

AI and Quantum Research Center (AIQRC), Asia University, Taiwan

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[1] Upcoming event, Dec. 3 – 4, 2026

About the Symposium

AI is moving beyond chatbots and software — into robots, factories, vehicles, and autonomous systems that sense, reason, and act in the real world. This is Physical AI, and it represents the next great competitive frontier for enterprise technology.

Physical AI & Robotics Symposium 2026 brings together the pioneers building this future — engineers, researchers, and enterprise leaders working at the intersection of AI, robotics, and industrial automation. Over two days, attendees will explore how intelligent machines are reshaping manufacturing, healthcare, logistics, and human-machine collaboration, and what it truly takes to move Physical AI from experimentation

Click [here](#) for more details.



[2] Asia University and AIQRC, supported by the Ministry of Education's Taiwan Global Pathfinders Grant Program, provide Taiwan students with world-class experiential learning opportunities through programs in IBM quantum technologies, UCLA academic exchange, quantum finance, humanoid robotics, and astronaut mission training.



(A) IBM dream program



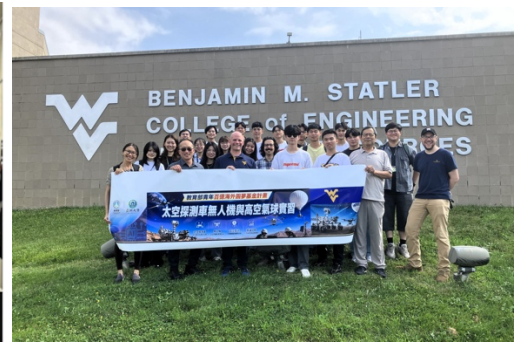
(B) UCLA elite program



(C) Quantum finance program



(D) Humanoid robot program



(E) Astronaut mission training program

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[3] Hybrid Quantum–Classical Machine Learning in FinTech: From Technical Possibility to Business Value

Abstract

Quantum computing is attracting growing interest in financial services, particularly for complex analytical and decision-making tasks. This article examines **hybrid quantum–classical machine learning in FinTech** from a business value perspective. Rather than focusing only on technical capability, it proposes a simple assessment framework based on three questions: **Does quantum processing improve analytical performance? Does it provide a meaningful computational advantage? And is the improvement worth the added cost and complexity?** Using credit risk prediction as an example, **the articles [1, 2]** argues that the near-term value of quantum computing lies in selective integration with existing financial systems rather than their replacement.

1. Introduction

Machine learning is already widely used in FinTech for **credit scoring, fraud detection, financial forecasting, and portfolio management**. However, financial data are often complex, dynamic, and uncertain, making prediction and decision-making more challenging as the volume and variety of data continue to grow.

Quantum Machine Learning (QML) has emerged as a possible extension of existing analytical approaches. Recent studies have explored its potential in financial prediction, risk analysis, fraud detection, and investment optimization, although current quantum technologies still face limitations in hardware capacity, noise, and scalability. **For FinTech, the more important question is therefore not whether quantum computing can replace machine learning, but whether it can create measurable value when integrated with existing financial systems.**

2. Hybrid Quantum–Classical Architecture and Business Value

A hybrid architecture combines conventional financial systems with quantum processing at selected stages of analysis. Most activities including data collection, preparation, and final decision-making remain within classical systems, while quantum processing is introduced only where it may offer additional analytical capability.

Financial Data → Classical Data Preparation → Quantum Processing → Classical Analysis → Business Decision

Credit risk prediction provides a simple example. A financial institution may use income, debt level, repayment history, and transaction behaviour to estimate the likelihood of default. In a hybrid system, conventional methods prepare and select these variables, while a quantum component is used to analyse selected relationships before the result is returned to the existing risk assessment process.

Customer Data → Feature Selection → Quantum Analysis → Risk Prediction → Lending Decision

The business objective remains unchanged: better lending decisions and more effective risk management. The key issue is whether the quantum component improves the decision process enough to justify its use. Based on insights from [3,4], we propose a simple **Business Value Test for Hybrid QML** on three questions: **Does it improve analytical performance? Does it provide a meaningful computational advantage? And is the improvement worth the additional cost and complexity?**

Hybrid QML creates business value only when its technical benefits translate into better decisions, greater efficiency, or improved risk management.

3. Challenges and Future Directions

Hybrid QML still faces major barriers, including limited hardware capacity, system instability, scalability, data preparation requirements, and implementation cost. More importantly, current research does not yet provide consistent evidence that quantum-based approaches outperform strong classical models in real financial environments.

Building upon insights from [3,4], the proposed Business Value Test shifts the evaluation of hybrid QML beyond technical performance alone. Future research should examine not only whether quantum processing improves prediction or computational performance, but also whether those improvements translate into measurable financial value. **The next stage of quantum FinTech research should therefore move from demonstrating technological possibility to proving business usefulness.** Real-world testing, cost-effectiveness, system integration, and comparison with strong classical benchmarks will be essential before hybrid QML can become a practical part of mainstream FinTech.

References

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- [3] Naik, A. S., Yeniaras, E., Hellstern, G., Prasad, G., & Vishwakarma, S. K. L. P. (2025). From portfolio optimization to quantum blockchain and security: a systematic review of quantum computing in finance. *Financial Innovation*, 11, 88. DOI: 10.1186/s40854-025-00751-6.
- [4] Chiv, K., Nayyar, A., & Kim, T.-K. (2026). A comprehensive survey of quantum computing approaches for portfolio optimization in FinTech. *ICT Express*. DOI: 10.1016/j.icte.2026.07.025

Hybrid Quantum-Classical Machine Learning in FinTech: From Technical Possibility to Business Value

A graphical summary



1 FinTech Context

Machine learning is widely used for credit scoring, fraud detection, forecasting, and portfolio management. Financial data are complex, dynamic, and uncertain.



Banking & Finance



Fraud Detection

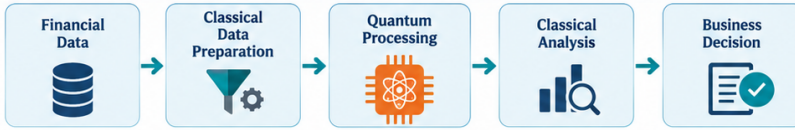


Forecasting



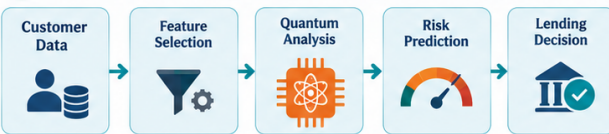
Portfolio Management

2 Hybrid Quantum-Classical Architecture



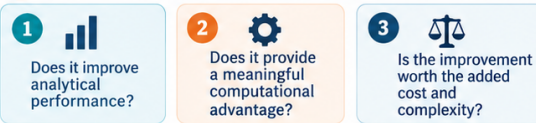
Quantum processing is introduced only at selected analytical stages.

3 Example: Credit Risk Prediction



Goal: better lending decisions and stronger risk management.

4 Business Value Test for Hybrid QML



Hybrid QML creates value only when technical gains translate into better decisions, greater efficiency, or improved risk management.

5 Challenges and Future Direction



The next stage of quantum FinTech research should move from technological possibility to business usefulness.

QUANTUM AND CLASSICAL INTELLIGENCE
FOR A MORE RESILIENT FINANCIAL WORLD

IDEAS → ANALYSIS → BETTER DECISIONS



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