Archer Materials
Technology

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ASX Announcement (ASX: **AXE**) 4 June 2026

Quantum Machine Learning Fraud Detection Project Achieves Key Technical Milestones

Highlights

- Successful completion of the next stage of Archer's quantum machine learning (QML) fraud detection project, following the dataset preparation milestone announced in March 2026.
- A quantum neural network (QNN) fraud detection model was successfully tested and benchmarked using a publicly available financial fraud dataset.
- When testing the early, small QNN on a qubit simulator, even at this early stage, it performed equivalently to the best classical models used in the benchmarking. The model generated only one false positive while correctly identifying 118 fraudulent transactions.
- These early tests demonstrate that a QNN model can be used for fraud detection, is already competitive with classical models, can achieve high precision, and can run on both quantum simulators and real quantum hardware.
- The model was also successfully executed on IQM Garnet, a commercial superconducting quantum computer accessed through AWS Braket.
- This progress has substantially reduced technical uncertainty and established a foundation for the next phase of the project aimed at testing on larger quantum systems and establishing quantum advantage for this high value application.
- Global financial institutions and quantum technology companies are actively exploring similar use cases, including Quantinuum's work with HSBC on QML for fraud detection and Intesa Sanpaolo's collaboration with IBM to explore QML for improving fraud detection.

Archer Materials Limited ("Archer", the "Company", "ASX: AXE"), a quantum company developing technologies in computing, sensing, and medical diagnostics, has completed the next stage of its QML research project for financial fraud detection.

In March 2026, Archer announced that the dataset preparation stage was complete and the project was moving into QML simulations and benchmarking (ASX ann. 18 Mar 2026). This simulation and benchmarking work has now been completed.

The QNN workflow was developed and evaluated using a publicly available financial fraud dataset containing more than 280,000 transaction records. The dataset was processed using dimensionality reduction and data balancing techniques to enable operation within current quantum computing constraints.

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A staged experimental framework was used to identify an optimal quantum model configuration, including qubit-selection studies, feature-map optimisation, benchmarking against classical machine learning approaches, and quantum noise analysis.

Quantum fraud detection results

The QNN model performed strongly in the simulator test environment. It correctly identified 118 fraudulent transactions and missed 30 fraudulent transactions, while producing only one false positive. This is important because one of the biggest practical challenges in fraud detection is avoiding excessive false alerts that create unnecessary review costs and poor customer experience.

The selected model was also tested under simulated quantum noise and remained stable at low noise, with only minor performance degradation at moderate noise levels. At higher noise levels, performance declined materially. This is a useful technical finding because it helps identify the hardware quality and noise levels that may be required for future practical QML applications.

In addition to simulator-based testing, the QNN was executed on IQM Garnet, a 20-qubit superconducting quantum computer available through AWS Braket. The hardware validation successfully detected 18 of 19 fraudulent transactions in the test set, demonstrating operation of the model on commercial quantum hardware.

While the real-hardware experiment involved higher false-positive rates than simulator testing, the results provide valuable validation of the model under current quantum computing conditions and support further investigation of quantum machine learning applications.

The work to date has successfully demonstrated that QML models can perform competitively on a real fraud-detection benchmark and can be executed on both simulators and physical quantum hardware. The work identified a high-performing quantum architecture, established a repeatable benchmarking framework, and provided valuable insights into scaling, noise tolerance and deployment constraints.

While Archer has not yet demonstrated a clear performance advantage over leading classical AI approaches, we have substantially reduced technical uncertainty and established a foundation for the next phase of the project aimed at testing whether larger quantum systems and richer feature representations can deliver measurable business advantages.

Quantum machine learning for financial services is attracting growing international attention. Quantinuum and HSBC have announced work exploring quantum machine learning for fraud detection[1], while Intesa Sanpaolo, a major Italian banking group, is collaborating with IBM to explore QML for improving fraud detection accuracy and speed. These external programs demonstrate that leading financial institutions are investigating similar quantum use cases[2].

[1] https://www.quantinuum.com/press-releases/hsbc-and-quantinuum-explore-real-world-use-cases-of-quantum-computing-in-financial-services
[2] https://group.intesasanpaolo.com/en/newsroom/press-releases/2023/02/intesa-sanpaolo--agreement-with-ibm-for-an-innovative-technology

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Next Steps

This phase of the QMPL project was conducted on a prepared research dataset, using a selected group of comparison models and current quantum computing constraints. Further testing, including larger datasets, additional classical benchmarks, repeated trials and further hardware validation, is required before any commercial deployment pathway can be assessed. Archer and is aiming for a full QML prototype by the end of this year.

Commenting on the progress of the QML Project, Dr Simon Ruffell, CEO of Archer, said

"These results have demonstrated that QML approaches can deliver strong fraud detection performance while operating within the constraints of current quantum computing systems.

"The simulator results were solid, particularly the very low false-positive rate, and the successful execution on real quantum hardware is an important validation step.

"The research collaboration agreement with the CSIRO forms part of Archer's strategy to investigate practical applications of quantum computing technologies and support future commercialisation opportunities in data-intensive industries. Fraud detection is a relevant use case for QML because banks and payment providers must analyse large volumes of transaction data quickly, while reducing both missed fraud and false alerts."

The Board of Archer authorised this announcement to be given to ASX.

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About Archer

Archer is a quantum technology company that operates within the semiconductor industry. The Company is developing advanced semiconductor devices, including chips relevant to quantum computing, sensing, and medical diagnostics. Archer utilises its global partnerships to develop these technologies for potential deployment and use across multiple industries. www.archerx.com.au