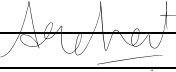




Master's Independent Study Authorization Form

Student Information		
Name: (Last, First) Ashok Kumar, Arahant		University ID # N 1 3 1 3 5 7 1 2
Independent Study Information		
Term & Year Term: Fall Year: 2020		Number of Credits: 3
<p>Brief Description of Independent Study: <u>Quantum Networks - Topological-Photonic Qubit Interchangeability</u></p> <p>Looking at how things are developing in the Quantum Computing space, it's largely hybrid: Superconducting Qubits for running quantum algorithms, Photonic Qubits for communications, Trapped-ion Qubits forming memory, etc. In this mix is also Topological Qubits.</p> <p>In the larger Quantum Network infrastructure, efficient integration between these aspects would become crucial. Memory, Computation and Communication are all crucial aspects of Classical networks as well. Classically, logical bits are, more or less, homogenous over all these aspects.</p> <p>But, each of the different aspects of Q-Computing (Qubits) are very different by nature. And to integrate all of them to build a seamless and efficient Q-Network infrastructure becomes exponentially complicated. This, therefore, is an important problem to solve.</p> <p>My focus would be to arrive at a solution to this critical challenge. Within this "Qubit-interchangeability" problem, I would like to focus on 2 types of Qubits: Topological Qubits and Photonic qubits. Topological Quantum Computing (TQC), theoretically, is an error free way to perform Q-Computing. It is a field of much interest in the Q-Computing space. This could potentially become the next important Q-Computing paradigm. However, TQC is ill-suited for communication.</p> <p>And communication is where Photonic qubits really excel at. Although there are errors which creeps in, Qubit Err Correction tries to address that problem. My focus would, therefore, look into Qubit-interchangeability between Topological Qubits (for computation) and Photonic Qubits (for communication). In the Network stack level, this would be in the Physical layer.</p> <p>GitHub link: https://github.com/arahant/Quantum-Networks</p>		
SIGNATURES		
Student Name: Arahant Ashok Kumar	Signature: 	Date: 8-19-2020
Professor Name: Anirudh Sivaraman	Signature:	Date:
DGS Name:	Signature:	Date:
<p align="center">IMPORTANT GUIDELINES FOR INDEPENDENT STUDY</p> <ul style="list-style-type: none"> ❖ Students must arrange to work on independent study projects under the direction of a full-time Department of Computer Science faculty member. ❖ Students should submit this form, after it is completed and signed off on by the professor, to their advisor, either Betty Tsang in CIWW 326 or James Paguyo in CIWW 324. 		