Electrical Engineering and Computer Science
Research Fields
2004

A broad range of research opportunities exists within the Department of Electrical Engineering and Computer Science and its associated interdepartmental laboratories. To evaluate your application as fairly as possible and to match your interests with available resources, we ask you to choose one of the research fields described below as your primary research field. Your application will be evaluated by faculty whose interests lie within that field and it is expected that your research program will be carried out in that field.

On page 1, line 2 of your application, please enter the name of the field that you have chosen, using the name as given in bold face type below. You may include a second field if you wish. You should also give a clear description of your interests in your Statement of Objectives.

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Descriptions of Research Fields

A. **Communications:** digital communication, information theory; coding; wireless and cellular systems; multi-user communications, multi-access systems, data networks, optical networks

B. **Systems, Decision and Control:** dynamic systems, hybrid systems, large-scale systems; feedback control, robust control, intelligent control, system identification; optimization-based methodologies, operations research, numerical methods, scientific and engineering computation

C. **Signal Processing:** digital signal processing, signal modeling, image processing, speech and audio processing, synthesis and recognition of speech, signal modeling; detection and estimation, statistical signal processing, array processing; oceanographic signals and systems; advanced television systems, video processing systems

D. **Bioelectrical Engineering:** electromagnetic fields in biological tissue and cells, connective tissue and cell physiology; auditory physiology and psychophysics; sensory aids for hearing and vision; biomedical and physiological instrumentation; speech production and perception

E. **Circuit Design:** computer-aided circuit design, integrated circuit design and analysis; VLSI for signal processing and communications; analog and digital system design, theory of nonlinear circuits and systems; low-power electronics

F. **Devices and Materials:** fabrication, integration, nanotechnology, materials growth; nonlinear optics and ultrafast optics, optoelectronics and photonics; organic optoelectronics; micro-electromechanical systems; microwave and terahertz devices; quantum-effect device physics and electronics, carbon nanotubes, microelectronic devices

G. **Electromagnetic Energy, Fields, and Waves:** plasmas and controlled thermonuclear fusion, energy conversion components and systems; power systems and high voltage research, power electronics, continuum electromechanics; electromagnetic waves, fields, and applications; radio astronomy

H. **Theoretical Computer Science:** algorithms; computability and complexity; cryptography and network security; distributed systems; parallel algorithms

J. **Computer Systems and Architecture:** computer architecture; distributed computing; fault-tolerant computing; high performance computing and applications; operating systems; parallel systems, parallel computation; programming languages and compilers; software specification, design, and analysis; VLSI architecture and computer systems

K. **Artificial Intelligence:** knowledge representation and reasoning, knowledge-based systems, medical information systems; machine learning; natural language processing; perceptual interfaces and human/computer interaction; robotics; speech understanding; vision

L. **Computer Networks:** adaptive networks; mobile and wireless computing; protocol design; router design

M. **Computer Graphics:** computer animation; geometric modeling; graphical interfaces; image capture, image-based modeling and rendering; material modeling and textures; multimedia processing; rendering algorithms