Quantum Computing and Cryptography - 14: Single-Qubit Gates and Operations

Length	Nanomodule
Collection	NSA NCCP
Updated	March 14, 2019
Contributors	Abhishek Parakh
Academic Levels	Undergraduate, Graduate
Topics	Quantum Computing
Link	https://clark.center/details/aparakh/b84bef9d-c1e0-463d-a5e3-3159b694be26

Description

In this nanomodule, students will learn to apply common single-qubit operations (gates) to quantum states. They will be able to build sequential quantum circuits for single qubits and compute the effect (output) of given sequential quantum circuit.

Email Dr. Abhishek Parakh at aparakh@unomaha.edu for solutions to the problems.

Note: To get started with Jupyter notebooks please follow the userguide available at: https://sites.google.com/unomaha.edu/userguideqcl/

Outcomes

- Calculate the effect of given sequential quantum circuit on a qubit.
- Build sequential quantum circuits for single qubits.
- Apply common single-qubit operations (gates).

Alignment

The standards and guidelines this learning object is mapped to

- NICE Workforce Knowledge (2017) - K0052: Knowledge of mathematics (e.g. logarithms, trigonometry, linear algebra, calculus, statistics, and operational analysis).
- CAE Cyber Defense (2014) - Programming: Students will be able to demonstrate proficiency in the use of a programming language to solve complex problems in a secure and robust

manner.
- CAE Cyber Defense (2014) - Basic Scripting: Students will be able to write simple and compound conditions within a programming language or similar environment (e.g., scripts, macros, SQL).
- NICE Workforce Knowledge (2017) - K0068: Knowledge of programming language structures and logic.

Links

External links that are associated with this learning object

- User guide