Graduation Project Proposal

QAL Mobile: Implementing QAL for iPhone and Android smartphones

QAL (Quantum Algorithms Lab) is an innovative visual interactive app that is currently under development for researching and teaching quantum algorithms and related mathematical fields. For more info on QAL, check https://q-info.github.io/QAL-Lite.

Project Description: QAL is currently implemented as a web app. In this graduation project students will be responsible of putting their programming skills and mobile app development skills towards providing a simple first-cut implementation of QAL as a mobile app instead, either for Android smartphones, Apple iPhones, or both.

In particular, QAL is currently designed as a "desktop" web app—one with a fixed screen orientation ('landscape/tilted') and a fixed color scheme ('light/day'). To support handheld devices, QAL can allow algorithms to be presented either horizontally ("in landscape mode," as in most desktop apps) or vertically ("in portrait mode," as in most mobile apps). Traditionally, i.e., in most quantum computing literature, quantum algorithms are presented with time "flowing" from left to right. In some quantum computing literature, however, it has been implicitly suggested that the time flow (i.e., the stacking of quantum operations) in quantum algorithms could be vertical (i.e., top to bottom). Supporting the vertical stacking of quantum operations in QAL will be explored in this graduation project. Also, the usual change of lighting conditions surrounding mobile devices suggests adding support for a 'dark/night' color scheme in the handheld/mobile version of QAL.

Team Size: 2-3 members.

Main Technologies: JavaScript, Swift, Java, and/or Kotlin. (Using other technologies, such as Flutter, is optional and, if needed, can be picked up quickly during the development of the graduation project.)

Prerequisites: Excellent OOP and mobile app development skills. Good knowledge of general math, particularly of linear algebra, is a plus, but not absolutely necessary.

Frameworks: QAL is currently implemented as a client-side web app that uses few simple libraries and frameworks (e.g., well-known JavaScript libraries such as jQuery, jQueryUI, … etc.). How these libraries are used in QAL can be explained to the students.

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