Bach Hoang

Full/Legal Name: Viet Bach Hoang

EDUCATION

2022 - 2026 B.S., Mathematics and Computer Science **University of Illinois at Urbana-Champaign**
GPA: 3.92/4.0, Dean's List

2019 - 2022 Talented class in Mathematics **High School for Gifted Students, Hanoi, Vietnam**
GPA: 3.92/4.0, top **1% (5/600)**

SELECTED HONORS

2024 Travel Grant to USENIX Security Symposium 2024

2023 Travel Grant from National Science Foundation (NSF) to FABRIC KNIT 6

2021 **Gold and Bronze Medal**, Singapore and Vietnam Mathematical Olympiad

PUBLICATIONS

2024 **Post-Quantum Cryptography (PQC) Network Instrument: Measuring PQC Adoption Rates and Identifying Migration Pathways**
Jakub Sowa, **Bach Hoang**, Steven Qie, Advaith Yeluru, Phuong Cao. In 2024 IEEE International Conference on Quantum Computing and Engineering (QCE'24). Link.

2024 **The Landscape of Formal Verification in APL: a Review with a Case Study in Quantum Computing (Extended Abstract)**
Santiago Nunez-Corrales, Phuong Cao, **Bach Hoang**. In 2024 Programming Language and Design (PLDI) ARRAY Workshop. Link.

2023 **Post-Quantum Cyberinfrastructure Security Readiness: Risks, Measures and Prospects (Position Paper)**
Phuong Cao, **Bach Hoang**, Santiago Nunez-Corrales. In *ASCR Basic Research Needs in Quantum Computing and Networking*, sponsored by the Department of Energy, Office of Advanced Scientific Computing Research. PDF.

TEACHING

2025 **CS 473: Algorithm** Course Assistant
Instructor: ***Makrand Sinha***

2025 **ECE 484: Principles of Safe Autonomy** Course Assistant
Instructor: ***Huan Zhang***

TECHNICAL SKILLS

Languages: Lean, **Dafny**, Verilog, Assembly, **Ocaml**, C/C++, Java, Python,.
Tools: Git, Docker, Android Studio, PyCharm, Vim, Linux.
Libraries: IBM Qiskit, **Pennylane**, **Z3 SMT solver**, NumPy, Matplotlib, Pytorch, TensorFlow.

REFERENCES

Sayan Mitra, Director of the Center for Autonomy, *Professor* of Department of Electrical and Computer Engineering (ECE), University of Illinois, Urbana-Champaign (UIUC).
Santiago Nunez-Corrales, *Quantum Lead*, National Center for Supercomputing Applications (NCSA).
Jim Basney, *Principal Research Scientist*, National Center for Supercomputing Applications (NCSA).
Phuong Cao, *Cybersecurity Research Specialist*, National Center for Supercomputing Applications (NCSA).

EXPERIENCES

05-2025–Now *Research Intern*, Reliable Autonomy Research Group **Coordinated Science Lab (CSL)**

- ✓ Working under **Prof. Sayan Mitra**'s and graduate students' guidance on analyzing and testing Verse, a Python Library for Reasoning About Multi-agent Hybrid System Scenarios.
- ✓ Providing documentation for Verse code for future development and educational purposes.
- ✓ Investigating how to integrate the newly starset implementation to Verse.

06-2024–Now *Research Assistant*, Reliable Autonomy Research Group **Coordinated Science Lab (CSL)**

- ✓ Working directly under the guidance of **Prof. Sayan Mitra** on formalizing hybrid automata on Lean theorem prover. Artifact (In progress): Link
- ✓ Using Lean to prove several characteristics of hybrid automata models including inductive invariants.
- ✓ Using Lean to prove and verify algorithms for safe autonomy including reachability analysis, and control synthesis.

05-2023–07-2024 *Research Intern*, Student Pushing Innovation Intern **National Center for Supercomputing Applications**

- ✓ Work directly under the guidance **Dr.Santiago Nunez-Corrales** on a project: quAPL-V, a high-level programming language for quantum computing.
- ✓ Formalizing verification steps that can be offloaded to Z3 and generate output of various quantum programs.
- ✓ Our work is accepted as an Extended Abstract at PLDI ARRAY'24.

