Nik Sultana

http://www.cs.iit.edu/~nsultana1/ ✉ nsultana1 at iit.edu

Contents

Research Interests

Distributed systems, *Programmable networking*, *Security*, *Automated reasoning*, *Formal methods*.

Education

PhD in Computer Science July 2015
Trinity College, University of Cambridge
Thesis title: *Higher-order proof translation*
Supervised by Prof. Lawrence Paulson, FRS
Examiners: Prof. Mateja Jamnik, Dr. Christian Urban

MSc in Computer Science (by research) November 2008
University of Kent, Canterbury, UK
Thesis title: *Verification of Refactorings in Isabelle/HOL*
Supervised by Prof. Simon Thompson
Examiners: Dr. Stefan Kahrs, Prof. Ooge de Moor

BSc in Information Technology (Honours) December 2005
University of Malta
Thesis title: *Abductive runtime verification of Lustre programs*
Supervised by Mr Michael Rosner and Prof. Gordon Pace

Experience

Illinois Institute of Technology — Chicago, USA August 2021–now
Tenure-track Assistant Professor of Computer Science.

Fermilab (Fermi National Accelerator Laboratory) — Batavia, USA June–July 2023, 2024
Universities Research Association (URA) Visiting Scholar.
Affiliated with the Fermilab Quantum Institute and the Real-time Processing Systems Division.

University of Pennsylvania — Philadelphia, USA March 2017–August 2021
Postdoctoral Researcher working on Denial-of-Service (DoS) mitigation, programmable networking and software security. I worked with several people at Penn and partner institutions on several released systems and the publications based on them. Mentors: Boon Thau Loo, André DeHon.

Cambridge University March 2014–January 2017
Research Associate (post-doc) on the EPSRC-funded Network-as-a-Service project. I worked with several people at Cambridge and at partner universities on the Flick, Emu, Kneecap, and Pax released systems, and the publications based on them. Mentors: Andrew W. Moore, Jon Crowcroft, Richard Mortier, Anil Madhavapeddy.

Microsoft Research — Cambridge, UK November 2013–January 2014
Internship during which I wrote a model checker to analyze biological networks. Mentors: Hillel Kugler, Boyan Yordanov, Yousef Hamadi, and Christoph Wintersteiger.

Open Book Publishers — Cambridge, UK March 2013–December 2016
Prototyped project ideas, wrote bespoke software, configured and maintained a multi-role server, and liaised on IT-related matters.

Microsoft Research — Cambridge, UK May–August 2012
Internship with Moritz Becker and Markulf Kohlweiss during which I implemented a logic-based authorization system that could be predicated on cryptographic primitives, and contributed to a publication.

Microsoft Research — Cambridge, UK September–November 2011
Internship with Moritz Becker during which I implemented a theorem-prover for automated reasoning on Datalog programs, and contributed to a publication.

Mathematical Institute, Ludwig Maximilian University — Munich, Germany January–August 2008
Research assistant working on constructive proof search. Mentor: Helmut Schwichtenberg.

Selected Publications

Survey on Packet Filtering Accepted for publication
N.S, Hyunsuk Bang, Elena Yulaeva, Ricky Mok, kc claffy, Richard Mortier
SIGCOMM Computer Communication Review (CCR)

Towards Practical Application-level Support for Privilege Separation December 2022
N.S, H. Zhu, K. Zhong, Z. Zheng, R. Mao, D. Chauhan, J. Zhao, S. Carrasquillo, L. Shi, N. Vasilakis, B. Loo
Annual Computer Security Applications Conference (ACSAC)

Flightplan: Dataplane Disaggregation and Placement for P4 Programs April 2021
N.S, J. Sonchack, H. Giesen, I. Pedisich, Z. Han, N. Shyamkumar, S. Burad, A. DeHon, B. Loo
USENIX Symposium on Networked Systems Design and Implementation (NSDI)

Emu: Rapid Prototyping of Networking Services July 2017
N.S, S. Galea, D. Greaves, M. Wojcik, J. Shipton, R. Clegg, L. Mai, P. Bressana, R. Soulé, R. Mortier, P. Costa, P. Pietzuch, J. Crowcroft, A. Moore, N. Zilberman
USENIX Annual Technical Conference (ATC)

FLICK: Developing and Running Application-Specific Network Services June 2016
A. Alim, R. Clegg, L. Mai, L. Rupprecht, E. Seckler, P. Costa, P. Pietzuch, A. Wolf, N.S*, J. Crowcroft, A. Madhavapeddy, A. Moore, R. Mortier, M. Koleni, L. Oviedo, D. McAuley, M. Migliavacca
USENIX Annual Technical Conference (ATC)

* *Lead author from Cambridge University*

Other Publications

Towards Testbed-Wide Traffic Profiling for FABRIC In press
Nishanth Shyamkumar, Sean Cummings, Hyunsuk Bang, N.S
International Workshop on Computer and Networking Experimental Research using Testbeds (CNERT)

A Domain-Specific Language for Reconfigurable, Distributed Software Architecture January 2024
Henry Zhu, Junyong Zhao, N.S
International Journal of Networking and Computing, Vol. 14 No. 1

A Domain-Specific Language for Reconfigurable, Distributed Software Architecture May 2023
Henry Zhu, Junyong Zhao, N.S
Workshop on Advances in Parallel and Distributed Computational Models (APDCM)

Towards In-Network Semantic Analysis: A Case Study involving Spam Classification May 2023
Cyprien Gueyraud, N.S
8th IEEE/IFIP International Workshop on Analytics for Network and Service Management (AnNet)

In-Network Fractional Calculations using P4 for Scientific Computing workloads December 2022
Shivam Patel, Rigden Atsatsang, Kenneth Tichauer, Michael H L W Wang, James Kowalkowski, N.S
5th European P4 Workshop (EuroP4)

A Case for Remote Attestation in Programmable Dataplanes November 2022
N.S, Deborah Shands, Vinod Yegneswaran
ACM Workshop on Hot Topics in Networks (HotNets-2022)

Demo: The Hangar environment for Teaching and Research in Programmable Networking Oct. 2022
N.S
International Conference on Network Protocols (ICNP)

Experiment Planning for Heterogeneous Programmable Networks June 2022
N.S
International Workshop on Test and Evaluation of Programmable Networks

Data Management and Storage over Programmable Networks January 2022
N.S, James B. Kowalkowski, Michael H. L. S. Wang, Marc F. Paterno
ASCR Workshop on the Management and Storage of Scientific Data

IPC Evolution thru Declarative Interface Generation December 2021
N.S, Saket, Andrew Zhao, Shubhendra Pal Singhal, Michael Kaplan, Rajesh Krishnan, Boon Thau Loo
Workshop on Descriptive Approaches to IoT Security, Network, and Application Configuration (DAI-SNAC)

Leveraging In-Network Application Awareness August 2021
N.S
Workshop on Network-Application Integration (NAI)

Meta-level issues in Offloading: Scoping, Composition,Development, and their Automation Apr. 2021
André DeHon, Hans Giesen, N.S, Yuanlong Xiao
Workshop on Languages, Tools, and Techniques for Accelerator Design (LATTE)

Debugging strongly-compartmentalized distributed systems May 2020
Henry Zhu, N.S, Boon Thau Loo
Workshop on Advances in Parallel and Distributed Computational Models (APDCM)

