- ***<u>THEORITICAL ANALYSIS</u>***

- ***Q1: Explain how Edge AI reduces latency and enhances privacy compared to cloud-based AI. Provide a real-world example (e.g., autonomous drones).***

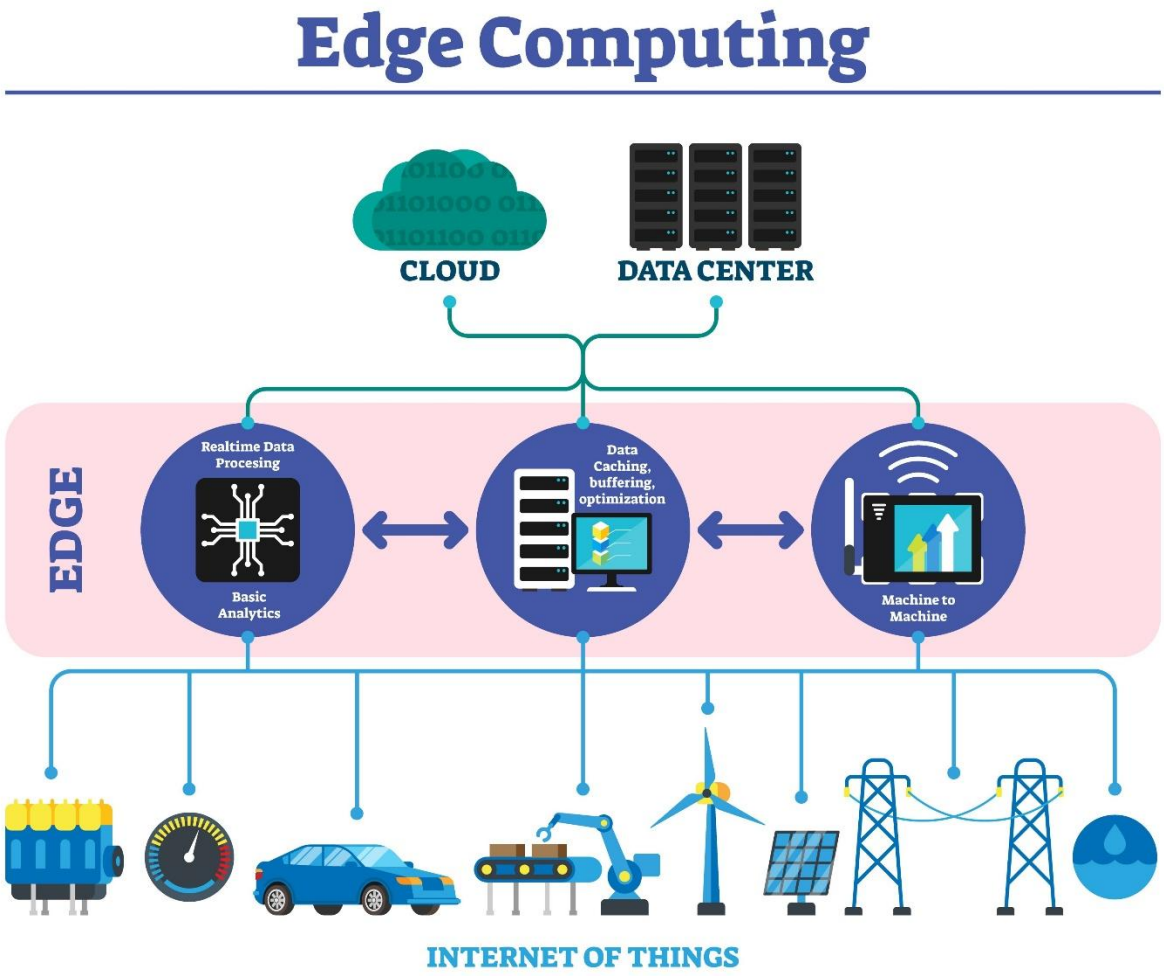
  ***Edge AI involves processing data locally on the device (the "edge") rather than sending it to a centralized data centre.***

- ***Latency Reduction: In cloud AI, data must travel to a server, be processed, and return. This "round-trip" time is too slow for split-second decisions. Edge AI eliminates this travel time, allowing for near-instantaneous inference.***

- ***Privacy Enhancement: Sensitive data (video feeds, biometric data) never leaves the local device. This reduces the "attack surface" and prevents data interception during transmission.***

- ***Real-World Example***

  ***(Autonomous Drones): An autonomous drone navigating a forest cannot wait 500ms for a cloud server to identify a tree. Using Edge AI, the drone processes onboard camera data locally to perform obstacle avoidance in real-time ($<10\text{ms}$), ensuring it doesn't crash if it loses its Wi-Fi/LTE connection.***




- ***Q2: Compare Quantum AI and classical AI in solving optimization problems. What industries could benefit most from Quantum AI?***

Classical AI uses bits (0 or 1), while **Quantum AI** uses qubits, which leverage **superposition** and **entanglement**.

- **Optimization Problems:** Classical computers must often check solutions sequentially or use heuristics that might miss the "global optimum." Quantum algorithms (like the Quantum Approximate Optimization Algorithm) can explore a massive solution space simultaneously, finding the most efficient route or configuration much faster.
- **Beneficiary Industries:**
    - **Logistics:** Solving the "Traveling Salesperson Problem" for global shipping fleets.
    - **Pharmaceuticals:** Simulating molecular structures for drug discovery.

- **Finance:** High-frequency trading and complex risk-assessment modelling.