Snehasis Addy

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Education

University of Massachusetts-Amherst — *Amherst, United States*

Doctor of Philosophy in Computer Science — *Sept 2024 - Present*

- **Supervisor: Prof. Filip Rozpędek; Co-Supervisor: Prof. Gayane Vardoyan**

University of Calgary — *Calgary, Canada*

Masters of Science in Physics- Thesis based — *Sept 2021 - Apr 2024*

- **Supervisor: Prof. Daniel Oblak; Co-Supervisor: Prof. Reihaneh Safavi-Naini**
- Current GPA: 3.75/4.
- **Courses:** Building a Quantum Computer, Introduction to Quantum Optics, Relativistic Quantum Mechanics, Statistical Physics

Indian Institute of Technology (ISM), Dhanbad — *Dhanbad, India*

Bachelors of Technology in Electronics and Communication Engineering — *Sept 2017 - May 2021*

- Graduated with an overall of 8.22/10 GPA.

Master's Projects

Error Correction in Quantum Key Distribution using Polar Codes — *Calgary, Canada*

University of Calgary — *Sept 2021 - Present*

- Developed an algorithm to find the reliability sequence required to do encoding for arbitrarily long block length in a binary discrete memory-less channel.
- Implemented encoding of polar codes using the generated reliability sequence.
- Implemented decoding of polar codes using successive-cancellation decoding method.
- Calculated the entropy loss and extractable key length.
- Studied working and design of polar codes.
- Worked with high-performance computer clusters.
- **Technical Skills:** programming, security analysis, data analysis, algorithm design, LaTeX.
- **Soft Skills:** time Management, teamwork, presentation skills, report writing.

Implementation of LDPC Error Correction over Experimental QKD Dataset — *Calgary, Canada*

University of Calgary — *Sept 2021 - Dec 2021*

- Implemented LDPC encoding.
- Implemented LDPC decoding using Belief Propagation algorithm on the data set collected from satellite QKD experiments in our group.
- **Technical Skills:**Python, algorithm design.
- **Soft Skills:** presentation skills, leadership, teamwork, logical thinking.

Work Experience

University of Calgary — *Calgary, Canada*

Lead Teaching Assistant — *Sept 2022 - December 2022*

- **Course:PHYS 369- Acoustic, Optics and Radiation**
- Taught students various experiments related to the course and how to do them.
- Managed teaching assistants of several classes.
- Ensured smooth running of the course.
- **Soft Skills:** time management, leadership, communication skills.

University of Calgary — *Calgary, Canada*

Teaching Assistant — *Jan 2022 - Apr 2022*

- **Course: PHYS 259- Electricity and Magnetism**
- Taught various concepts related to electricity and magnetism.
- Ensured smooth running of a class.
- **Soft Skills:** time management, communication.

University of Calgary — *Calgary, Canada*

Research Intern — *May 2020 - July 2020*

- **Project: Error Correction in Quantum Key Distribution using LDPC codes.**
- Designed an algorithm to find the parity check matrix needed to generate syndrome.
- Designed a complete interface to handle error correction (encoding and decoding) in a binary symmetric channel with different error rates.
- Studied error correction using LDPC codes.
- **Technical Skills:** Python, C++, LaTex, Git.
- **Soft Skills:** time management, scientific writing and verbal communication, presentation skills.

Publications

THESIS

Polar codes for information reconciliation in QKD *Quantum security for polarized channels*
Snehasis Addy

available at: prism.ucalgary.ca.

PAPER

Flexible polar encoding for information reconciliation in QKD
Snehasis Addy, Sabyasachi Dutta, Somnath Panja, Kunal Dey, Reihaneh Safavi-Naini, and Daniel Oblak

available on arXiv as arXiv:2312.03100

Presentations

Efficient polar encoding for information reconciliation in QKD — *College Park, United States*
Poster — *Aug 14-18, 2023*
QCRYPT- 2023

Efficient polar encoding for information reconciliation in QKD — *Edmonton, Canada*
Contributed Talk — *July 31- Aug 1, 2023*
Quanta CREATE Symposium- 2023

Improved Polar Code Encoder for Quantum Key Distribution — *Online*
Poster — *Jan 17-19, 2023*
Quantum Days- 2023

Error Correction in Quantum Key Distribution using Polar Codes — *Calgary, Canada*
Poster — *Oct 11-13, 2022*
Quantum Alberta Summit- 2022

Information Reconciliation in Quantum Key Distribution — *Edmonton, Canada*
Contributed Talk — *Aug 7-9, 2022*
Quanta CREATE Symposium

Error Correction in Quantum Key Distribution — *Calgary, Canada*
Contributed Talk — *Feb 22, 2022*
University of Calgary Physics and Astronomy Symposium

Error Correction in Quantum Key Distribution — *Online*
Contributed Talk — *May 3-4, 2021*
Undergraduate Research in Science Conference of Alberta- 2021

Skills

Programming	Proficient in Python, Matlab and C/C++; Intermediate in Qiskit; Beginner in TensorFlow and PyTorch
Miscellaneous	Algorithm design, Information theory and Coding theory, LaTeX, Microsoft Office, Git.
Platform	Worked on personal computers as well as high-performing computer clusters such as Microsoft's Azure.
Soft Skills	Time Management, Teamwork, Leadership, Problem-solving, Critical Thinking, Documentation, Scientific Presentation and Writing

Awards and Achievements

2024	**Scholarship**, 2024 CICS Scholarship	*United States*
2021-2023	**Award**, International Graduate Tuition Award	*Canada*
2023	**Award**, University of Calgary PHAS Internal Award	*Canada*
2022	**Award**, University of Calgary PHAS Internal Award	*Canada*
2021	**2nd Place**, Undergraduate Research in Science Conference of Alberta (URSCA)	*Canada*
2020	**Award**, MITACS Globalink Research Award	*Canada*
2017	**99.44 percentile**, JEE (Mains) and JEE (Advanced)	*India*
2017	**Certificate of Excellence**, All India Senior School Certificate Examination	*India*
2017	**99.9 percentile**, Physics and Math in Senior Secondary Examination	*India*

Languages

English	Bilingual proficiency
Hindi	Bilingual proficiency
Bengali	Native proficiency

References

Prof. Daniel Oblak — *University of Calgary*
Supervisor — *Associate Professor*
Contact: *doblak@ucalgary.ca*

Prof. Reihaneh Safavi-Naini — *University of Calgary*
Co-supervisor — *Professor*
Contact: *rei@ucalgary.ca*

Prof. Barry C. Sanders — *University of Calgary*
Committee Member — *Professor*
Contact: *sandersb@ucalgary.ca*