Trace-based Behaviour Analysis of Network Servers October 2019
N.S, Achala Rao, Zihao Jin, Pardis Pashakhanloo, Henry Zhu, Vinod Yegneswaran, Boon Thau Loo
International Conference on Network and Service Management (CNSM)

Hashtray: Turning the tables on Scalable Client Classification April 2019
N.S, Pardis Pashakhanloo, Zihao Jin, Achala Rao, Boon Thau Loo
International Workshop on Analytics for Network and Service Management

What we talk about when we talk about pcap expressions February 2019
N.S
ACM Workshop on Real World Domain Specific Languages

DoSarray: An extensible evaluation system for DoS research January 2019
N.S, Shilip Bose, Boon Thau Loo
International Conference on COMmunication Systems & NETworkS (COMSNETS)

Source-level Support for Transforming Legacy Software into a Network of Tasks October 2018
N.S, Achala Rao, Zihao Jin, Pardis Pashakhanloo, Henry Zhu, Ke Zhong, Boon Thau Loo
Workshop on Forming an Ecosystem Around Software Transformation (FEAST)

In-network computing to the rescue of faulty links August 2018
H. Giesen, L. Shi, J. Sonchack, A. Chelluri, N. Prabhu, N.S, L. Kant, A. McAuley, A. Poylisher, A. DeHon, B. Loo
Workshop on In-Network Computing (NetCompute)

Report on Networking and Programming Languages 2017 October 2017
Nikolaj Bjørner, Marco Canini, N.S
Computer Communication Review, Vol. 47 No. 5

Middleboxes for selective disclosure of network monitoring to distrusted parties August 2016
N.S, Markulf Kohlweiss, Andrew Moore
ACM SIGCOMM Workshop on Hot Topics in Middleboxes and Network Function Virtualization (HotMiddlebox)

Kneecap: model-based generation of network traffic July 2016
N.S, Richard Mortier
14th International Workshop on Satisfiability Modulo Theories (SMT)

The Higher-Order Prover LEO-II December 2015
Christoph Benzmüller, N.S, Lawrence C. Paulson, Frank Theiss
Journal of Automated Reasoning, Vol. 55 No. 4

Proofs and reconstructions September 2015
N.S, Christoph Benzmüller, Lawrence C. Paulson
Frontiers in Combining Systems symposium (FroCoS)

Systematic Verification of the Modal Logic Cube in Isabelle/HOL August 2015
Christoph Benzmüller, Maximilian Claus, N.S
Proof Exchange between Theorem Provers workshop (PxTP)

Selective Disclosure in Datalog-based Trust Management September 2013
N.S, Moritz Y. Becker, Markulf Kohlweiss
Security and Trust Management workshop (STM)

LEO-II 1.5 (System Description) June 2013
Christoph Benzmüller, N.S
Proof Exchange between Theorem Provers workshop (PxTP)

LEO-II and Satallax on the Sledgehammer test bench March 2013
N.S, Jasmin Christian Blanchette, Lawrence C. Paulson
Journal of Applied Logic, Vol. 11 No. 1

Understanding LEO-II's proofs March 2012
N.S, Christoph Benzmüller
International Workshop on the Implementation of Logics (IWIL)

Foundations of Logic-Based Trust Management May 2012
Moritz Y. Becker, Alessandra Russo, N.S.
IEEE Symposium on Security and Privacy ("Oakland conference")

Mechanical Verification of Refactorings January 2008
N.S., Simon Thompson
ACM SIGPLAN Symposium on Partial Evaluation and Program Manipulation (PEPM)

Selected Online Demos/Videos

Testbed Evaluation of an Attestation-Capabale Programmable Software Switch November 2023
Alexander Wolosewicz, Nishanth Shyamkumar, N.S.
Innovating the Network for Data-Intensive Science (INDIS)

Flexible Topology and Configuration Generation as a Resource for Networking Research August 2021
Aishwarya Wesanekar, N.S.
Networking Women Professional Development Workshop (N2Women)

Demo: Disaggregated Dataplanes July 2021
Heena Nagda, Rakesh Nagda, N.S, Boon Thau Loo.
ICDCS (International Conference on Distributed Computing Systems)

FDP: A Teaching and Demonstration Platform for Networking March 2021
Heena Nagda, Rakesh Nagda, N.S, Swapneel Sheth, Boon Thau Loo.
SIGCSE (Computer Science Education)

FDP: A teaching and demo platform for P4-based SDN August 2020
Heena Nagda, Rakesh Nagda, Isaac Pedisich, N.S, Boon Thau Loo.
Networking Women Professional Development Workshop (N2Women)

A Demonstration of the DeDoS Platform for Defusing Asymmetric DDoS Attacks in Data Centers August 2017
by H. Demoulin, T. Vaidya, I. Pedisich, N.S, B. Wang, J. Qian, Y. Zhang, A. Chen, A. Haeberlen, B. Loo, L. Phan, M. Sherr, C. Shields, W. Zhou.
SIGCOMM Posters and Demos 2017

Research-related System Releases

Pitchfork Project (2022) ..... http://pitchfork.cs.iit.edu

(FDP) Flightplan Demo Platform (2021) ..... http://www.github.com/eniac/FDP

Flightplan (2020) ..... http://flightplan.cis.upenn.edu

Apache httpd Worker Union MPM (2019) ..... https://gitlab.com/DeDos/apache_httpd_workers_union

Flowdar (2019) ..... https://gitlab.com/DeDos/flowdar

TYM Datalog (2019) ..... https://github.com/niksu/tym

Caper (2019) ..... https://gitlab.com/niksu/caper

hashtray (2018) ..... https://gitlab.com/niksu/hashtray

DoSarray (2018) ..... https://github.com/niksu/dosarray

Pax (2016) ..... https://github.com/niksu/pax

Kneecap (2016) ..... https://github.com/niksu/kneecap

Motto (2016) ..... https://github.com/NaaS/motto

Counterdog (2012) https://www.rise4fun.com/Counterdog

Selected Awards

Universities Research Association's (URA) Visiting Scholars Program (VSP) April 2024
This award funded part of my collaboration with Fermilab.

Universities Research Association's (URA) Visiting Scholars Program (VSP) April 2023
This award funded part of my collaboration with Fermilab.

Google Research Scholar award April 2022

Finalist essay in the Tipping Point Prize May 2019
This competition was organized by the National Endowment for Science, Technology and the Arts (NESTA) and sought horizon-scanning essays. My essay described how bounded latency could enable more reliable Internet-carried services.

Student Bursary Summer 2016
Was awarded a grant from the Engineering and Physical Sciences Research Council that funded a 10-week research internship (UROP—Undergraduate Research Opportunities) for a student (Jonny Shipton), and for him to give a talk at the 4th South of England Regional Programming Language Seminar.

Julius Springer award September 2015
Travel grant from CADE Inc (Conference on Automated Deduction) for the presentation of my paper at the symposium on Frontiers of Combining Systems.

Conference on Automated Deduction, Automated Theorem Prover (ATP) System Competition August 2015
This is a competition in which ATPs are ranked by their ability to prove the most theorems in the least time. I helped with Satallax, the ATP that came first in the Typed Higher-order Form division.

The Observer Tech Monthly Student Essay Competition February 2014
Won two weeks work experience at The Observer for an essay on the mixed blessings of hi-tech on modern life.

