WE INTEGRATE
HARDWARE, SOFTWARE, AI ALGORITHMS, AND DATA FOR SCALABLE MACHINE LEARNING AND SECURITY

REAL-TIME DATA ANALYTICS
Hardware, software and algorithm co-design for real-time data analytics. Our customized performance optimization engine is automated and works across platforms, from low-power sensors to data centers and the cloud. Our solutions integrate adaptive data collection processes with training, learning, and inference in real-time and streaming applications.

PARADIGM SHIFT IN DEEP LEARNING
Automated acceleration and adaptive retraining of deep learning. Our framework allows for training of deep learning networks that are platform independent, and scale from sensors to mobile to data centers. We introduced a paradigm shift when we built and demonstrated the first training of deep learning on Edge devices.

SECURITY AND PRIVACY FOR CYBER-PHYSICAL SYSTEMS
To secure cyber-physical systems, we fully consider hardware, software, algorithms and data – and their isolation and interactions. We offer new approaches to security and privacy. Safe machine learning / defense against adversarial attacks, secure embedded medical devices, and privacy-preserving computing (DNA, learning, biometrics) are examples.
Our work is crucial for developing scalable and secure machine intelligence for cloud computing, data centers, Internet of Things, drone-based search and rescue, imaging systems, low-power sensor networks, and many other applications.

CENTER LEADERSHIP

Farinaz Koushanfar
Center Co-Director
Accelerated and domain-specific machine learning (ML), safe and secure ML, private ML, embedded and hardware systems, security and trust

Tara Javidi
Center Co-Director
Practical solutions with theoretical guarantees for information acquisition, processing, and communication

Mingu Kang
Software-hardware co-design, circuits

Ryan Kastner
Embedded security, hardware and FPGA acceleration; FPGAs; reconfigurable computing

Duygu Kuzum
In-memory computing with emerging non-volatile memory devices, neuromorphic computing, brain interfaces

Hanh-Phuc Le
Integrated/miniaturized power electronics, delivery, and management for all

Siavash Mirarab
Scalable analysis of large-scale biological datasets

Truong Nguyen
Image and video processing on low-power, low-cost systems

Alon Orlitsky
Estimation, learning, and speech processing

Piya Pal
High dimensional statistical signal processing, high resolution imaging

Bhaskar Rao
Signal processing, estimation theory, speech processing

Yuanyuan Shi
Data-driven control, energy systems and cyber-physical systems

Tajana Simunic Rosing
Embedded system design and software optimization, power management

Deian Stefan
Systems, security, and programming languages

Behrouz Touri
Dynamics and controls over complex networks, distributed optimization and computation

Yatish Turakhia
Algorithms and hardware-accelerators for computational biology

Nuno Vasconcelos
Statistical signal processing, computer vision, machine learning, multimedia

Lily Weng
Robust, safe and trustworthy Machine Learning, uncertainty quantification, robust optimization of system design

Rose Yu
Large-scale spatiotemporal learning, deep learning, tensor methods, and their applications

Jishen Zhao
Memory and storage architecture and systems, domain-specific acceleration, software/hardware co-design

CENTER FACULTY

Nicholas Antipa
Computational optical imaging systems design

Ilkay Altintas
Makes computational data science more reusable, scalable and reproducible through methods and tools for workflows for problem solving

Kamalika Chaudhuri
Trustworthy machine learning, learning and active learning theory

Pamela Cosman
Image and video compression, processing, and wireless communications

Hadi Esmaeilzadeh
Immersive machine intelligence, full-stack solutions

Andrew Kahng
Physical design of VLSI

Mingu Kang
Software-hardware co-design, circuits

Ryan Kastner
Embedded security, hardware and FPGA acceleration; FPGAs; reconfigurable computing

Duygu Kuzum
In-memory computing with emerging non-volatile memory devices, neuromorphic computing, brain interfaces

Hanh-Phuc Le
Integrated/miniaturized power electronics, delivery, and management for all

Siavash Mirarab
Scalable analysis of large-scale biological datasets

Truong Nguyen
Image and video processing on low-power, low-cost systems

Alon Orlitsky
Estimation, learning, and speech processing

Piya Pal
High dimensional statistical signal processing, high resolution imaging

Bhaskar Rao
Signal processing, estimation theory, speech processing

Yuanyuan Shi
Data-driven control, energy systems and cyber-physical systems