08-2022–07-2024 *Research Assistant* **National Center for Supercomputing Applications**

- ✓ Working directly with **Dr.Phuong Cao** and 3 students to measure post-quantum cryptography network protocol adoption.
- ✓ Collecting data from seven network layers and implementing data analysis on 13TB of network logs generated by Zeek.
- ✓ Co-author on a paper about this work (Accepted to 2024 IEEE International Conference on Quantum Computing and Engineering (QCE'24))

08-2022–12-2022 *Research Fellow*, SciAuth Students Fellow Program **National Center for Supercomputing Applications**

- ✓ Working directly with **Dr.Jim Basney** to work on verifying and assessing security for SciTokens, a federated ecosystem for authorization on distributed computing.
- ✓ Synthesized > 18,000 lines of code of verified and functional code, see GitHub repository Link.

OTHER CONFERENCE ACTIVITIES

2025 **IEEE Transactions on Information Forensics and Security** *Subreveiwer*
Main Reviewer: Phuong Cao.

2025 **2025 International Conference on Neuro-symbolic Systems (NeuS)** *Subreviewer*
Main Reviewer: Sayan Mitra.

2024 **Post-Quantum Cryptography (PQC) Network Instrument: Measuring PQC Adoption Rates and Identifying Migration Pathways**
USENIX Security Symposium, Philadelphia, PA.

2024 **Bringing Verification-Aware Languages to Formal Verification of Federated Authentication Protocols**
USENIX Security Symposium, Philadelphia, PA.

2024 **Post-Quantum Cryptography (PQC) Network Instrument: Measuring PQC Adoption Rates and Identifying Migration Pathways** *Presentation*
National Center for Supercomputing Applications (NCSA), Urbana, IL.

2023 **Post-Quantum Cryptography (PQC) Adoption Measured at the National Center for Supercomputing Applications (NCSA)** *Poster*
Illinois Quantum Information Science & Technology Center (IQUIST) All-Hands Meeting, Urbana, IL.

2023 **quAPL-V: Formal Verification in an Array Programming Language-based quantum library**
Poster
Sandia-UIUC Student Mini-Conference, Urbana, IL

2023 **Verifying quAPL: an APL-based quantum programming library** *Presentation*
STEM Career Exploration and Research Symposium, Urbana, IL.

2023 **Workshop on Machine Assisted Proof** *Attendee*
Institute of Pure and Applied Mathematics (IPAM), organized by Prof. **Terence Tao**, Los Angeles, CA.

2023 **FABRIC KNIT TESTBED** led by PI **Inder Monga** (ESnet) *Attendee*
Texas Advanced Computing Center (TACC), Austin, TX.

INVITED TALKS

2023 **NCSA Industry Conference, Lightning Talks**
National Center for Supercomputing Applications, Urbana, IL.

EXTRACURRICULAR ACTIVITIES

2024 **Quantum + Chips Summer School** *Participant*
University of Minnesota, MN

2024 **102nd Engineering Open House** *Presenter*
University of Illinois Urbana-Champaign, Urbana, IL.

MEMBERSHIPS

2023 **Association for Computing Machinery (ACM)** **Student Member**

CERTIFICATES

2024 **Machine Learning Specialization** (Certificate)

2023 **HackerRank: Problem Solving** (Certificate ID: c29835340a05)

SELECTED COURSES

Math 416 Abstract Linear Algebra (A)
Math 441 Differential Equations (A)
CS 579 Computational Complexity (In progress)
CS 521 Technological Foundation of Blockchain (A)
CS 521 Trustworthy AI Systems (In progress)
CS 477 Formal Software Development Methods (A+)
CS 473 Algorithms (A)
CS 421 Programming Languages and Compilers (A)
CS 407 Cryptography (In progress)
Note: All 400+, 500+ courses can be counted towards graduate school (PhD or Masters) credits.

CONTACTS

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GitHub: https://github.com/BachHV
Website: https://publish.illinois.edu/bachh2/