German Academic Exchange Service (DAAD) study grant September–December 2012
This grant funded a three-month research visit to the Free University of Berlin where I worked with Dr Christoph Benzmüller on extending the LEO-II theorem-prover.

Cambridge European Trust Scholarship (Honorary) 2008
Awarded by Cambridge Trusts.
External Research Scholarship 2008
Awarded by Trinity College, Cambridge. This scholarship funded my PhD work.

Marie Curie fellowship 2007
Awarded by MATHLOGAPS, which was a multi-participant Marie Curie Early Stage Research Training Site in MATHematical LOGic and APplicationS. This fellowship funded my eight-month visit to Ludwig Maximilians Universität where I researched constructive proof search. I wrote a logic tool that was open-sourced.

Teaching

Illinois Institute of Technology Spring 2024
CS542: **Computer Networks 1: Fundamentals**.

Illinois Institute of Technology Fall 2023
CS595: **Applications of Programmable Networking**.

Illinois Institute of Technology Spring 2023
CS543-1, CS543-2, ITM595-5: **Software-Defined Networking**.

Illinois Institute of Technology Fall 2022
CS351: **Systems Programming**.

Illinois Institute of Technology Spring 2022
CS595-1, CS595-2, ITM595-5: **Designing Large-Scale Networked Systems**.

Illinois Institute of Technology October 7, 2021
Gave guest lecture on **Large-Scale System Development + Research** as part of the Operating Systems course (CS450) taught by Prof. Francis Leung.

Illinois Institute of Technology September 28, 2021
Gave guest lecture on **Datacenter Networking and Research** as part of "Computer Networks I: Fundamentals" (CS542). The course was being taught by Prof. Edward Chlebus.

University of Pennsylvania November 12, 2019
Gave guest lecture on **Denial-of-Service attacks and mitigations** as part of "Introduction to Networks and Security" (CIS331) and formulated exam questions related to my lecture. The course was being taught by Prof. Sebastian Angel.

Cambridge University Computer Lab Michaelmas Term 2016
Lectured the course on **Prolog** to provide sabbatical cover. This was taught as a flipped classroom. I fielded student questions in person and online, ran the exercise assessment, and wrote the exam question with Dr Alastair Beresford.

Cambridge University (various colleges) 2008–2016
Small-group teaching for the following courses:

- Compiler construction
- Computer networking
- Concepts in programming languages
- Denotational semantics
- Discrete maths
- Foundations of computer science
- Logic and proof
- Operational semantics
- Optimising compilers
- Prolog
- Software and interface design
- Specification and verification
- Unix tools

Initiatives

Networked Systems Tech Talks 2022–now
I started a talk series that focuses on practical or applied research ideas in data networking. This series intended to be a research stimulus and to expose students to practical challenges in networking—beyond the simplified problems that are typically covered in university courses. The series of talks is carefully curated, widely advertized and it is open to all. I maintain the series' webpage: http://www.cs.iit.edu/~nsultana1/techtalks/
(Department of Computer Science, Illinois Tech)

Seminar on the C language September 8, 2022
I led the preparation of this seminar, which was designed to help students with C programming. The seminar was delivered by Irina Klein who worked with me over the summer, with technical input from another student Henry Zhu and organizational assistance from ACM-W. 49 students attended this event, for which we experimented with a Jupyter-based platform for teaching.
(Department of Computer Science, Illinois Tech)

"Research Opportunities in Programmable Networking" January 4, 2022
Gave talk at the COMSJOB event at COMSNETS 2022
(Department of Computer Science, Illinois Tech)

Q&A with Faculty for PhD applicants November 11, 2021
(Department of Computer Science, Illinois Tech)

Service to Department or University

Campus Champions 2024–now

PhD Oral Qualifying Exam of Jane Downer February 23, 2024
Advisor: Prof. Binghui Wang
(Department of Computer Science, Illinois Tech)

PhD Oral Qualifying Exam of Yueqing Liang February 21, 2024
Advisor: Prof. Kai Shu
(Department of Computer Science, Illinois Tech)

Computer Science Seminars Committee (Chair) Fall 2023
(Department of Computer Science, Illinois Tech)

Academic advisor to 10 undergraduate students 2023-2024
(Department of Computer Science, Illinois Tech)

PhD Recruitment and Experience Committee 2023–2024
(Department of Computer Science, Illinois Tech)

MS project viva of Mousam Sarkar April 14, 2023
Advisor: Prof. Boris Glavic.
(Department of Computer Science, Illinois Tech)

PhD Oral Qualifying Exam of Nanda Velugoti February 24, 2023
Advisor: Prof. Kyle Hale
(Department of Computer Science, Illinois Tech)

PhD Oral Qualifying Exam of Lan Nguyen February 24, 2023
Advisor: Prof. Ioan Raicu
(Department of Computer Science, Illinois Tech)

PhD Oral Qualifying Exam of Jiya Su October 6, 2022
Advisor: Prof. Rujia Wang
(Department of Computer Science, Illinois Tech)

PhD Oral Qualifying Exam of Jie Ye October 6, 2022
Advisor: Prof. Xian-He Sun
(Department of Computer Science, Illinois Tech)

MS project viva of Mikel Santana August 17, 2022
Advisor: Prof. Kyle Hale.
(Department of Computer Science, Illinois Tech)

Broadening Participation in Computing (BPC) 2022–2023
(Department of Computer Science, Illinois Tech)

Graduate Studies Committee 2022–2024
(Department of Computer Science, Illinois Tech)

PhD Comprehensive Exam of Yao Kang April 21, 2022
Advisor: Prof. Zhiling Lan
(Department of Computer Science, Illinois Tech)

CS695: Doctoral Seminar Spring 2022
Students attend talks by external speakers and by their peers, discuss research and write short summaries. This course helps student develop their communication, presentation, and critical thinking skills.
(Department of Computer Science, Illinois Tech)

MS project viva of Jorge Gonzalex Lopez November 29, 2021
Title: "Comprehensive review and evaluation of classification networks for radar and communication signals". Advisor: Prof. Gady Agam.
(Department of Computer Science, Illinois Tech)

Undergraduate Studies Committee 2021–2022
(Department of Computer Science, Illinois Tech)

Admissions interviews 2015, 2016
Helped with undergraduate college admission interviews for the Computer Science program.
(Clare College, Cambridge)

Service to the Profession

*Technical PC of **USENIX ATC** (Annual Technical Conference)* 2022, 2023, 2025

*Panel participant for **NSF** (National Science Foundation)* 2022–2024

*Technical PC of **ACM SoCC** (Symposium on Cloud Computing)* 2023, 2024

*Publicity Co-Chair and Technical PC member of **CANS** (Cryptology and Network Security)* 2024

*Organizing Committee of **INDIS** (International Workshop on Innovating the Network for Data Intensive Science)* 2024

*Technical PC of **APSys** (Asia-Pacific Workshop on Systems)* 2024

*Technical PC of **EuroP4** (The European P4 Workshop)* 2023, 2024

*Reviewing for **ToN** (IEEE/ACM Transactions on Networking)* 2022, 2023

*Technical PC of **COMSNETS** (International Conference on COMmunication Systems & NETworkS)* 2020–2024

*Contributed to drafting the workshop report for **ASCR's** (Advanced Scientific Computing Research) Workshop on the Management and Storage of Scientific Data* 2022

*Reviewing for **PADS** (IEEE Transactions on Parallel and Distributed Systems)* 2021, 2022

*PC of **FEAST** (Workshop on Forming an Ecosystem Around Software Transformation)* 2020

*Grant reviewing for **ETH Zurich Research Commission*** October 2019

*PC of **SIGCOMM Posters+Demos*** 2018, 2019

*Reviewing for **TRETS** (ACM Transactions on Reconfigurable Technology and Systems)* 2018

*External reviewing for **ANCS** (ACM/IEEE Symposium on Architectures for Networking and Communications Systems)* 2015

Networks and Programming Languages (NetPL) workshop 2016, 2017
Led the submission of the proposal to hold this workshop at SIGCOMM 2016, then helped with the workshop's organization when the proposal was accepted.

