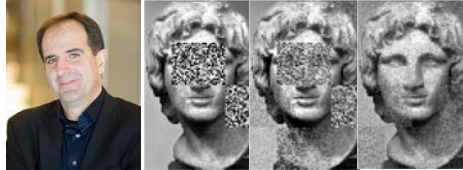


Department of Electrical Engineering

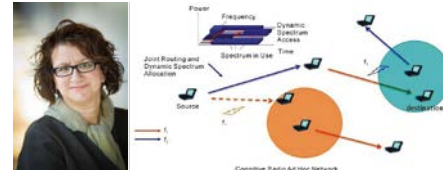
Signals, Communications & Networking

Dimitris Pados



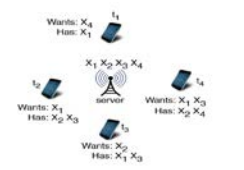
Communication theory and systems; coding & sequences; adaptive signal processing. Applications to signal waveform design; multiplexing, multiple-access & interference channels; secure wireless communications; cognitive radios and networks; L1-subspace signal processing; compressed sensing; error correcting coding; data embedding & hiding; antenna arrays and array radar.

Stella Batalama



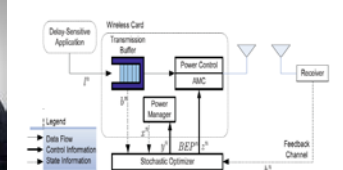
Statistical and Adaptive Signal Processing; Wireless Communication Systems and Networks including CDMA Cellular Communications; Cognitive and Collaborative Networks; Underwater Communications; Multimedia Security and Data Hiding; Covert Communications; Compressed Sensing; Small Sample Support Optimization

Michael Langberg



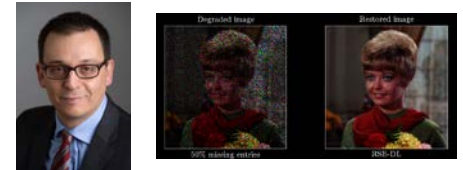
Information Theory, Coding Theory, Network Communication and Network Coding, "Big Data" in the form of Succinct Data Representation via Geometric Clustering, and Probabilistic Methods in Combinatorics

Nick Mastrorade



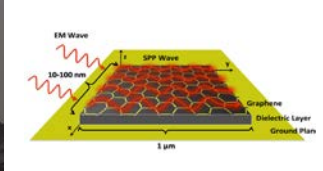
Energy-Efficient Multimedia Systems, Resource Allocation and Scheduling, Airborne Networking and Communications, Incentive Mechanisms for D2D Relaying, Cross-Layer Optimization, Markov Decision Processes, Reinforcement Learning.

Konstantinos Slavakis



Signal processing; Machine learning; Big data analytics; (Stochastic) optimization; Online learning; Adaptive signal processing; Dimensionality reduction; Clustering; Image processing; Communications

Josep M. Jornet



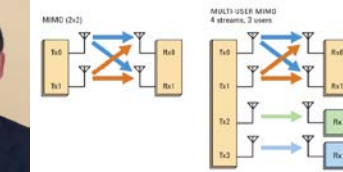
Electromagnetic nanonetworks, graphene-enabled wireless communication, Terahertz Band communication networks, Wireless Nanosensor Networks and the Internet of Nano-Things.

Leslie Ying



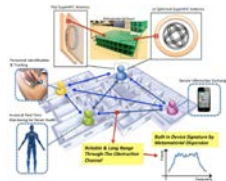
Compressed sensing, Magnetic resonance imaging, l image reconstruction

Weifeng Su



Wireless Communications and Networking, MIMO Systems and Space-Time Coding, MIMO-OFDM Systems, Cooperative Communications for Wireless Networks

Zhi Sun



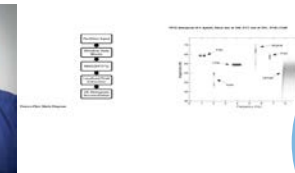
Wireless Communication and Networking in Extreme Environments, Metamaterial Enhanced Communication and Networking, Wireless Intra-Body Networks, Cyber Physical Systems, Wireless Underground Sensor Networks

Elena Bernal Mor



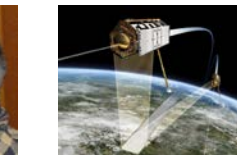
Performance evaluation and resource management for communication networks; traffic engineering and provisioning of quality of service in different types of wireless networks; ranging from mobile cellular systems to Dynamic Spectrum Access networks

Adly Fam

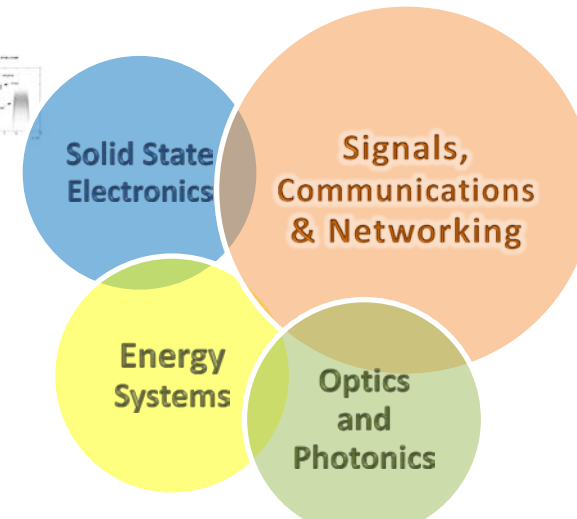


Digital Signal Processing; Arithmetic Intensive Computing; Communications and Radar

