CNS
CENTER FOR NETWORKED SYSTEMS

OCTOBER 2020 RESEARCH REVIEW

Co-Directors: Stefan Savage & George Porter

UC San Diego
JACOBS SCHOOL OF ENGINEERING
Computer Science and Engineering

WELCOME

- 29th CNS research review
  - Fostering UCSD/industry collaboration since 2004
  - 100+ students, 50+ projects, 150+ internships

WHAT IS CNS ABOUT?

- We focus on new challenges in networked systems platforms and environments
  - Build, test, measure, evaluate real systems
  - Deliver results that have impact
- Play to strengths of members & partners
  - Networking, data centers, measurement
  - Security, data analysis
- Connect industry with faculty + students
- Your problems are what we value most!

NEW FACULTY

PAT PANNUTO

Pat Pannuto is an Assistant Professor in Computer Science Engineering at the University of California, San Diego. Pat's research is in the broad area of networked embedded systems, with contributions to computer architecture, wireless communications, mobile computing, operating systems, and development engineering. Pat's work has been recognized as a Top Pick in Computer Architecture and selected as a Best Paper Finalist at IPSN, and has been awarded NSF, NDSEG, and Qualcomm Innovation fellowships. Pat has also received teaching awards from the Computer Science Department, the College of Engineering, and the Rackham Graduate School at the University of Michigan.

AWARDS

ALEX C. SNOEREN

IEEE Fellow

Alex C. Snoeren was elected to the IEEE Fellow class of 2020 for his contributions to management and security of networked systems.

MORE AWARDS

STEFAN SAVAGE

ACM CSS Test-of-Time Award

For the 2009 paper, “Hey, You, Get off My Cloud: Exploring Information Leakage in Third-Party Compute Clouds.”

IEEE Test-of-Time Award on Security and Privacy

Research demonstrated the ability to hack a car’s computer system sparked new automotive security standards.

AND MORE AWARDS…

Facebook: 2020 Networking Systems Research Awards

Proposal on a custom NIC and network stack to support parallel network fabrics.

GEORGE PORTER

AARON SCHULMAN

ALEX SNOEREN

DEPT OF ENERGY ARPA-E Phase II award

PIs George Papen (ECE), Joe Ford (ECE),
Alex C. Snoeren (CSE) and George Porter (CSE)

CNS faculty members George Papen, George Porter, and Alex Snoeren, along with fellow professor Joe Ford were awarded Phase II of the $3.8 million Department of Energy ARPA-E Award. The research team is developing a new datacenter network based on photonic technology that can double the datacenter's energy efficiency. Their LEED project mirrors the development of CPU processors in PCs. Previous limitations in the clock rate of computer processors forced designers to adopt parallel methods of processing information and to incorporate multiple cores within a single chip. The team envisions a similar development within datacenters, where the advent of parallel lightwave networks can act as a bridge to more efficient datacenters. This architecture leverages advanced photonic switching and interconnects in a scalable way. Additionally, the team will add a low-loss optical switch technology that routes the data traffic carried as light waves. They will also add the development of packaged, scalable transmitters and receivers that can be used in the system without the need for energy-consuming optical amplification, while still maintaining the appropriate signal-to-noise ratio. The combination of these technologies can create an easily controllable, energy-efficient architecture to help manage rapidly transitioning data infrastructure to cloud-based services and cloud-based computing hosted in datacenters.

