anagani, Rajesh Doriya and Chandrasekhar Jatoth (2025). *Harnessing Quantum Cryptography for Next-Generation Security Solutions* (pp. 1-36).

www.irma-international.org/chapter/exploring-the-frontier/362582

Integration of Hybrid Quantum–Neuromorphic AI With Cloud, Edge, and High-Performance Computing Environments

Arun B. Prasad, Ajay Prasad, Dineshkumar Rajendran, Anurag Tiwari, T. Akilan and Islombek Khushvaktov (2026). *Emerging Hybrid Models for Neuromorphic AI and Quantum Computing* (pp. 201-232).

www.irma-international.org/chapter/integration-of-hybrid-quantum-neuromorphic-ai-with-cloud-edge-and-high-performance-computing-environments/404177

Smart Parking Management System Using AI Enhanced by Quantum Network

S. Akash, S Mary Joans, T. Mukunthrajan and P. Karthikeyan (2024). *Quantum Networks and Their Applications in AI* (pp. 321-336).

www.irma-international.org/chapter/smart-parking-management-system-using-ai-enhanced-by-quantum-network/354378