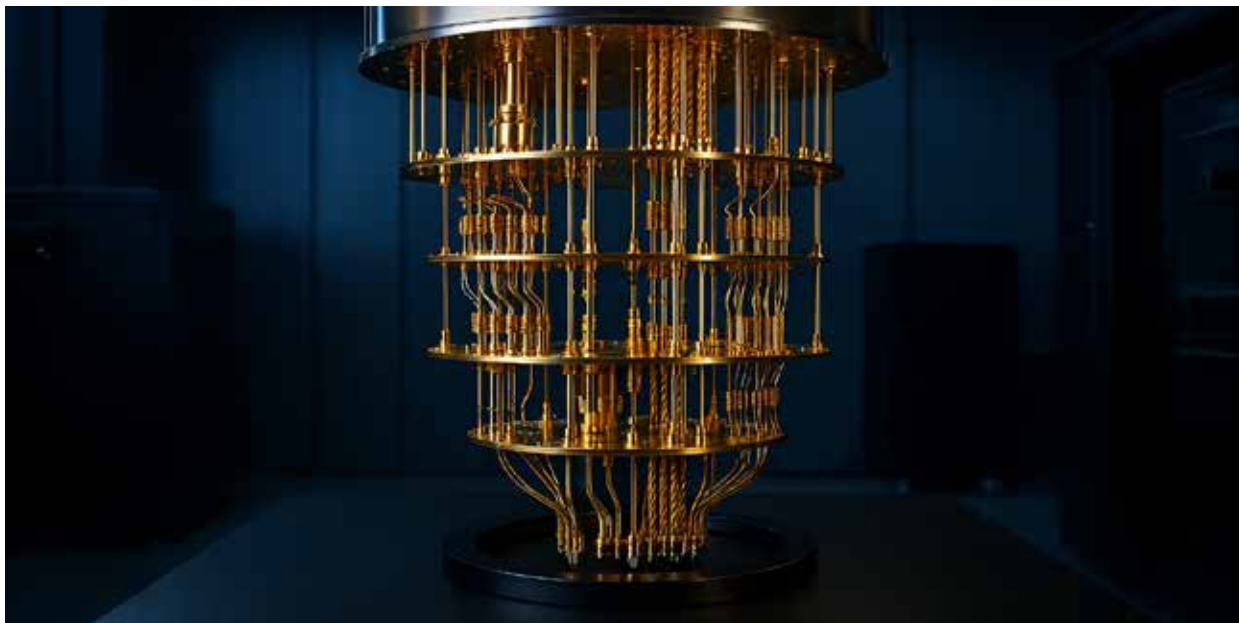


THE TECH TALK

From Bits to Qubits: Quantum Computing a Glimpse of Tomorrow

Quantum computing is an emerging deep-tech field with the potential to redefine future scientific discovery, **industrial innovation**, and **computational capability**. While the underlying research foundation is already strong, growing **global competition** makes it increasingly important to move faster from **laboratory-scale experiments** to **scalable, real-world quantum systems**.

Achieving this shift depends on strengthening the entire **quantum technology stack**, from **fundamental research** and **specialized skills development** to **robust software platforms**, reliable hardware infrastructure, and clearly defined application use cases. Crucially, **close collaboration between academia and industry** will determine success as quantum technologies advance from today's **noisy intermediate-scale quantum (NISQ)** devices toward **fault-tolerant quantum computers** capable of delivering **transformative practical impact**.



Evolution of Quantum Computing



Theory (1980s–1990s)

- Quantum computing was proposed to solve problems beyond classical limits



Early Experiments (2000s)

- Small lab systems with a few qubits demonstrated feasibility



NISQ Era (2010s–Today)

- Noisy machines with tens to hundreds of qubits used for research and testing



Hybrid Computing (Near Term)

- Quantum processors work alongside classical computers as accelerators.



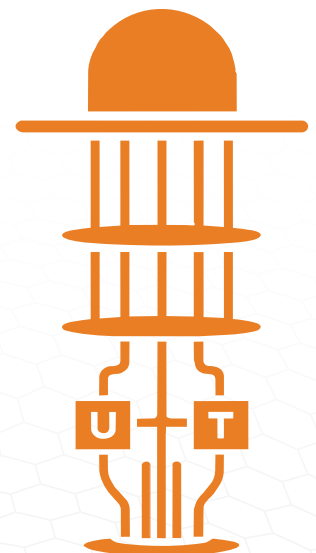
Fault-Tolerant Systems (Future)

