EE/ CprE/ SE 491 - sddec23-17

Simulated Design of Quantum Networks

Week 3 Report

Feb 13 - Feb 19

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

- Focused on a deeper understanding of the basics of Quantum Information Systems and how they work fundamentally.

- **Ben** - Quantum Key Distribution
    - Learned basics of quantum circuits and how to implement them in the qiskit framework
    - Explored the technical side of the EK91 Quantum key Distribution protocol and implemented it in Qiskit

- **Derrick** - Researching about quantum information - Derrick
    - Explored uses of quantum information systems and how we could implement a system to improve an existing system
    - Began looking into Qiskit basics and understanding how to implement quantum information networks with qiskit

- **Ohik** - Researching about quantum hardware
    - Researched into what Quantum information systems are on a low level and how they work using quantum circuits and quantum gates
    - Reading textbooks about noiseless vs noisy coding theory for quantum information theory
    - Got a better understanding of the basics of quantum computing theory

- **Steven** - Researching about quantum networks
    - Began looking into how Qiskit simulates a quantum particle and how we can use that to simulate a quantum network
    - Read documentation about Qiskit and practiced creating quantum circuits to implement into our quantum network.

Resources

Slides we used during a meeting

https://drive.google.com/drive/folders/14SBQ7WX_hiMyA4cD8afOY_JiGtXTvxmE?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
- Local quantum dot tuning on photonic crystal chips
- A high-fidelity quantum matter-link between ion-trap microchip modules
- Github Qiskit Community Tutorials

Pending Issues

- Study more about quantum networks and information technology - everyone
- Start to publish our Senior project web page and devise a method for tracking hours of contribution
- Understanding how Qiskit works and how we can implement it into our own quantum network

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Benjamin Amick	Researched about QKD	3	8
Derrick Wright	Researched Quantum Information	3	8
Ohik Kwon	Research quantum gates	3	8
Steven Tompary	Researched quantum networks	3	8

Plans for Coming Week

- Share individual research about quantum networks and set our virtual environment for our project - everyone
- Setting our website and better communication line between our advisors.- everyone
- Research about quantum information and networks, understand theoretical base for quantum gates - ohik
- Research about quantum key distribution algorithm on Qiskit platform - Benjamin
- Understand basics of qiskit and how we can implement it - Steven
- Research about Qiskit platform and quantum information system - Derrick