ALAN TURING ENDOWMENT

REACHED OUR GOAL OF

$250,000

CNS can award $10,000 per year in perpetuity, starting in the fall of 2021

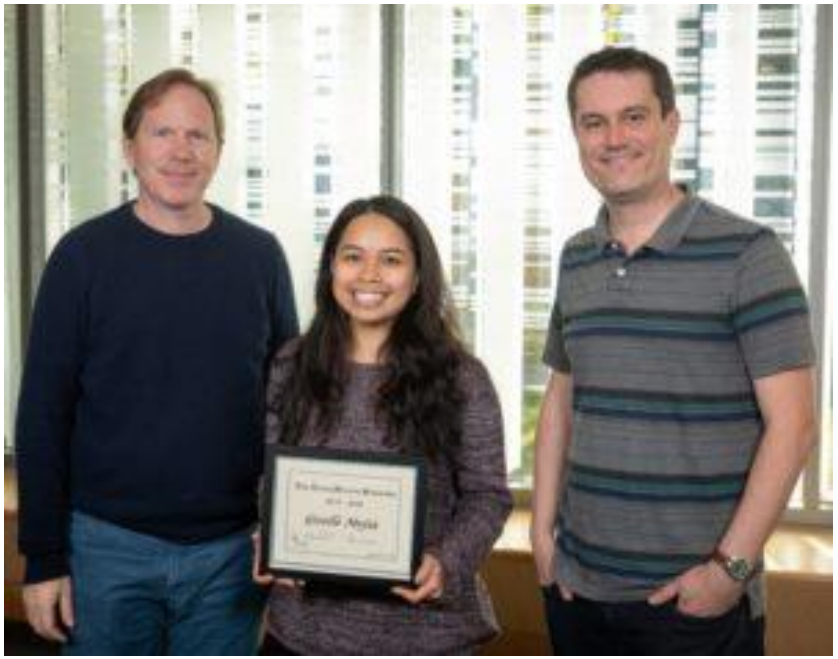
Generous donations from:

- Amateur Radio Digital Communications(ARDC)
- Brian Kantor, a UC San Diego alumnus who worked at UC San Diego for 47 years
- The founder of the ARDC.

Brian Kantor

ALAN TURING MEMORIAL SCHOLARSHIP

- Recognizes support for LGBT diversity efforts
- CNS-related fields + written application process + essay
- Thanks to Qualcomm and Motorola (2nd year!) for their generous support
- The 2020 -2021 recipient to be announced this month.



2019/2020 winner Giselle Mejia w/CNS Co-Directors






CNS GRADUATES!





UPCOMING AGENDA

3	3	2
Sessions	15-minute talks Per session	15-minute break or informal interaction

Informal Interactions

1. Option to stay in the main Zoom meetings with continuous 2-minute lightning presentations.
2. Option of joining one of three rooms for open discussion on cloud computing, or computer architecture, or system and network security.

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CNS 2020 Research Review Agenda

Thursday, October 15, 2020

9:00 a.m. **Welcome**
Stefan Savage and George Porter, CNS Co-Directors and CSE Professors

9:15 a.m. **Session 1**

Trufflehunter: Sniffing Out Rare Domains in Large Public DNS Resolvers (15 min + 5 min Q&A)
Audrey Randall, CSE Graduate Student (Aaron Schulman, Geoff Voelker, Stefan Savage)

RLBox: secure sandboxing for buggy/unsafe application components (15 min + 5 min Q&A)
Shravan Narayan, CSE Graduate Student (Deian Stefan)

Risky BIZness (15 min + 5 min Q&A)
Gautam Akiwate, CSE Graduate Student (Geoff Voelker, Stefan Savage)

10:15 a.m. **Break and Informal Interaction** (15 min)
Option to stay with the main Zoom meeting with continuous 2-minute lightning presentations OR join any Zoom room for open discussion.

10:30 a.m. **Session 2**

Disaggregating Persistent Memory and Controlling Them Remotely: An Exploration of Passive Disaggregated Key-Value Stores (15 min + 5 min Q&A)
Yizhou Shan, CSE Graduate Student (Yiying Zhang)

Cerebro: A Layered Data Platform for Scalable Deep Learning (15 min + 5 min Q&A)
Yuhao Zhang and Supun Nakandala, CSE Graduate Students (Arun Kumar)

Corrosion Batteries: Repurposing today's infrastructure to power tomorrow's Smart City (15 min + 5 min Q&A)
Dhananjay Jagtap, ECE Graduate Student (Pat Pannuto)

11:30 p.m. **Break and Informal Interaction** (15 min)
Option to stay with the main Zoom meeting with continuous 2-minute lightning presentations OR join any Zoom room for open discussion.

11:45 p.m. **Session 3**

ActiveP4: Enabling Active Networking on Programmable Switch Hardware (15 min + 5 min Q&A)
Rajdeep Das, CSE Graduate Student (Alex Snoeren)

Serverless Scheduling (15 min + 5 min Q&A)
Lixiang Ao, CSE Graduate Student (George Porter, Geoff Voelker)

Building a Safety Verifier for WASM (15 min + 5 min Q&A)
Evan Johnson, CSE Graduate Student (Deian Stefan, Stefan Savage)

12:45 p.m. **Concluding Remarks and Feedback from Company Representatives**


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THANK YOU!