## Hoong Chuin Lau's Research on Quantum Optimization

I am interested in solving combinatorial optimization problems with hybrid classical-quantum and quantum-inspired algorithms. The following lists the publications and shows my group at SMU.

### Publications and Working Papers

Monit Sharma and Hoong Chuin Lau. From Circuits to Hardware: Benchmarking Standard and Qubit-Efficient Quantum Optimization on Real Hardware. *Quantum Science and Technology* , Volume 11, no. 4 (2026). https://arxiv.org/pdf/2607.11637

Xinjian Yan, Xinwei Lee, Ningyi Xie, Yoshiyuki Saito, Leo Kurosawa, Nobuyoshi Asai, Dongsheng Cai, Hoong Chuin Lau. Light Cone Cancellation for Variational Quantum Eigensolver in Solving Noisy Max-Cut, *Sci Rep* ***16****, 9597 (2026).* https://arxiv.org/abs/2404.19497

Monit Sharma and Hoong Chuin Lau. AutoQResearch: LLM-Guided Closed-Loop Policy Search for Adaptive Variational Quantum Optimization. In: Proceedings of the IEEE Quantum Computing and Engineering Conference (QCE), 2026. https://arxiv.org/abs/2604.24283

Monit Sharma and Hoong Chuin Lau. Hybrid Learning and Optimization methods for solving Capacitated Vehicle Routing Problem. In: Proceedings of AAAI 2026 Workshop on Quantum Computing and Artificial Intelligence, *Springer Communications in Computer and Information Science*, volume 2872. http://arxiv.org/abs/2509.15262

Monit Sharma and Hoong Chuin Lau. Learning-Based Graph Shrinking for Quantum Optimization of Constrained Combinatorial Problems. In: Proceedings of AAAI 2026 Workshop on Quantum Computing and Artificial Intelligence. *Springer Communications in Computer and Information Science*, volume 2872. https://arxiv.org/abs/2506.14250

Monit Sharma and Hoong Chuin Lau. Transferable Equivariant Quantum Circuits for TSP: Generalization Bounds and Empirical Validation. http://arxiv.org/abs/2510.14533

Jonanthan Teo, Xin Wei Lee and Hoong Chuin Lau. Understanding the Nature of Depth-1 Equivariant Quantum Circuit. https://arxiv.org/abs/2511.10756

Jonanthan Teo, Xin Wei Lee and Hoong Chuin Lau. Improving the Equivariant Quantum Circuit for TSP. Working paper.

Monit Sharma and Hoong Chuin Lau. Cutting Slack: Quantum Optimization with Slack-Free Methods for Combinatorial Benchmarks. https://arxiv.org/abs/2507.12159

Xin Wei Lee and Hoong Chuin Lau. Implementing Slack-Free Custom Penalty Function for QUBO on Gate-Based Quantum Computers. In: Proceedings of the *IEEE Quantum Computing and Engineering Conference* (QCE), 2025. https://arxiv.org/abs/2504.12611

Xin Wei Lee and Hoong Chuin Lau. Solving Constrained Combinatorial Optimization Problems with Variational Quantum Imaginary Time Evolution. In: Proceedings of the *IEEE Quantum Computing and Engineering Conference* (QCE), 2025. https://arxiv.org/abs/2504.12607

Monit Sharma and Hoong Chuin Lau. Quantum Monte Carlo methods for Newsvendor problem with Multiple Unreliable Suppliers. http://arxiv.org/abs/2409.07183

Monit Sharma and Hoong Chuin Lau. A Comparative Study of Quantum Optimization Techniques for Solving Combinatorial Optimization Benchmark Problems. https://arxiv.org/abs/2503.12121

Ningyi Xie, Xinwei Lee, Dongsheng Cai, Yoshiyuki Saito, Nobuyoshi Asai and Hoong Chuin Lau. A Feasibility-Preserved Quantum Approximate Solver for the Capacitated Vehicle Routing Problem. *Quantum Information Processing*, Issue 8/2024. Presented in *27th Int. Conf. on Quantum Information Processing*, Taipei, 2024. https://arxiv.org/abs/2308.08785

Monit Sharma, Hoong Chuin Lau and Rudy Raymond. Quantum Enhanced-Simulation Based Optimization for Newsvendor Problems. In: Proceedings of the *IEEE Quantum Computing and Engineering Conference* (QCE), Montreal, Canada, 2024. Presented in *27th Int. Conf. on Quantum Information Processing* (QIP), Taipei, January 2024. https://arxiv.org/abs/2403.17389

Monit Sharma, Jin Yan, Hoong Chuin Lau, and Rudy Raymond. Quantum Relaxation for Solving Multiple Knapsack Problems. In: Proceedings of the *IEEE Quantum Computing and Engineering Conference* (QCE), Montreal, Canada, 2024. http://arxiv.org/abs/2404.19474

Siong Thye Goh, Jianyuan Bo, Sabrish Gopalakrishnan and Hoong Chuin Lau. Techniques to Enhance a QUBO Solver For Permutation-Based Combinatorial Optimization. In: *Genetic and Evolutionary Computation Conference (GECCO) Workshop on Quantum Optimization*, July 2022, Boston, USA. https://dl.acm.org/doi/10.1145/3520304.3533982 (early manuscript in https://arxiv.org/abs/2009.12767)

Whei Yeap Suen, Matthieu Parizy and Hoong Chuin Lau. Enhancing a QUBO solver via Data Driven Multi-start and its Application to Vehicle Routing Problem. In: *Genetic and Evolutionary Computation Conference (GECCO) Workshop on Quantum Optimization*, July 2022, Boston, USA. https://dl.acm.org/doi/10.1145/3520304.3533988

Siong Thye Goh, Jianyuan Bo, Matthieu Parizy and Hoong Chuin Lau. A Recommendation System Approach to Tune a QUBO Solver. In: *International Joint Conf. on Artificial Intelligence (IJCAI) Workshop on New Architectures for Search and Optimization*, July 2022, Vienna, Austria. https://sites.google.com/view/naso-2022

Tian Huang, Siong Thye Goh, Sabrish Gopalakrishnan, Tao Luo, Qianxiao Li, and Hoong Chuin Lau QROSS: QUBO Relaxation Parameter Optimisation via Learning Solver Surrogates. In: Proceedings of *IEEE 41st International Conference on Distributed Computing Systems Workshops* (ICDCSW), pages 35–40. 2021. https://arxiv.org/abs/2103.10695

Whei Yeap Suen, Chun Yat Lee and Hoong Chuin Lau. Quantum-inspired algorithm for Vehicle Sharing Problem. In: Proceedings of the *IEEE International Conference on Quantum Computing and Engineering* (QCE), Virtual, October, 2021. Link

**My Quantum Computing group at SMU (to be updated)**

Group Members:
Assoc Prof Manoj THULASIDAS
Dr LEE Xinwei (Research Scientist)
Monit SHARMA (Research Engineer)
Jonathan Teo (Student)
HUANG Beifei (Intern)
Dr Rudy RAYMOND, University of Tokyo (External Collaborator)