

Q1 Edge AI vs. Cloud-Based AI: Reducing Latency & Enhancing Privacy

Edge AI refers to running AI algorithms locally on devices like smartphones, sensors, or drones rather than sending data to a centralized cloud server for processing.

Advantages over Cloud-Based AI:

- **Reduced Latency:** Data doesn't need to travel to remote servers. Decisions are made instantly on-device critical for real-time applications like autonomous navigation or healthcare monitoring.
- **Improved Privacy:** Sensitive data (e.g., biometric, medical, or environmental) stays local, minimizing exposure to breaches or misuse during transmission or storage in centralized clouds.

Real-World Example: Autonomous Drones

Drones used for search-and-rescue missions equipped with Edge AI can:

- Detect obstacles and navigate terrains in real time without relying on a network.
- Analyse visual input to identify human figures or distress signals locally, preserving the privacy of individuals captured during surveillance.
- Continue functioning in connectivity-poor environments like forests or disaster zones.

By offloading intelligence to the edge, drones operate with greater autonomy, speed, and privacy assurance critical for emergency response and defence.

Q2 Quantum AI vs. Classical AI in Optimization

Optimization problems like route planning, portfolio management, or molecular simulations are computationally intensive and grow exponentially with complexity.

Classical AI:

- Relies on conventional machine learning and deep learning techniques.
- Effective for structured environments but often struggles with complex, multidimensional optimization problems.

Quantum AI:

- Uses **quantum bits (qubits)** which can represent multiple states simultaneously.
- Leverages **quantum superposition** and **entanglement** to evaluate many possibilities in parallel.

- Quantum algorithms (e.g., Grover's, QAOA) can offer exponential speedup for specific problems.

Industries Poised to Benefit Most:

Industry	Quantum AI Advantage
Healthcare	Drug discovery via quantum molecular modelling
Logistics & Supply Chain	Route optimization across variables
Finance	Portfolio optimization and risk assessment
Energy	Grid management and resource allocation

Quantum AI promises breakthroughs in problems classical systems find intractable—but hardware and stability challenges remain.

Q3 Societal Impact of Human-AI Collaboration in Healthcare

AI integration in healthcare is reshaping how professionals deliver care transforming roles, augmenting decision-making, and improving patient outcomes.

Impact on Roles:

- **Radiologists:** AI can pre-analyse images for anomalies freeing radiologists to focus on edge cases, consultations, and oversight.
- **Nurses:** AI-assisted triage, real-time patient monitoring, and administrative automation lighten workloads and enable more personalized care.

Societal Transformations:

- **Accessibility:** AI tools extend diagnostic capabilities to underserved or rural areas.
- **Efficiency:** Reduced wait times, streamlined workflows, and better resource allocation.
- **Ethical Considerations:** Requires oversight to avoid bias in AI diagnostics and ensure trust between patients and providers.

The key is **collaboration**, not replacement. AI becomes an intelligent assistant allowing human professionals to focus more on empathy, creativity, and decision-making.