

SUMMARY

I am a Ph.D. candidate and Dean's Fellow at Arizona State University. My research focus is on building cooperative systems robust to adversarial interference, especially in distributed networks, as well as techniques for privacy preservation and decentralized autonomous decision-making. My current work analyzes temporally-evolving graphs of networks and credentials to improve attack resilience in complex systems. I've worked in and managed teams, taught classes, and have highly polished communication and leadership skills earned over years of real-world industry experience.

EDUCATION

- **Arizona State University** Tempe, AZ
Doctor of Philosophy, Computer Science (GPA: 4.12/4.00) 2016 – 2021 (*Expected*)
Co-Advised by Profs. K. Selçuk Candan & Gail-Joon Ahn
- **Arizona State University** Tempe, AZ
Master of Science, Computer Science 2020
- **University of California, Irvine** Irvine, CA
Bachelor of Science, Information & Computer Science 2004 – 2007

REFEREED PUBLICATIONS

- **Cyber-Quantitative Resilience Metrics**
HW Behrens, B Gelfand, and KS Candan
In Preparation
- **WindRose: Adversarially-Resistant Oblivious Routing with Masked Geographic Targeting**
HW Behrens and KS Candan
In Submission
- **DataStorm: Coupled, Continuous Simulations for Complex Urban Environments**
HW Behrens, KS Candan, X Chen, Y Garg, ML Li, X Li, S Liu, ML Sapino
ACM Transactions on Data Science (TDS) 2021
Journal Article
- **Arbiter: Improved Smart City Operations through Decentralized Autonomous Organization**
Francis Mendoza and HW Behrens
IEEE International Symposium on Technology and Society (ISTAS) 2020
Research Track
- **Pando: Byzantine-Resistant Sensor Fusion through Hierarchical Overlay Ensembles**
HW Behrens and KS Candan
IEEE International Conference on Communications (ICC) 2020
Research Track
- **Practical Security for Cooperative Ad Hoc Systems**
HW Behrens and KS Candan
IEEE Conference on Pervasive Computing and Communications (PerCom) 2020
Forum Track
- **Velocity: Scalability Improvements in Block Propagation Through Rateless Erasure Coding¹**
N Chawla, HW Behrens, D Tapp, D Boscovic, and KS Candan

¹Finalist for Best Paper Award

- **Load-Adaptive Continuous Coupled-Simulation Ensembles with DataStorm and Chameleon**
HW Behrens, ML Li, A Gadkari, Y Garg, X Chen, S Liu, and KS Candan
Chameleon User Meeting (CHUM) 2019
Demonstration Track
- **Adversarially-Resistant On-Demand Topic Channels for Wireless Sensor Networks**
HW Behrens and KS Candan
IEEE International Symposium on Reliable Distributed Systems (SRDS) 2018
Research Track
- **DataStorm-FE: A Data- and Decision-Flow and Coordination Engine for Coupled Simulation Ensembles**
HW Behrens, KS Candan, X Chen, A Gadkari, Y Garg, ML Li, *et al.*
International Conference on Very Large Data Bases (VLDB) 2018
Demonstration Track
- **Lightweight Authentication of Fault-Tolerant Topic-Channel Queries in Distributed Systems**
HW Behrens and KS Candan
ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC) 2018
Consortium Track

SERVICE

- **Conference Volunteer:** (2017) CODASPY; (2018) HPDC; (2019) PLDI
- **Peer Reviewer:** (2017) ASONAM, TKDE; (2018) DASFAA, EDBT, EUROPAR, SIGKDD, TKDE; (2019) DASFAA, ICDE, TCC, TKDE; (2020) DASFAA, ICSE, TCC, TKDE; (2021) IOTJ, TKDE;
- **Student Program Committee:** (2019) S&P
- **ASU Committees:** University Hearing Board, Teaching Excellence Award Committee, Family Resources Advisory Board
- **Graduate Student Mentorship Program:** Designed, implemented, and ran a peer mentorship program pairing junior and senior graduate students within the department (≈ 300 PhD students) for academic, social, and professional support. Participants reported higher program satisfaction, improved mental health, and better team cohesion within and across research groups.

PROFESSIONAL EXPERIENCE

- **Los Alamos National Lab** Los Alamos, NM
Visiting Graduate Researcher, Advanced Research in Cyber Systems Division *June 2020 – Present*
 - Explored the application of quantitative methods to cyberassurance, by creating systems to estimate the security and resilience implications of operational changes by identifying potential structural and architectural weaknesses and proactively improve deployment resilience.
 - Designed and built a simulation and modeling tool to represent possible failure modes for networked smart grids, based on real-world production datasets, to estimate the impact and influence of adversarial actors.
 - Investigated the application of digital twin modeling to power grid security and resilience to adversarial attack.
- **Arizona State University** Tempe, AZ
Dean's Fellow, Graduate Research Assistant, & Graduate Teaching Assistant *Aug 2016 - Present*
 - Awarded the prestigious Dean's Fellowship, a four-year paid fellowship reserved for the most high-performing Ph.D. students from each incoming class.
 - Sole instructor for an introductory engineering course (ASU 101), responsible for curriculum design, lecture delivery, and grade evaluation of 130 undergraduate students.
 - Designed and conducted a personal research agenda, under the Center for Assured and SCALable Data Engineering (CASCADE), to explore novel ideas in the intersection of scalability and security.

