Graduation Project Proposal

QAL-XR: Adding Virtual/Augmented/Mixed Reality (VR/AR/XR) Support to QAL

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.

Educational and exploratory experiences that involve virtual reality (VR), augmented reality (AR), or mixed reality (XR) are typically strongly engaging. QAL visualizations and interactions currently build on the strong foundation of standard 2D and 3D graphics.

Project Description: In this graduation project students will be responsible of putting their graphics programming skills and web app development skills (using WebXR, JavaScript, TypeScript, … etc.) towards adding support for VR/AR/XR in QAL, building on the underlying data structures (e.g., for game state and game evolution) already present in QAL and in harmony with the graphics libraries used in it.

Team Size: 2-3 members.

Main Technologies: JavaScript and WebXR. (Other technologies are optional and, if needed, can be picked up quickly during the development of the graduation project.)

Prerequisites: Excellent programming skills. Excellent knowledge of VR/AR/XR concepts and tools (e.g., WebXR). Good knowledge of general math, particularly of linear algebra, is a plus, but not absolutely necessary.

(NB: This project will need to wait for QALA NIVs to be patented, and an NDA must be signed before working on the project. More details on patenting QALA NIVs are available in the QAL Abstract document.)

Frameworks: QAL is currently implemented as front-end code 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.

(If the students are interested in making major changes to the underlying frameworks used in QAL, e.g., to make QAL use Node.js, React.js, Vue.js, Anime.js, or other frameworks and libraries, suggestions of such changes are welcome and will be acceptable as long as a *strong arguments* for the changes are presented.)

More Details: Contact moez@alexu.edu.eg or moez@cs.rice.edu.