Posters

High-throughput Custom Monitoring for the Mu2e TDAQ System July 2024
Sean Cummings, Nishanth Shyamkumar, Michael H. L. S. Wang, James B. Kowalkowski, Ryan Rivera, N.S
57th Annual Users Meeting, Fermilab (Abstracts)

In-Network DAQ Functions June 2023
N.S, James B. Kowalkowski, Michael H. L. S. Wang
56th Annual Users Meeting, Fermilab (Abstracts)

Compiling Natural Language Expressions to Extended BPF Programs for Stateful Network Policy Enforcement April 2023
Mohammad Firas Sada, N.S
Symposium on the Science of Security (HotSoS)

Securing Software through Network Slicing December 2021
Neil Dhote, N.S
SPACE 2021: Eleventh International Conference on Security, Privacy and Applied Cryptographic Engineering

The Usability of a Debugger Designed for Compartmentalized Systems December 2020
Junyong Zhao, Henry Zhu, N.S, Boon Thau Loo
Annual Computer Security Applications Conference 2020

A Case Study of Fine-Grained Software Compartmentalization using cURL December 2020
Stephen Carrasquillo, Junyong Zhao, Henry Zhu, N.S, Boon Thau Loo
Annual Computer Security Applications Conference 2020

FDP: A teaching and demo platform for P4-based SDN December 2020
Heena Nagda, Rakesh Nagda, Isaac Pedisich, N.S, Boon Thau Loo.
International Conference on emerging Networking EXperiments and Technologies (CoNEXT)

Trace-based Behaviour Analysis of Network Servers October 2019
N.S, Achala Rao, Zihao Jin, Pardis Pashakhanloo, Henry Zhu, Vinod Yegneswaran, Boon Thau Loo.
International Conference on Network and Service Management (CNSM)

Interfacing Isabelle with other systems October 2009
Verification Technology, Systems & Applications (VSTA), INRIA Nancy, France.

Burden of Proof June 2009
Microsoft Summer School, Microsoft Research, Cambridge.

Mechanical Validation of Refactorings June 2007
KentPGC (Postgraduate workshop), the Computing Laboratory, University of Kent.

Technical Reports

Towards In-Network Semantic Analysis: A Case Study involving Spam Classification March 2023
Cyprien Gueyraud, N.S.
IIT Repository, Islandora 1012248

Semantics and further Use-Cases and Evaluation of the C-Saw language March 2023
Henry Zhu, Junyong Zhao, N.S.
IIT Repository, Islandora 1012250

Foundations of Logic-Based Trust Management February 2012
Moritz Y. Becker, Alessandra Russo, N.S.
Microsoft Research MSR-TR-2012-10

Invited Talks

Debuggable, Programmable Networking July 16, 2024
(Online)
FABRIC "Stitching Together Innovation" webinar series

Leveraging FABRIC's Hardware Resources for Programmable Networking March 21, 2024
UC San Diego
KNIT8/NRP5 workshop keynote

A Case for Remote Attestation in Programmable Dataplanes
Microsoft Research, Cambridge, UK August 4, 2023
Computer Science Lab, SRI International October 27, 2022

Torches on Pitchfork: Multi-feature Evaluation of a Security-oriented Programming Toolchain December 6, 2022
Learning from Authoritative Security Experiment Results (LASER) Workshop
Austin, TX, USA

Disaggregation and Placement of In-Network Programs
Hunt Group, UT Austin December 6, 2022
NetLab, University of Kentucky November 3, 2022
Department of Computer Science, Santa Clara University October 20, 2022
ECE department, Illinois Institute of Technology September 23, 2022
Software Analysis Seminar, University of Illinois in Chicago September 6, 2022
Networked Systems Group, ETH Zurich February 23, 2022
Data Science Research Platform seminar, University of Malta February 23, 2022
Microsoft Research, Cambridge February 22, 2022
SRI International February 17, 2022
ESNet/LBL Network and Edge Reading Group February 16, 2022
AMD Inc. January 25, 2022
ANTLab and NECSTLab, Politecnico di Milano December 10, 2021
Barefoot Division (BXD), Intel Inc. December 9, 2021
CINI Cybersecurity Lab, University of Catania December 3, 2021
Eötvös Loránd University November 23, 2021
VMware Research November 3, 2021
DePaul University October 22, 2021

Experiment Planning for Heterogeneous Programmable Networks August 31, 2022
Focus Group on Autonomous Networks, 9th virtual meeting
International Telecommunications Union

Flightplan: Dataplane Disaggregation and Coordination for In-network Computing
Internet Research Task Force's "Compute in the Network" Research Group February 10, 2022
Google October 12, 2021

Research and Teaching Resources for Programmable Networking January 27, 2022
Focus Group on Autonomous Networks, 6th virtual meeting
International Telecommunications Union

Flexibility and Performance in Programmable Data Networks November 30, 2021
Database Systems Group
University of Bozen-Bolzano

Balancing Needs and Resources in Programmable Networking November 3, 2021
Focus Group on Autonomous Networks, 5th virtual meeting
International Telecommunications Union

Disaggregation and Placement of In-Network Programs September 2, 2021
Focus Group on Autonomous Networks, 4th virtual meeting
International Telecommunications Union

Programming for Distributed and Heterogeneous Resources March 1, 2021
CS Seminar
George Mason University

Flightplan: Dataplane Disaggregation and Coordination for In-network Computing
Trinity College, Dublin July 2, 2019
Edinburgh University June 25, 2019

Flexible and performant network programming December 7, 2018
Programmable Storage meeting
UC Santa Cruz

Flightplan: Dataplane Disaggregation and Coordination for In-network Computing
Distributed Systems Lab seminar, University of Pennsylvania December 10, 2018
ONF Connect 2018 December 5, 2018
CMU Silicon Valley December 4, 2018

High-level development and debugging of FPGA-based network programs
Advanced Programming Specialist Group, British Computing Society, London January 26, 2017
Programming Languages and Systems seminar, University of Kent January 23, 2017
Systems Research Group Seminar, Cambridge University January 19, 2017

Light at the Middle of the Tunnel: Middleboxes for Selective Disclosure of Network Monitoring to Distrusted Parties December 7, 2016
Constructive Security group, Microsoft Research
Cambridge, UK

Verification of Refactorings in Isabelle/HOL
ProVal group, INRIA-Futurs, Paris November 2007
Semantics and Verification Research Group, University of Malta October 2007

Conference/Workshop Talks

A Domain-Specific Language for Reconfigurable, Distributed Software Architecture May 8, 2023
Workshop on Advances in Parallel and Distributed Computational Models (APDCM)
St Petersburg (FL)