- Successfully managed a team of graduate and undergraduate students in achieving our ambitious research goals, and leading to a successful top-tier publication of our complex distributed system.

• **Canela Software, Inc.**

Temecula, CA

Chief Technical Officer

Nov 2015 – Jul 2016

- Coordinated a major business pivot, requiring reallocation of approximately 85% of development resources. This pivot successfully produced a well-received prototype, and generated significant new client interest.
- Proposed, designed, and executed a complete overhaul of developmental process company-wide; proposals influenced release deployment, change management, issue tracking, code review, regression testing, and more.
- Organized a widespread shift to more well-defined agile methodologies, especially Scrum, to increase team flexibility to customer-driven changes; this flexibility proved a critical enabling factor for the success of our pivot.

• *Engineering Manager*

Jul 2011 – Nov 2015

- Designed and implemented enhancements to the software licensing system, enabling SaaS deployments, increasing enterprise penetration, and converting 5% of gross revenue to recurring revenue.
- Created an in-app store and purchasing system, increasing adoption of add-on products by 40%.
- Architected, designed, and rolled out a completely custom cloud database, opening up completely new markets and reducing cloud development overhead by almost 75%.

• *Senior Software Engineer*

Mar 2009 – Jul 2011

- Built a new online software licensing system, reducing accounting workload by 4 hours per day, decreasing software piracy by over 95%, and increasing revenue by 14% year over year.
- Created an automatic update architecture to deploy incremental updates to over 10,000 client systems, reducing support requests by 12% and permitting the rapid release of new features.

• *Software Engineer*

Jan 2008 – Mar 2009

- Designed a new calibration algorithm to increase rendering precision, which reduced measurement error below 0.01 mm and increased diagnosis accuracy by 4%.
- Implemented a serial-to-USB interface for a new control method, increasing margins in regional markets by \$125/unit.
- Added multi-monitor support to a diagnostic product, a feature which is now used by 10% of all installations.

HONORS & AWARDS

- **Upsilon Pi Epsilon ($\Upsilon\Pi E$)**, ACM Computing Honors Society, Founding President (*Alpha Chapter of AZ*).
- **Phi Kappa Phi ($\Phi K \Phi$)**, Graduate Honors Society, Member.
- **Eta Kappa Nu (HKN)**, IEEE Honors Society, Member.
- **Herbold Foundation Graduate Engineering Scholarship**, (2019) for outstanding engineering graduate students.
- **Achievement Rewards for College Scientists (ARCS) Foundation Scholar**, (2019, *Nominee*) for scholastically outstanding doctoral students.
- **Engineering Graduate Fellow** (2018, 2019), for extraordinary academic achievements.
- **Nora J. Folkenflik Memorial Essay Prize**, for outstanding written communication.
- **Chancellor's Achievement Scholarship**, awarded to the top 0.1% of undergraduates.
- **Travel Grant Awardee**: (2019) NDSS, CHUM, ICBC; (2020) ICC

TECHNICAL SKILLS

- **Primary Languages:** Python, C++
- **Automation & Cloud:** Ansible, OpenStack, Vagrant, Docker, Kubernetes, Jenkins, AWS, Google Cloud, Azure
- **Libraries:** NetworkX, NumPy, SciPy, Matplotlib, Boto3
- **Others:** Google Search, Git, Linux, Unix, Ubuntu, Debian, CentOS, Bash, Zsh, L^AT_EX, Regex, vim, grep, ssh

RELEVANT COURSEWORK

- **Applied Cryptography:** Using cryptography to secure communication protocols over networked systems, including signatures, certificates, timestamps, elections, digital cash, and other multiparty coordination.
- **Artificial Intelligence:** Definitions of intelligence, computer problem solving, game playing, pattern recognition, theorem proving, and semantic information processing; evolutionary systems; heuristic programming.
- **Bio-Inspired Computing:** Discussing computational methods derived from biological processes and models including: evolution, immunology, social insects, metabolic scaling, and epidemiology.
- **Cloud Computing:** Virtualization, cloud computing, programmable networking, performance evaluation, information assurance, distributed and parallel computing, and cloud computing-based applications.
- **Data Visualization:** Covers techniques and algorithms for creating effective visualizations based on principles from graphic design, visual art, perceptual psychology and cognitive science to enhance the understanding of complex data.
- **Distributed & Multiprocessor Operating Systems:** Distributed systems architecture, remote file access, message-based systems, object-based systems, client/server paradigms, distributed algorithms, replication and consistency, and multiprocessor operating systems.
- **Distributed Database Systems:** Distributed database design, query processing, and transaction processing; distributed database architectures and interoperability; emerging technologies.
- **Foundations of Algorithms:** Advanced topics in formal algorithm design and analysis, including advanced shortest-paths algorithms, amortized analysis, network flows, NP-completeness, selected topics in computational geometry, as well as distributed, parallel, randomized, and approximation algorithms.
- **Multimedia and Web Databases:** Data models for high-dimensional and graph data; query processing and optimization for inexact retrieval; advanced indexing, clustering, and search techniques in high-dimensional spaces.
- **Statistical Machine Learning:** Spectral clustering, regression, classification, semi-supervised learning, feature reduction, manifold learning, ranking, kernel learning and multitask learning.