Thanathorn (Tammy) Sukprasert

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Research Focus

Systems researcher building infrastructure for **energy-constrained AI**. My work spans precise systems measurement, power-aware cluster control under grid constraints, large-scale analysis of the limits of carbon-aware scheduling, and renewable-native system design to make AI workloads reliable and sustainable under real-world energy scarcity.

Education

University of Massachusetts Amherst Amherst, MA
MS/PhD in Computer Science 2022–Present
Advisors: Prof. Prashant Shenoy, Prof. David Irwin
Relevant Coursework: Distributed & Operating Systems, Computer Architecture, Database Systems, Algorithms

University of Massachusetts Amherst Amherst, MA
B.S. in Computer Engineering, *Summa Cum Laude*, GPA: 3.97/4.00 2018–2022
Relevant Coursework: System Software Design, Computer Networking, Communication Systems, Design Project

Experience

Dolby Laboratories. Research Intern Sunnyvale, CA
End-to-End Measurement of Low-Latency AR/VR Streaming Systems Summer 2024

- Investigated discrepancies between server-reported and client-observed motion-to-photon latency in **ALVR**-based real-time AR/VR streaming systems.
- Built a reproducible `tc-netem`-based packet-forwarding testbed to run ALVR under controlled network latency, jitter, and packet loss, enabling systematic end-to-end latency measurement.
- Identified a **2× gap** where server-side latency reported by ALVR exceeded client-side end-to-end motion-to-photon measurements.

University of Massachusetts Amherst. Graduate Research Assistant 2022–Present
PowerRanger: Reliable Distributed Systems under Power Scarcity

- Addressed the growing gap between AI compute demand and datacenter power availability under grid-imposed demand response (DR) constraints.
- Designed and implemented a power-aware LXD cluster manager enforcing node- and container-level power budgets using cgroups, cpuset, and DVFS.
- Developed global and local orchestration policies that translate raw grid DR signals into workload control actions (dynamic power capping vs. workload revocation), validated on a physical testbed instrumented with RAPL, IPMI, and PDU telemetry.
- Demonstrated real-time enforcement of grid-imposed DR upper and lower power bounds while maintaining stable application execution.

Renewable-Powered Edge Site Selection

- Investigated whether latency-sensitive distributed systems can operate entirely on intermittent renewable energy.
- Modeled solar and wind generation as stochastic assets using **Modern Portfolio Theory** to capture diversification.
- Designed site-selection policies balancing availability, latency, and reliability under renewable variability.
- Replayed solar and wind generation traces on a physical edge testbed to evaluate availability gains from spatial diversification under renewable intermittency.

Characterizing the Limits of Carbon-Aware Cloud Scheduling

- Challenged the assumption that temporal and spatial workload shifting alone can deliver large carbon reductions.
- Designed experiments using real carbon-intensity signals and workload traces from AWS, Azure, and GCP.
- Analyzed **123 global regions (2020–2022)** under realistic datacenter capacity constraints.
- Showed that while idealized migration enables up to **96%** emission reduction, practical constraints limit achievable global reductions to ∼**52%**.

Comparing Average vs. Marginal Carbon Signals in Cloud Optimization

- Evaluated 65 global regions and identified weak correlations between average and marginal carbon-intensity signals.
- Demonstrated that optimizing for one signal can unintentionally increase emissions under the other.
- Provided guidance for selecting carbon-aware policies across workloads and regions.

Publications

Thanathorn Sukprasert, Abel Souza, Noman Bashir, David Irwin, and Prashant Shenoy. *On the Limitations of Carbon-Aware Temporal and Spatial Workload Shifting in the Cloud*. Proceedings of the Nineteenth European Conference on Computer Systems (EuroSys). Athens, Greece. April 2024. Coupled with a poster.

Thanathorn Sukprasert, Noman Bashir, Abel Souza, David Irwin, and Prashant Shenoy. *On the Implications of Choosing Average versus Marginal Carbon Intensity Signals on Carbon-aware Optimizations*. Proceedings of the 15th ACM International Conference on Future and Sustainable Energy Systems (e-Energy). Singapore. June 2024. Short paper.

Thanathorn Sukprasert. *How the Choice of Carbon Signal Impacts Carbon-Aware Scheduling Decisions*. EuroSys Doctoral Workshop (EuroDW). Athens, Greece. April 2024.

Thanathorn Sukprasert, Abel Souza, Noman Bashir, David Irwin, and Prashant Shenoy. *Spatiotemporal Carbon-aware Scheduling in the Cloud: Limits and Benefits*. Companion Proceedings of the 14th ACM International Conference on Future Energy Systems (e-Energy Companion). Orlando, Florida. June 2023.

Untangling the Carbon-Cost Tradeoffs and Stampede Effect Challenges in Cloud Computing. In submission.

Technical Skills

Programming: Python, C/C++, Bash
Systems: Linux internals, cgroups, cpuset, DVFS, LXD, Docker, Spark
Cloud & Infra: GCP, AWS, Azure, HAProxy
Measurement: RAPL, IPMI, ePDU, latency tracing, tcpdump, tc-netem
Data & Analysis: NumPy, Pandas, SciPy, scikit-learn
Research Themes: Power-aware systems, carbon-aware scheduling, renewable-powered infrastructure

Awards and Honors

UMass Chancellor's Scholarships (all 8 semesters, $48,000)
Undergraduate Dean's List (all 8 semesters)
Eta Kappa Nu (IEEE-HKN), junior-year inductee

Research Advising and Mentorship

UMass CS Undergraduate Research Volunteer Program (URV)
Himnish Chhabra, Nishil Adina. *GreenBalance: Carbon-Aware Load Balancing*. 2025.
Lindsey Blau, Sabrina Nguyen, Sampada Tumuluri. *Marginal or Average: Which Metric Really Matters?*. 2024.
Anh Trinh, August Huber, Khang Do, Pranav Ravi Buregoni. *Analyzing Predictive Models with ENTSO-E Carbon Data*. 2024.
Ruth Barasa, Gabriel Laboy, Farhana Rahman, Megan Wong. *Effects of Energy Sources on CO_2 Intensity*. 2023.

NSF Research Experiences for Undergraduates (REU)
Mary-Alice Wieland. *How Low Can We Go? Analyzing Spatiotemporal Workload Shifting to Reduce U.S. Datacenter Emissions*; presented at MAGICC 2025.

Teaching Experience

Distributed and Operating Systems (Spring 2024, Spring 2025)
Teaching Assistants as Tomorrow's Faculty (Fall 2025)
Introduction to Python (Fall 2023)
Mobile Health Sensing (Spring 2023)
Computer Systems Principles (Fall 2022)
Undergraduate Instructor: Engineering Special Design Project (Spring 2022)

Service

EuroSys 2026 Shadow PC (2025)
UMass CS PhD Application Reviewer (2024)
UMass Turing Summer Program (2023, 2025)
UMass Summer Engineering Institute Mentor (2022)
Podcast Guest: Disseminate CS Research Podcast; Environmental Variables Podcast
PhD Peer Mentor (2024–2025)
UMass Engineer Peer (2020–2021)
Eta Kappa Nu Treasurer (2021–2022)
Hack(H)er413 Volunteer (2019)