Towards In-Network Semantic Analysis: A Case Study involving Spam Classification May 15, 2023
8th IEEE/IFIP International Workshop on Analytics for Network and Service Management
Miami

Towards Practical Application-level Support for Privilege Separation April 4, 2023
Symposium on the Science of Security (HotSoS)
(virtual)

A Case for Remote Attestation in Programmable Dataplanes April 4, 2023
Symposium on the Science of Security (HotSoS)
(virtual)

Towards Practical Application-level Support for Privilege Separation December 6, 2022
Annual Computer Security Applications Conference (ACSAC)
Austin, TX, USA

A Case for Remote Attestation in Programmable Dataplanes November 15, 2022
HotNets 2022
Austin, TX, USA

The Hangar environment for Teaching and Research in Programmable Networking October 31, 2022
(Demo)
International Conference on Network Protocols
Lexington, KY, USA

Thrifty Workload Planning for Datacenter Sustainability and Efficiency October 19, 2022
OCP Future Technologies Symposium
San Jose, CA, USA

Experiment Planning for Heterogeneous Programmable Networks June 1, 2022
International Workshop on Test and Evaluation of Programmable Networks
Marina Del Rey, LA, California

Leveraging In-Network Application Awareness August 23, 2021
Workshop on Network-Application Integration
(Held online)

Meta-level issues in Offloading: Scoping, Composition,Development, and their Automation April 15, 2021
Workshop on Languages, Tools, and Techniques for Accelerator Design
(Held online)

Flightplan: Dataplane Disaggregation and Placement for P4 Programs April 13, 2021
18th USENIX Symposium on Networked Systems Design and Implementation
(Held online)

What we talk about when we talk about pcap expressions February 17, 2019
ACM Workshop on Real World Domain Specific Languages
Washington, DC, USA

An extensible evaluation system for DoS research January 10, 2019
11th International Conference on COMmunication Systems & NETworkS (COMSNETS)
Bengaluru, India

Making Break-ups Less Painful: Source-level Support for Transforming Legacy Software into a Network of Tasks October 19, 2018
Workshop on Forming an Ecosystem Around Software Transformation (FEAST)
Toronto, Canada

In-Network Computing to the Rescue of Faulty Links August 20, 2018
ACM SIGCOMM Morning Workshop on In-Network Computing (NetCompute)
Budapest, Hungary

Light at the Middle of the Tunnel: Middleboxes for Selective Disclosure of Network Monitoring to Distrusted Parties August 26, 2016
ACM SIGCOMM Workshop on Hot Topics in Middleboxes and Network Function Virtualization (HotMiddlebox)
Florianopolis, Brazil

Kneecap: Model-based Generation of Network Traffic July 1, 2016
14th International Workshop on Satisfiability Modulo Theories (SMT)
Coimbra, Portugal

Proofs and reconstructions September 23, 2015
International Symposium on Frontiers of Combining Systems (FroCoS)
Wroclaw, Poland

Flick: A DSL for middleboxes July 7, 2015
Workshop on Domain-Specific Language Design and Implementation (DSLDI)
Prague, Czech Republic

Kneecapping considered more productive than pcapping July 2, 2015
Cosener's Workshop
Abingdon, UK

Functional Programming meets Reconfigurable Hardware: Train wreck? July 10, 2014
Cosener's Workshop
Abingdon, UK

Selective Disclosure in Datalog-based Trust Management September 13, 2013
Security and Trust Management (STM)
Egham, UK

Solving trust issues using Z3 3rd November 2011
Z3 Special Interest Group
Microsoft Research, Cambridge, UK

Work in progress: A prototype refactoring tool based on a mechanically-verified core July 18, 2011
21st International Symposium on Logic-based Program Synthesis and Transformation (LOPSTR)
Odense, Denmark

Logic and Automation November 30, 2009
RCSU/TCSS Symposium
Imperial College, London, UK

Peripheral Scope of Science August 5, 2009
Science in Society Conference
Cambridge, UK

Logic leaps and boundaries June 26, 2009
Interdisciplinary Graduate Conference 2009
Cambridge, UK

Combining proof tools March 8, 2009
Trinity College Science Symposium (TCSS)
Cambridge, UK

Refactoring May 2007
Canterbury-Littoral Doctoral Conference
Canterbury, UK

Seminar Talks

Seeing through the Cloud: An introduction to FABRIC February 28, 2024
ACM-W Show & Tell Event
Illinois Institute of Technology

In-Network DAQ Functions June 14, 2023
Fermilab

A Case for Remote Attestation in Programmable Dataplanes May 2, 2023
Security/Privacy Seminar
Georgetown University

In-Network DAQ Functions February 3, 2023
In-Storage LDRD Weekly Meeting
Fermilab

Towards Practical Application-level Support for Privilege Separation October 25, 2022
Software Analysis Seminar
University of Illinois in Chicago

Towards Practical Application-level Support for Privilege Separation September 30, 2022
Security Reading Group
Illinois Institute of Technology

Edge Computing for Big Science March 30, 2022
Argonne—Illinois Tech Spring Research Seminar
Illinois Institute of Technology

Outline of ongoing research December 3, 2022
CS Faculty Research Intro Workshop
Illinois Institute of Technology

Flexibility and Performance in Programmable Data Networks November 23, 2021
Center for Interdisciplinary Scientific Computation
Illinois Institute of Technology

FDP: a student-built learning tool for data networking November 12, 2021
Center for Learning Innovation's Virtual Faculty Lounge
Illinois Institute of Technology

Denial-of-Service mitigations & research November 11, 2021
ACM-W Show & Tell Event
Illinois Institute of Technology

Paper pitch: Distributed State and Language Primitives for Reconfigurable Software Architecture November 10, 2021
PEnn Automated Reasoning and Learning (PEARL) Group
University of Pennsylvania

Disaggregation and Placement of In-Network Programs October 20, 2021
PEnn Automated Reasoning and Learning (PEARL) Group
University of Pennsylvania

Summary of recent research October 5, 2021
Scalable Computing Software (SCS) seminar
Illinois Institute of Technology

What we talk about when we talk about pcap expressions February 15, 2019
Joint seminar of the Distributed Systems Lab (DSL) and Programming Languages club (PLclub)
University of Pennsylvania

An extensible evaluation system for DoS research January 3, 2019
Distributed Systems Lab seminar
University of Pennsylvania

FLICK: Developing and Running Application-Specific Network Services April 13, 2017
Distributed Systems Lab seminar
University of Pennsylvania

A programming model for application-level middleboxes November 25, 2014
Networks and Operating Systems (NetOS) talklet
Cambridge University Computer Lab

Trip report from S-REPLS 4 October 11, 2016
Networks and Operating Systems (NetOS) talklet
Cambridge University Computer Lab

Light at the Middle of the Tunnel: Middleboxes for Selective Disclosure of Network Monitoring to Distrusted Parties August 9, 2016
Networks and Operating Systems (NetOS) talklet
Cambridge University Computer Lab

A new packet filtering technique March 11, 2016
Security Group
Cambridge University Computer Lab

Trip report from DSLDI July 14, 2015
Networks and Operating Systems (NetOS) talklet
Cambridge University Computer Lab

