

IEEE Transactions on Consumer Electronics

Call for Papers

Special Section on “Quantum in Consumer Technology: Opportunities and Challenges”

Theme:

Quantum computers are built based on the principles of quantum mechanics, such as superposition and entanglement, which enable them to perform certain computations much faster than classical computers. The gate model is a common way to implement quantum algorithms, where the algorithms are broken down into a sequence of simple gates that operate on one or more quantum bits. This manipulation of a quantum computer involves a series of unitary transformations that affect each component of the superposition simultaneously, enabling significant parallel data processing and reducing execution time. As a result of these capabilities, quantum technology is expected to provide abilities and performance that are currently unattainable by classical methods. However, quantum hardware is still in its early stages of development and is prone to errors, which can negatively impact the performance of quantum methods. To overcome this challenge, error mitigation techniques are used to reduce the impact of errors on the final results. By leveraging the speedup offered by quantum hardware and using effective error mitigation techniques, quantum methods can outperform classical methods for various Consumer Applications (CA).

Quantum technology has the potential to revolutionize a wide range of industries, including Consumer Technology (CT). The complexity of consumer technology will create major issues such as privacy, scalability, decision-making, and performance. Furthermore, the heterogeneity of connected devices and services will generate a huge amount of data that must be processed and managed efficiently. This trend is expected to increase further with the integration of applications such as smart cities, connected vehicles, homes, medical devices, consumer electronics, digital rights management, supply chain management, insurance, and more. Solving these problems will require substantial computations and data analytics that are too expensive and time-consuming to perform on classical computers. Therefore, conventional approaches are unable to address these challenges adequately, and the community requires unconventional solutions. The ability of quantum computers to process a large amount of data quickly and accurately can enable new and improved products and services for consumers such as machine learning, drug discovery, financial modeling, and cryptography. Therefore, the special issue is intended to report high-quality research on recent advances toward quantum and CT convergence, more specifically to the state-of-the-art approaches, methodologies, and systems for the design, development, deployment and innovative use of those quantum convergence technologies to provide insight into CT service demands. We hope that this Special Issue helps identify promising directions and future trends for those seeking to contribute to this research direction.

Topics of interest in this Special Section include (but are not limited to):

- Quantum machine learning for optimization and data-driven CA.
- Post-Quantum and Quantum cryptography for security, trust and privacy in CA.
- Quantum communication architectures and protocols for CA.
- Quantum sensing and sensor systems for consumer devices and CA.
- Quantum algorithms for data processing/use/management in CA.
- Quantum blockchain to secure critical infrastructure for CA.
- Industrial experience reports and use cases of quantum enabled emerging CA.
- Benchmarking of classical and quantum approaches for CA.

Important dates:

- End of submission of Manuscripts: January 31, 2024
- Expected publication date (tentative): 4th quarter 2024

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Instructions for authors:

Manuscripts should be prepared following guidelines at: <https://ctsoc.ieee.org/publications/ieee-transactions-onconsumer-electronics.html> and must be submitted online following the IEEE Transactions on Consumer Electronics instructions: <https://ctsoc.ieee.org/publications/ieee-transactions-on-consumer-electronics.html>. During submission, the Special Section on **“Quantum in Consumer Technology: Opportunities and Challenges”** should be selected.