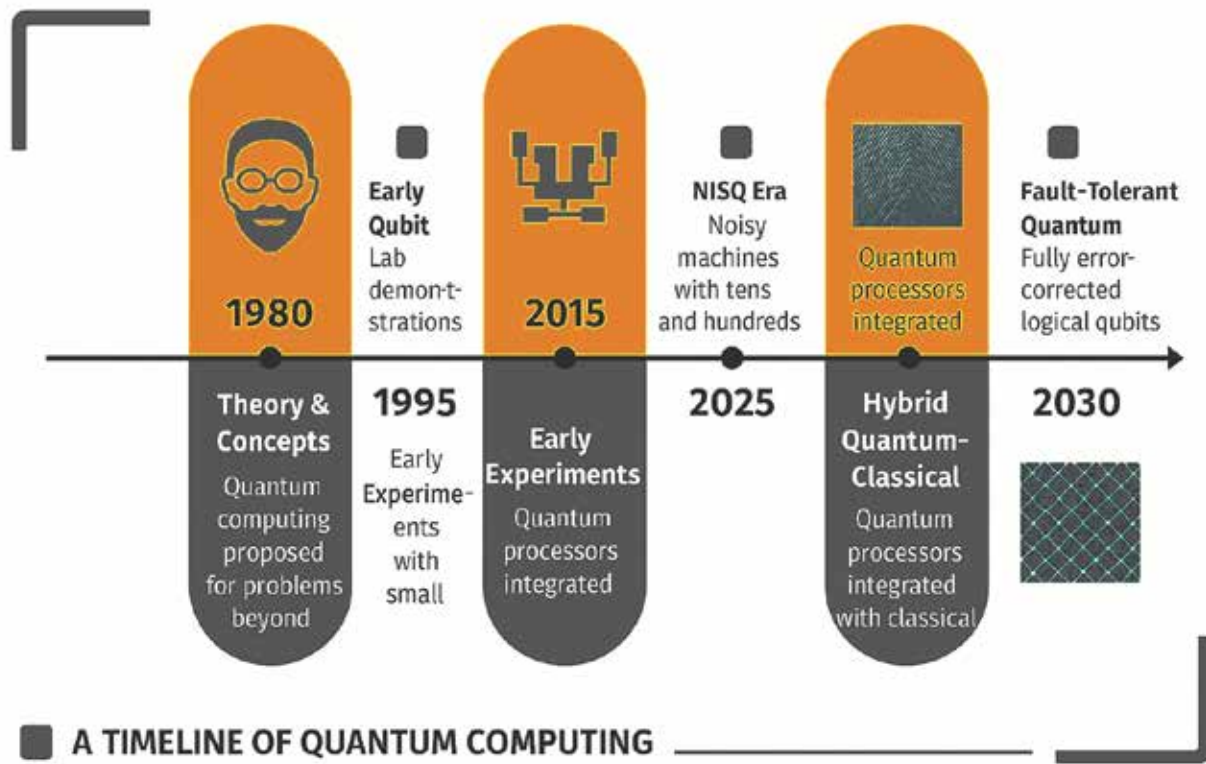
- Error-corrected quantum computers enable deeper and more reliable computations



Large-Scale Quantum (Long Term)

- Scalable systems for problems impossible for classical computing





Quantum-Enhanced Artificial Intelligence: Motivation and Scope

Why Quantum Computing Matters for AI

- **Artificial intelligence workloads are growing rapidly** in size, complexity, and ambition across research and industry
- Many leading AI methods rely on **computationally intensive operations**, including:
 - Large-scale optimization across vast solution spaces
 - Sampling from complex probability distributions
 - Processing and learning from high-dimensional data
- As model sizes and data volumes increase, classical computing architectures are reaching practical limits in terms of:
 - Computation time
 - Energy consumption
 - Scalability and cost

Key Takeaway

- While quantum-enhanced AI will not benefit all applications equally, it holds **strong promise for targeted, high-impact use cases** where classical computation faces fundamental limits
- Identifying and validating these use cases is a critical step toward realizing **practical and scalable quantum-assisted AI systems**

Quantum Computing Approaches for Machine Learning

Quantum supervised learning (QSL) explores how quantum computing can be used to support and enhance classical supervised learning tasks. In supervised learning, models are trained on **labeled data** to learn the mapping between **input features** and **output labels**, to make accurate predictions on previously unseen data.

Core Concepts of Supervised Learning

- Supervised learning is one of the most widely used machine learning paradigms
- Typical tasks include:
 - **Classification** – assigning inputs to predefined categories
 - **Regression** – predicting continuous numerical values

Modern approaches, such as **deep neural networks**, have achieved strong performance when large datasets and specialized hardware are available

Limitations of Classical Supervised Learning

Despite their success, classical methods face several challenges:

High data requirements

- Large volumes of labeled data are often needed for effective training

Scalability challenges

- Modeling high-dimensional, non-linear relationships can be computationally prohibitive

“Where classical computing stops scaling, quantum computing begins”

Our Vision:

“Act as a catalyst to make housing affordable in India by enabling risk optimization through data technology leverage”

Our Mission:

- Partner with the housing finance industry to drive financial inclusion goals and promote responsible lending
- Maximise shareholder value while maintaining prudent risk discipline



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