Interfacing and improving proof tools March 4, 2014
Automated Reasoning Group
Cambridge University Computer Lab

Interpreting Leo-II's proofs in Isabelle/HOL October 23, 2013
Interruption Club
University of Malta

Selective Disclosure in Datalog-based Trust Management August 30, 2013
Security Group
Cambridge University Computer Lab

Proof Assistants October 12, 2012
Free University
Berlin, Germany

Selective Disclosure in Datalog-based Trust Management August 3, 2012
Microsoft Research
Cambridge, UK

Isabelle and THF August 16, 2011
Technical University of Munich
Munich, Germany

Work in progress: A prototype refactoring tool based on a mechanically-verified core June 7, 2011
Automated Reasoning Group
Cambridge University Computer Laboratory

Little Languages May 16, 2011
Interruption Club
University of Malta

Rough-and-ready proof reconstruction March 1, 2011
Automated Reasoning Group
Cambridge University Computer Lab

First prototype of an Isabelle/HOL-to-LeoII interface November 23, 2010
Automated Reasoning Group
Cambridge University Computer Lab

Introduction to Isabelle/HOL — Minicourse April 14–16, 2010
Interruption Club
University of Malta

Interfacing two similar HOLs March 9, 2010
Automated Reasoning Group
Cambridge University Computer Lab

Solving HOL problems using FOL tools June 2, 2009
Automated Reasoning Group
Cambridge University Computer Lab

Combining proof tools April 9, 2009
Interruption Club
University of Malta

Professional Membership

Association for Automated Reasoning
Association for Computing Machinery (ACM)
British Logic Colloquium (BLC)
Institute of Electrical and Electronic Engineering (IEEE)
Institution of Engineering and Technology (IET)
USENIX Association

Volunteering

Student mentoring SuperComputing 2023

Student mentoring CoNEXT 2021

Student mentoring SIGCOMM 2017, 2021

Student mentoring ASPLOS 2021

NetOS reading group 2015–2016
Organizer

Debate on the Axiom of Choice 2012
Organizer, in collaboration with the Trinity Mathematical Society

Principia Mathematica anniversary symposium 2010
Organizer

Trinity College Science Society 2009–2010
President

StreetBite, Cambridge 2008–2009
Volunteer

Outreach

ENVISION science competition Fall 2020, Spring 2022
Helped judge entries in the ENVISION science-proposal competition organized by WiSTEM (Women in STEM) for female high school students interested in STEM careers.

University of Pennsylvania Summers 2018, 2019
Gave presentation on *Denial-of-Service attacks and mitigations* as part of a varied seminar series for summer interns organized by Prof. Norm Badler at the School of Engineering and Applied Science.

Science communication inquiry April 2016
Collaborated with Dr Jat Singh and Prof. Jon Crowcroft on a submission to an inquiry by the House of Commons' Science and Technology Committee. The inquiry looked into improving trust and understanding of science by the public.

Computer Science 2008 December 15–17, 2008
As a grad student I served as a "big brother" to undergrads at a student research conference. From its website: "Computer Science 2008 will be the first research conference for undergraduate students. It aims to challenge, entertain, inform and above all, to enthuse students with the excitement of research in computer science." This event was organized by Prof. Anthony Finkelstein at Homerton College, Cambridge.

Non-academic Publications

Trip Report: A Research Visit to Fermilab January 2024
Blog entry for the The Chicago Council on Science and Technology.

Flightplan: Dataplane Disaggregation and Placement for P4 Programs April 2021
Wrote a post about the Flightplan paper (see above) in the P4 blog.

Online revolution: Building an Internet you can rely on May 2019
This was my entry for the Tipping Point Prize, later published online by NESTA UK.

Codebreaking after the Second World War October 2017
Chapter in *Codebreakers and Groundbreakers*, published by the Fitzwilliam Museum, Cambridge University. This was co-authored with Markulf Kohlweiss and Sir Tony Hoare FRS.

Hard truths about science software November 2015
Varsity

Cool Arctic squirrels may hold key to Alzheimer's cure April 2015
The Observer Tech Monthly

What we're Like January 2015
Varsity

Lab in a vat October 2014
Varsity

Ivan Oransky: Science needs a medical October 2014
Varsity

Interview with Karel Janaček May 2014
The Cambridge Student Online

Dissertation Advising

(In progress) PhD dissertation 2024–
Alexander Wolosewicz, Illinois Tech
Topic: Remote Network Attestation. This work generalizes Alexander's earlier CS497 project.
✸ Alexander's project was the key component in the work that received the Best Demo award at INDIS 2023. This work, done in close collaboration with Nishanth Shyamkumar, was featured on FABRIC's Threading the Needle blog. To further evaluate ideas for Alexander's PhD thesis, this work was developed further to produce a demo and poster at KNIT8 (for which Alexander received a travel stipend from FABRIC), a demo and poster at HotSoS 2024, and a talk given to ACM students at IIT during Spring 2024.
✸ Alexander received the Graduate TA award for 2023-2024 from the Department of Computer Science at IIT. He TA'd for CS542 with me in Spring'24 and made important contributions to new material that was developed for that course.

Bachelor dissertation project: "*Secure tamper-evident logging*" 2015–2016
Daniel Spencer, Emmanuel College (Cambridge University).
Co-supervised with Dr Richard Mortier (Cambridge University).

Bachelor dissertation project: "*Encrypted Keyword Search Using Path ORAM on MirageOS*" 2015–2016
Rupert Horlick, Homerton College (Cambridge University).
Co-supervised with Dr Richard Mortier (Cambridge University).
Code: `https://github.com/ruhatch/mirage-oram`
Dissertation: `https://github.com/ruhatch/dissertation`
Rupert carried out a research internship at Microsoft Research Cambridge after his bachelors, before starting postgraduate studies.

Bachelor dissertation project: "*Investigating Resolution Provers for Propositional Logic*" 2015–2016
Thomas Le Feuvre, Emmanuel College (Cambridge University).
Code: `https://github.com/thomaslefeuvre/TProver`

Bachelor dissertation project: "*Protocol Buffers in Standard ML*" 2015–2016
Radu Voroneanu, Queens' College (Cambridge University).
Co-supervised with Dr Lucas Dixon (Google).

Project Advising

MS project (CS597): "Custom monitoring using FABRIC's MFlib" Summer 2024
Bjoern Sagstad, Illinois Tech

MS project (CS597): "Integration and Tutorial of pmacct Toolset into FABRIC Testbed" Spring-Summer 2024
Pilar Fernandez Gayol, Illinois Tech (on exchange from Universidad Politécnica de Madrid)
Code: https://github.com/fabric-testbed/jupyter-examples/tree/main/fabric_examples/complex_recipes/pmacctd
✸ Pilar's code was merged into the FABRIC code example repository. In Spring 2024, Pilar presented a poster on this work at the College of Computing research exhibition.

MS project (CS597): "Extending tpcdump to anonymize packets using Prefix-preserving Anonymization" Spring-Summer 2024
Alberto Perez Bogantes, Illinois Tech (on exchange from Universidad Politécnica de Madrid)
Code: https://github.com/aperezb21/tcpdump
Alberto extended tcpdump to use the cryptopANT implementation of Crypto-PAn to anonymize various kinds of traffic. In Spring 2024, Alberto presented a poster on this work at the College of Computing research exhibition.

