The Effects of Qubit Entanglement in Quantum Teleportation

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Transfer of data and information through computational systems is oftentimes unsecure. Confidential information and private knowledge from a source to a destination runs the risk of being obtained by unwanted users. With growing sources of information, quantum teleportation could be evolved into something greater, eventually leading to the transfer of information between quantum computers in a developed, secure way. This research studies the effects of qubit entanglement in quantum teleportation to determine the efficiency of this quantum information transfer. I created a total of 6 different Quantum Teleportation Circuits. My first two circuits consist of single entanglement jobs which have separate codes for statevector simulation and quantum computers. The next two circuits consist of two qubit entanglement jobs and the last two circuits consist of three qubit entanglement jobs, all run on the same devices. Changes in average experimental error rate for increasing entanglements increased as more qubits were implemented. There was an abrupt increase in experimental error rate as the amount of entanglements increased for all quantum computers. The expected quantum computers exhibited behaviors that prove how several entanglements affect the final outcome while also showing how their calibration data poses some limitations to the extent of the teleportation efficiency. Overall; when there is less entanglements in quantum teleportation, the transfer of qubits is more efficient as observed by the increasing experimental error rate. My findings conducted in my research could prove to be useful in the development of ideas in quantum teleportation.