



DEPARTMENT OF  
COMPUTER SCIENCE

TEXAS TECH  
Whitacre College of Engineering

## Privacy-Preserving Quantum Annealing for Quadratic Unconstrained Binary Optimization (QUBO) Problems

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3:30 p.m.

Zoom

**Abstract:** Quantum computing offers new opportunities for solving complex optimization problems that are difficult for classical algorithms. One promising approach, quantum annealing, can efficiently handle Quadratic Unconstrained Binary Optimization (QUBO) problems found in areas such as scheduling, machine learning, and network design. However, using cloud-based quantum annealers introduces a key concern: submitting a QUBO problem may reveal sensitive information to the service provider.

In this talk, I will present a privacy-preserving framework that allows users to benefit from quantum annealing without disclosing their data. The method uses digit-wise splitting and matrix permutation to disguise the QUBO model while preserving its solvability, enabling accurate reconstruction of the original solution. I will show both theoretical and experimental results demonstrating that this approach effectively balances privacy, accuracy, and efficiency, paving the way toward secure and practical quantum optimization.

**Bio:** Qun Li is a Professor with the Department of Computer Science, William & Mary. His recent research centers around quantum computing and networking, edge computing, deep learning systems, as well as wireless, mobile, and embedded systems. He is an IEEE Fellow.