MS project (CS597): "Development, Implementation and Deployment of an Experimental Tool for the Teaching of Protocols and Network Programming using P4." Spring-Summer 2024
Laura Serrano Velázquez, Illinois Tech (on exchange from Universidad Politécnica de Madrid)
Code: https://github.com/LauSeVe/TFM/
In Spring 2024, Laura presented a poster on this work at the College of Computing research exhibition and at the Greater Chicago Area Systems Workshop.

MS project (CS597): "GraphBLAS on FABRIC" Spring 2024
Vaneshi Ramdhony, Illinois Tech
Code: https://gitlab.com/d-r-r/release/gbf
In Spring 2024, Vaneshi presented a poster on this work at the College of Computing research exhibition. During summer 2024, she interned at RENCI (mentored by Komal Thareja) to work on integrating P4 switches with the FABRIC testbed.

MS project (CS597): "Hardware Acceleration Support for Network Profiling on FABRIC" Spring 2024
Prajwal Somendyapanahalli Venkateshmurthy, Illinois Tech
In Spring 2024, Prajwal presented a poster and demo on this work at KNIT8.

MS project (CS597): "Remote Attestation using AMD-Xilinx U280 on FABRIC" Spring 2024
Hyunsuk Bang, Illinois Tech
This project was co-mentored by Chris Neely at AMD/Xilinx and builds on Hyunsuk's Spring 2023 CS595 project. In Spring 2024, Hyunsuk presented a poster and demo on this work at KNIT8 (for which Hyunsuk received a travel bursary from FABRIC).
✸ Hyunsuk won runner-up best poster at KNIT8.
While working on this project, Hyunsuk contributed the prototype presented at CPAD 2023.

MS project (CS597): "High-throughput Custom Monitoring for the Mu2e TDAQ System" Fall'23-Spring'24
Sean Cummings, Illinois Tech
This work was co-mentored by collaborators at Fermilab.
✸ Sean gave a presentation about this project at CPAD 2023, and a follow-up poster was presented at Fermilab.

BS project (CS497): "Improving Caper's documentation" Fall 2023
Aditi Kumar, Illinois Tech
Aditi gave a talk to ACM-W about her project. She was co-advised by Prof Jeremy Hajek (IIT).

BS project (CS497): "Converting between English and pcap expressions" Spring 2023
Marelle León, Illinois Tech
Code: https://gitlab.com/niksu/caper/-/merge_requests/32
✸ Marelle's project was merged into Caper and deployed on the third-party BPF Exam service.

BS project (CS497): "Prototype of an Attesting Switch" Spring 2023
Alexander Wolosewicz, Illinois Tech
Code: https://github.com/awolosewicz/bmv2-remote-attestation

BS project (CS497): "Translating pcap expressions into BPF" Spring 2023
Hyunsuk Bang, Illinois Tech
Code: https://gitlab.com/niksu/caper/-/merge_requests/31
✸ Hyunsuk's project was merged into Caper and deployed on the third-party BPF Exam service.
✸ Hyunsuk received an Honorable Mention from the 2023 URA Outstanding Undergraduate Research Award program for his work on this project and related follow-up work: a performance evaluation of Caper and the BPF Simulator site that he built.

BS project (CS497): "TCP session tracking in BPF" Fall 2022
Mohammad Firas Sada, Illinois Tech
Mohammad gave a presentation and demo of this project at HotSoS 2023 (the Symposium on the Science of Security).

BS project (CS497): "Analyzing network experiments on FABRIC" Fall 2022
Sean Cummings, Illinois Tech

MS project (CS597): "In-Network Spam Filtering with P4" Spring and Summer 2022
Cyprien Gueyraud, Illinois Tech (on exchange from EISTI-CyTech)
Cyprien presented posters on his work at Illinois Tech's Research Showcase and at the College of Computing poster competition, both in Spring 2022.
✸ This project resulted in a paper at AnNet'23, and its code was open sourced.
✸ Cyprien won the award for best MS poster at the College of Computing poster competition.

MS project (CS597): "Application hand-over in Edge Computing using SDN" Spring and Summer 2022
Luis Casarrubios Elez, Illinois Tech (on exchange from Universidad Politécnica de Madrid)
Co-supervised with Dr Luis Bellido Triana (UPM).
Luis presented a poster on his work at Illinois Tech's Research Showcase and at the College of Computing Poster competition, both in Spring 2022.

Independent study project: "*Disaggregations of switch.p4*" Fall 2020
Rakesh Nagda, University of Pennsylvania.

Research Mentoring

Prajwal Somendyapanahalli Venkateshmurthy (2023, Masters, Illinois Tech) worked on a RES-MATCH project titled "Distributed Computation for Light Propagation Modeling", which built on an earlier RES-MATCH project by Rigden Atsatsang. Prajwal undertook deep technical work to create a fork of the CODES network simulator that supported programmable hardware. This work was co-advised by Dr Kevin Brown at Argonne National Laboratory. Code: https://gitlab.com/d-r-r/release/iit-codes
Prajwal later TA'd for CS542 with me in Spring'24 and made important contributions to new material that was developed for that course.

Sean Cummings (2023, Undergrad, Illinois Tech) developed his CS497 project further to improve workload generation, graphing and result analysis of FABRIC experiments.
He was awarded a travel bursary by the FABRIC project to attend the KNIT6 workshop and contributed to an article on the Chicago Council on Science and Technology (C2ST) blog based on this trip. Sean was also awarded a travel bursary by the FABRIC project to attend the KNIT7 workshop where he presented a demo. During Summer 2023, Sean interned at ESnet and later contributed to a presentation about his work at the DPDK Summit in September 2023.
✸ Sean received an Honorable Mention from the 2023 URA Outstanding Undergraduate Research Award program.
✸ In Spring 2024, Sean received the College of Computing undergraduate award for Outstanding Research.

Willow Carlson-Huber (2023, Undergrad, Illinois Tech) packaged Caper for OPAM, Debian, and Nix.

David Kao (2023, TRAC, Fermilab) teaches math and computer science at Hinsdale Central High School, and during the summer he participated in the Teacher Research Associates (TRAC) program at Fermilab. During this program, he applied network calculus to model the Mu2e workload and gave a presentation about his work. David was co-advised also by Michael Wang and James Kowalkowski at Fermilab.

Yun Zi (2023, Masters, Illinois Tech) wrote an article on the Chicago Council on Science and Technology (C2ST) blog based her project from the CS543 course that she took with me.

H. E. Greenblatt (2023, Undergrad, Illinois Tech) participated in the RES-MATCH program in which she improved the Python prototype that was written by Rigden in Spring 2022 for his RES-MATCH project, and started modelling the system using the SST simulator. Co-advised with Dr Claude Bajada and Dr Ken Scerri of the University of Malta.

Irina Klein (2022, Masters, Illinois Tech) prototyped a tutorial for the C language that was delivered using Jupyter and collaborated with Henry Zhu on leveraging Jupyter's features to teach the language. Irina presented this tutorial to 49 CS students at an event organized with ACM-W at Illinois Tech in September 2022.

Simrat Kaur (2022, Masters, Illinois Tech, ECE) prototyped an FPGA design that carried out reconfigurable packet filtering.

