Information Systems Lab

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Stanford University
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Information Systems Lab

- Interdisciplinary research lab in EE
- Formed in early 60s to study mathematical aspects of EE systems
  - Now includes 21 faculty members, over 110 PhD students

- ISL has made significant contributions to:
  - Foundations of signal processing, information theory, systems and control, and image processing
  - Applications to communication, medical imaging, image and video communication, computer networks, and integrated circuit design and manufacturing
Impact on Information Technology

- DSL
- CDMA
- MIMO wireless systems
- Optical communications
- Secure Internet communication
- Compression standards
- MRI
- Digital control
- Microprocessor design
- FPGA architectures
- Embedded systems
- Algorithms for IC manufacturing
ISL Research Areas

- Information theory and coding:
  - Cover, El Gamal, Gill, Gray, Montanari, Weissman
- Communication network theory and algorithms
  - Bambos, Prabhakar
- Image and video processing and systems
  - El Gamal, Girod, Gray
- Medical imaging
  - Nishimura, Pauly
- Optimization, learning, and control
  - Boyd, Van Roy
- Wireless communication
  - Goldsmith, Paulraj
- Signal processing
  - Gray, Montanari, Weissman, Widrow
Information Theory: Applications

Discrete Denoising: Weissman

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

Compression/ classification: Gray

Network information theory: Cover, El Gamal
Optimization, Learning, and Control

Convex optimization: Boyd

Dynamic optimization: Van Roy

Statistical physics meets optimization: Montanari, Prabhakar

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Communication and Networks

Video communication: Girod

Clean slate Internet

Randomized algorithms: Prabhakar

Smart antennas: Paulraj

Wireless systems: Goldsmith
Medical Imaging

Professor Nishimura
Professor Pauly

Magnetic Resonance Systems
Research Lab (MRSRL)
Sensor Networks

Wireless: Goldsmith

Collaborative Camera Network: El Gamal, Guibas
3D-FPGA

El Gamal, Wong

Part of DARPA 3D-IC

Need very high density vertical interconnect
--> Monolithic stacking