Mehrdad Soumekh



Signal and Image Processing; Medical and Radar Imaging; Inverse Scattering



Current Research Projects in Signals, Communications and Networking:

Secure physical-layer communications • Small-sample-support interference suppression to pn-masked data streams • Minimum-distortion data embedding in multimedia files • Compressed-sensed video and deterministic measurement matrices • Underwater acoustic communications: Novel sub-symbol fading optimal receivers • Channel-data blind signal separation in underwater communications • Stochastic channel access for underwater acoustic sensor networks with spatial and temporal interference uncertainty • Analog network coding for multi-hop underwater acoustic networks • Jointly optimal channelization and routing in cognitive networks • Optimized hybrid-ARQ links Waveform-domain interference alignment on a software-defined radio network • Detection of unknown modulation schemes • Information-theoretic design of linear block codes • Uniquely-decodable overloaded multiplexing of digital waveforms • Performance vs complexity driven design of space-time block code transmission systems • Cross-layer optimized video streaming • Video streaming in cooperative networks • Online learning for energy-efficient delay-critical communication in unknown and dynamic wireless environments • Energy-efficient multicore video decoding • Data center power management • Magnetic induction-based wireless communication and networking in RF-challenged environments • Self-contained micro wireless sensor network in oil reservoirs • Disaster-immune communication and localization in mines and tunnels • Underground infrastructure monitoring and fault detection • Cooperative communications and relaying techniques • Cross-layer resource allocation for cognitive and cooperative ad hoc networks • Cooperative ARQ protocol design and analysis • Airborne MIMO communication systems • Interference alignment in multi-hop MIMO networks • Dynamic decision making under uncertainty and partial information in large-scale networks • Variational Inequalities: A new paradigm for cognitive network layering • Toward distributed decision making in cognitive radio ad-hoc networks based on bilevel equilibrium programming • Learning equilibria in mean-field networks via differential variational inequalities • Extending the realm of optimization for complex systems: Uncertainty, competition and dynamics • Robust compressed sensing reconstruction algorithms • Dynamic magnetic resonance imaging • Tissue parameter mapping • Non-Fourier encoding for magnetic resonance imaging • Kernel-based nonlinear image reconstruction techniques • Blind compressed sensing and its applications • Compressed sensing for photoacoustic imaging • Active networking and software-defined networked systems • Sensor networks for energy efficiency in buildings • Ultrasonic networking for intra-body implantable sensor networks • Multi-view rate control for multimedia sensor networks • Mobile cloud computing • Queuing games in interference-limited wireless networks • Jamming and anti-jamming in infrastructure-less wireless networks • Design and simulation of next-generation HF communication systems • Reliability aware design of multicore processor systems-on-chip (MPSoCs) • Energy aware design of network-on-chip based systems-on-chip • Embedded systems: Optimization and design methodologies • Reconfigurable and parallel computing • L1-subspace signal processing

Sample of Research Contributions:

N. Mastrorarde and M. van der Schaar, "Joint physical-layer and system-level power management for delay-sensitive wireless communication," *IEEE Trans. on Mobile Computing*, vol. 12, no. 4, pp. 694-709, April 2013.

L. Ding, T. Melodia, S. Batalama, J. Matyjas, M. Medley, "Cross-layer Routing and Dynamic Spectrum Allocation in Cognitive Radio Ad Hoc Networks," *IEEE Transactions on Vehicular Technology*, Vol. 59, No. 4, pp. 1969-1979, May 2010.

Weifeng Su, F. Chen, D. A. Pados, and J. D. Matyjas, "The outage probability and optimum power assignment for differential amplify-and-forward relaying," in *Proceedings of IEEE International Conference on Communications (ICC)*, Cape Town, South Africa, May 23-27, 2010.

Z. Sun and I. F. Akyildiz, "Magnetic Induction Communications for Wireless Underground Sensor Networks," *IEEE Transactions on Antenna and Propagation*, Vol. 58, No. 7, pp. 2426-2435, July 2010.

D. Liang, B. Liu, J. Wang, L. Ying. "Accelerating SENSE using compressed sensing", *Magnetic Resonance in Medicine*, vol. 62, No. 6, pp. 1574-1584, December 2009.

M. Li, S. N. Batalama, D. A. Pados, T. Melodia, M. J. Medley, and J. D. Matyjas, "Cognitive code-division links with blind primary-system identification," *IEEE Transactions on Wireless Communications*, vol. 10, pp. 3743-3753, Nov. 2011.

M. Li, S. Kundu, D. A. Pados, and S. N. Batalama, "Waveform design for secure SISO transmissions and multicasting," *IEEE Journal on Selected Areas in Communications, Special Issue on Signal Processing Techniques for Wireless Physical Layer Security*, vol. 31, pp. 1864-1874, Sept. 2013.

P. P. Markopoulos, S. Kundu, and D. A. Pados, "Small-sample-support suppression of interference to PN-masked data," *IEEE Transactions on Communications*, vol. 61, pp. 2979-2987, July 2013.