Shivam Patel (2022, Masters, Illinois Tech) collaborated with Rigden Atsatsang to port his photon propagation model to P4, and implemented approximations of real-valued functions.
The system is open-sourced at `https://github.com/ShivamPatelShivamPatel/Photon`. Shivam gave talks about this work at a P4 developers' meeting and at Illinois Tech's CS Department Research Showcase, and presented posters about this work twice at the Illinois Tech Research Showcase. He carried out a summer internship at SRI International where he applied his P4 skills to develop an in-network security tool prototype for the FABRIC project.
✸ Shivam contributed to a paper on this work that was accepted at EuroP4 2022 and presented it in person in Rome. He also filed a Technical Report at Illinois Tech's library. The TR expanded on the technical content of the EuroP4 paper.

Mohammad Firas Sada (2022-2023, Masters, Illinois Tech) built a new toolchain that converts English expressions into network configuration instructions.
Mohammad presented a poster on this work at Illinois Tech's Research Showcase and at the College of Computing poster competition, both in Spring 2022, and at the Symposium on the Science of Security (HotSoS) in April 2023.
He was awarded a travel bursary by the FABRIC project to attend the KNIT6 workshop.

Rigden Atsatsang (2022, Undergrad, Illinois Tech) developed and evaluated a model of photon propagation as a RES-MATCH project in collaboration with Shivam Patel, Nadia Netolicky, and Dr Kenneth Tichauer (the latter two from Illinois Tech's Department of Biomedical Engineering). Rigden presented a poster on this work at Illinois Tech's Research Showcase and at the College of Computing poster competition, both in Spring 2022. He contributed to a paper on this work that was accepted at EuroP4 2022.

Mohamad Dib Fares (2022, Undergrad, Illinois Tech) developed a conversion between Flightplan's configuration format and SVG (in both directions) to prototype a network configuration approach that can be provided as a visual sketch. Mohamad presented a poster on his work at Illinois Tech's College of Computing poster competition in Spring 2022.

Neil Dhote (2021-2022, Masters, Illinois Tech) helped prototype a P4-based network slicing approach as part of the GAPS CLOSURE project. Neil presented a poster on his work at SPACE in December 2021, at Illinois Tech's Research Showcase and at the College of Computing poster competition, the latter two in Spring 2022.

Xue Zhang (2022, Masters, Illinois Tech) implemented a prototype of a P4-based network slicing approach as part of the GAPS CLOSURE project in collaboration with Neil Dhote, and contributed to the presentation of this work at Illinois Tech's Research Showcase and at the College of Computing poster competition, both in Spring 2022.

Shubhendra Pal Singhal (2021, Masters, UPenn) improved the GAPS CLOSURE system and presented our position paper on IPC evolution at DAI-SNAC'21.

Aishwarya Wesanekar (2020–2021, Masters, UPenn) extended the topology-generation script in Flightplan to handle other types of topologies, and presented a poster at N2Women'21 on this project.

Saket (2020–2021, Masters, UPenn) extended the RPC of the GAPS CLOSURE system prototype to tolerate bounded disruption such as delays, reordering, and peer restarts.

Andrew Zhao (2020–2021, Undergrad, UPenn) extended the RPC of the GAPS CLOSURE system prototype to optimize the calling of pure cross-domain functions through memoization. ✸ Andrew joined Princeton's PhD program in Fall 2023.

Henry Zhu (2017–2021, Undergrad then Masters, UPenn) worked on trace navigation and replay for Flowdar and on various aspects of the Pitchfork project: software compartmentalization examples, compartment-aware debugging, and de/marshalling for C.
✸ Henry won an Outstanding Research award in 2020 from Penn's Computer and Information Science department for his achievements, which included writing a paper, releasing code, guiding other Research Assistants and contributing to other papers.
✸ Henry joined the PhD program at UIUC in Fall 2022.

Stephen Carrasquillo (2020, Masters, UPenn) worked on demos and use-cases for software compartmentalization as part of the Pitchfork project. He presented a poster at ACSAC'20 about his work.

Junyong Zhao (2020-2021, Undergrad, UPenn) worked on the following aspects of the Pitchfork project: automatic marshalling-related memory-leak elimination for compartmentalized software; improving usability of compartment-aware debugging. He presented a poster at ACSAC'20 on his work.
✸ Junyong joined the PhD program at University of Arizona in Fall 2022.

Heena Nagda (2020-2021, Masters, from Georgia Tech) worked on the online demo for Flightplan, and on the off-shoot project FDP (Flightplan Demo Platform), both of which were open-sourced. She presented posters at N2Women'20 and CoNEXT'20, and demos at SIGCSE'21 and ICDCS'21 on her projects.
✸ Heena's poster at N2Women'20 won the runner-up best poster award.
✸ Heena joined UPenn's PhD program in Spring 2022.

Rakesh Nagda (2020, Masters, UPenn) helped with Flightplan's code release, fixing various issues, documenting the setup and checking its reproducibility. He contributed to posters presented at N2Women'20 and CoNEXT'20, and worked on an individual project to port switch.p4 from $P4_{14}$ to $P4_{16}$: `https://github.com/rakeshnagda/switch_in_p4_16`.

Ritvik Sadana (2020, Masters, UPenn) worked on virtualized toolchain setups and reproducible experimentation related to the CLOSURE system.

Garvit Khandelwal (2020, Masters, UPenn) worked on virtualized toolchain setups and reproducible experimentation related to the CLOSURE system.

Zhilei Zheng (2019, Undergrad, UPenn) worked on use-cases for software compartmentalization as part of the Pitchfork project.

Shivani Burad (2019, Masters, UPenn) worked on virtual network experimentation for Flightplan.

Nishanth Shyamkumar (2019, Masters, UPenn) worked on workload profiling for Flightplan.

Digvijaysinh Chauhan (2019, Masters, UPenn) worked on use-cases for de/marshalling in software compartmentalization as part of the Pitchfork project.

Ruijie Mao (2019, Undergrad, UPenn) worked on use-cases for software compartmentalization as part of the Pitchfork project.

Zhaoyang Han (2018-2019, Masters, UPenn) worked on an FPGA implementation of an in-network Memcached cache.

Ke Zhong (2018, Undergrad, visiting from Shanghai Jiao Tong University) worked on thread-oriented software splitting.
✸ In 2019 Ke joined UPenn's PhD program, advised by Prof. Sebastian Angel.

Shilpi Bose (2018, Masters, UPenn) helped develop DoSarray.

Nishanth Prabhu (2018, Masters, UPenn) worked on virtual network experimentation using ns3 for datacenter-like workloads as part of our work on Wharf.

Anirudh Chelluri (2018, Masters, UPenn) worked on virtual network experimentation for network boosting research as part of our work on Wharf.

Zihao Jin (2017, Undergrad, visiting from Tsinghua University) worked on low-overhead trace generation and processing as part of Flowdar.

Achala Rao (2017, Masters, UPenn) worked on trace analysis and visualization as part of Flowdar.

Jonny Shipton (2016, Undergrad, Selwyn College, Cambridge University) carried out a summer research internship on the topic of "*Using C# for High Performance Network Programming*" (Code), and funded by an Undergraduate Research Opportunities Program (UROP) grant.
✸ Jonny gave a presentation on this work at the 4th South of England Regional Programming Language Seminar, and later built on this project for his bachelor dissertation project—a transpiler from P4 to C#—which was supervised by Dr David Greaves: `https://github.com/TMVector/P4ToCSharp`.