BSc Thesis Task Description

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Minimizing Power Consumption of MIMO Network Using a Novel Quantum Genetic Algorithm.

Quantum algorithms offer a dramatic speedup for computational problems, with the challenges facing the quality of service in a telecommunications network and communications channels, multiple-input and multiple-output (MIMO) system will need to be substituted with new alternative optimized solutions.

Tasks to be performed by the student will include:

- Present the fundamental knowledge and techniques in quantum computing and communications.
- Present a state of art of the existing classical and quantum genetic algorithms.
- Create and design a downlink MIMO model for a large scale of users and base stations.
- Develop a new an unconstrained quantum genetic algorithm (UQGA) inspired by quantum extreme value searching algorithm (QEVSA).
- Optimize the overall power consumption of the proposed downlink MIMO system.
- Compute the parameters set up for the UQGA.
- Compare the computational complexity of both classical and quantum genetic algorithms.
- Validate the efficiency of the UQGA by building a simulation environment.

Supervisor at the department: Sara El Gaily

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