**" Towards Quantum-Enhanced Machine Learning for Fraud Detection"**

*A project report submitted in fulfillment of the requirements for dissertation-II for*

*the degree of*

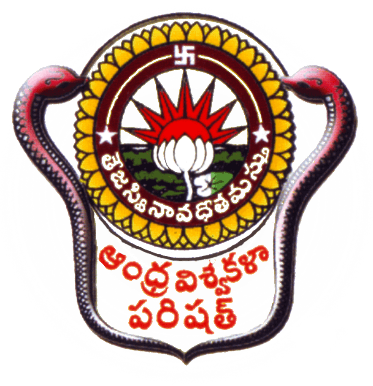
**MASTER OF TECHNOLOGY**  
*in*  
**COMPUTER SCIENCE AND TECHNOLOGY**

***submitted by*  
Pedada Harika   
(Reg. No: 323206415012)**

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***Under the esteemed guidance of***  
**DR. K VENKATA RAMANA**

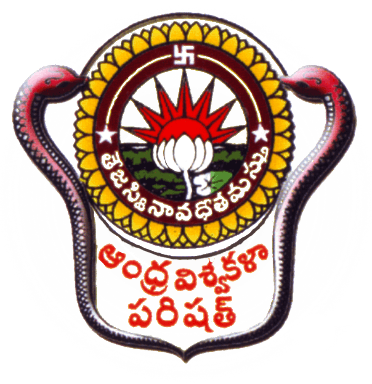
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(2025)**

**DEPARTMENT OF COMPUTER SCIENCE AND SYSTEMS ENGINEERING, ANDHRA UNIVERSITY COLLEGE OF ENGINEERING(A)**

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**CERTIFICATE**

This is to certify that the project entitled **TOWARDS QUANTUM-ENHANCED MACHINE LEARNING FOR FRAUD DETECTION** is a bonafide work being carried out by **Pedada Harika**, bearing Regd. No. **323206415012** in fulfillment of the requirements for dissertation-II for the degree of Master of Technology in **Computer Science and Technology** in the Department of Computer Science & Systems Engineering, Andhra University College of Engineering (A), Andhra University, Visakhapatnam, during the Academic Year 2024-2025.

**Dr. K. VENKATA RAMANA Prof. K. VENKATA RAO**

**Project Guide Head of the Department**

**DECLARATION**

I **Pedada Harika**, bearing a Regd. No **323206415012**, hereby declare that the project report entitled “**TOWARDS QUANTUM-ENHANCED MACHINE LEARNING FOR FRAUD DETECTION**” is an original work done at Department of Computer Science and Systems Engineering, Andhra University College of Engineering (A), Andhra University, Visakhapatnam, submitted in fulfillment of the requirement for dissertation-II for the degree of Master of Technology with Computer Science and Technology.

**PEDADA HARIKA**

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**ABSTRACT**

The study explores how advances in machine learning methods for identifying credit card fraud might benefit from quantum computing. The primary objective is to evaluate how well a Quantum Convolutional Neural Network (QCNN) performs relative to a classical Convolutional Neural Network (CNN) to determine whether quantum models deliver superior outcomes. The selection of this research topic stems from the increasing complexity of financial fraudulent activities combined with traditional models’ inability to manage extensive and imbalanced datasets. Quantum computing provides advantages such as parallel processing, superposition, and entanglement, offering improved computational performance for these tasks. The research began with the creation of a CNN model using conventional deep learning approaches, followed by the design of a QCNN model through quantum circuit simulations using a quantum framework. Both models were trained on identical datasets, and their learning patterns and results were comparatively analyzed. Observational results indicated that the quantum model exhibited superior pattern recognition and learning abilities when processing the data. The findings highlight the growing potential of quantum-enhanced machine learning in detecting complex financial fraud more accurately and efficiently. This advancement can significantly strengthen fraud detection systems used by banks, financial institutions, and cybersecurity applications. Moreover, the proposed framework can be extended to other domains involving imbalanced and high-dimensional data, such as healthcare diagnostics and cyber intrusion detection. Future work will focus on implementing QCNNs on real quantum hardware, optimizing circuit depth, and exploring hybrid quantum–classical models for scalable, real-world deployment.

**Keywords:** Quantum Machine Learning, Fraud Detection, Quantum Convolutional Neural Network, CNN, PennyLane, SMOTE.