EE/ CprE/ SE 491 - sddec23-17

Simulated Design of Quantum Networks

Week 4 Report

Feb 20 - Feb 26

Client: Dr. Durga Paudyal

Faculty Advisor: Dr. Durga Paudyal

Team Members:

Benjamin Amick - Network security engineer

Derrick Wright - System integration engineer

Ohik Kwon- System component designer

Steven Tompary- Network engineer

Past Week Accomplishments

- We are still taking our time to understand quantum technology and quantum networking. Dr. Jonathan from the math department joined our meeting last week.

- **Ben** - Qiskit Research
    - Read through Qiskit documentation to explore its capabilities and prepare when we start to use it.
    - Researched graphical representation of quantum circuits and possible options we can use for the project

- **Derrick** - Researching about quantum gate
    - Researched about quantum gates by reading “Ytterbium ion trap quantum computing : The current state of the art” thesis.

- **Ohik** - Researching about quantum information and hardware
    - Researched quantum information in fundamental aspects by reading two chapters of a book.
    - Researched how a simple quantum key distribution works such as how a quantum key could be generated and why it is secured.

- **Steven** - Researching about quantum networks
    - Researched simple algorithms for communication between quantum computers and classical computers.
    - Specified problems might be substantial at the implementation stage which is that we can not use recursion logics in quantum computing.

Resources

Slides we used during a meeting

https://drive.google.com/drive/folders/1iGh7m19HMkXpeD560JwqtE8Lo48Vp942?usp=sharing

Books we are reading

- Introduction to quantum information, Stephen M. Barnett
- Quantum Computation and Quantum Information, Michael A. Nielson

Articles we found this week and reading

- Perspective on quantum transduction
- Github Qiskit Community Tutorials
- Ytterbium ion trap quantum computing : The current state of the art

Pending Issues

- Start to consider our fictional scenario where our quantum networking might need some imaginary customers.
- Decide to our schedule when we will finish our research phase and start to design for handling problem
- Preparing to take an outside lecture about quantum computing.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Benjamin Amick	Researched about QKD	4	12
Derrick Wright	Researched Quantum Information	4	12
Ohik Kwon	Research quantum gates	4	12
Steven Tompary	Researched quantum networks	4	12

Plans for Coming Week

- Share individual research about quantum networks- everyone
- Finish reading the introduction to quantum information book and move onto quantum gate technology as planned. - ohik

- Research about the ability of Qiskit and its implementation for our project- Benjamin
- Research about communication between classical computers and quantum computers for our project- Steven
- Research about Qiskit platform and quantum information system and finish to read a paper - Derrick

A Use-Case Diagram

Since our project is quite research oriented and talking about future implementations, we thought that our users should be developers or normal customers who want to access quantum networking 5 years from now. In that case, our use-case diagram would be like below.