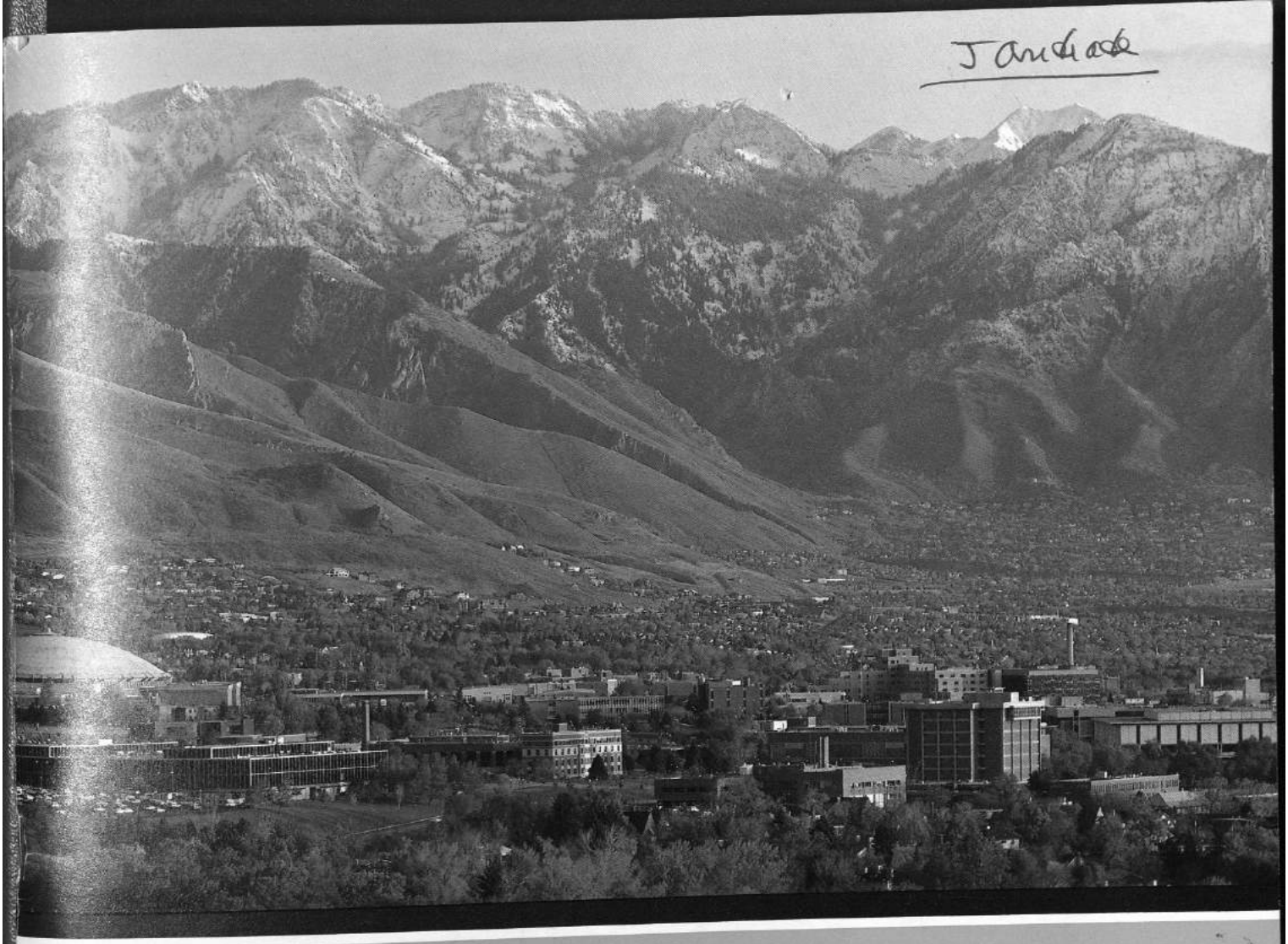


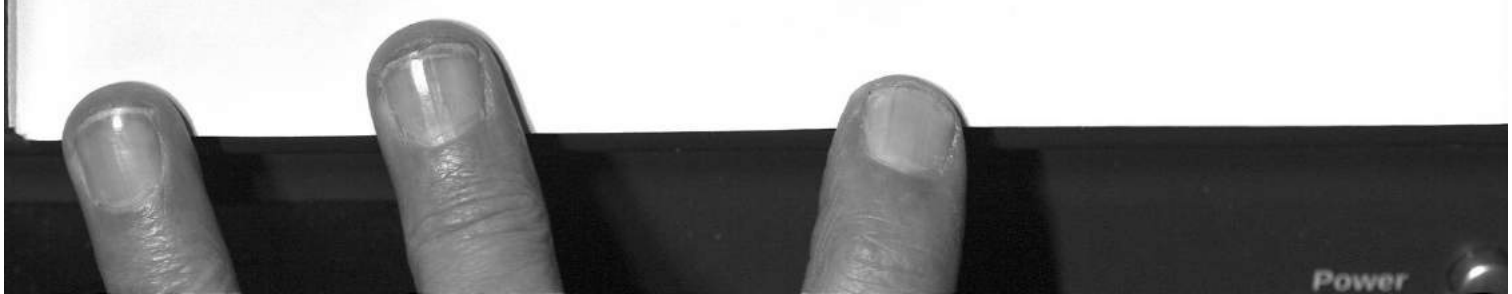
Faculty Research Directory

1984-86

University of Utah
College of Engineering

TABLE OF CONTENTS

COLLEGE OF ENGINEERING
UNIVERSITY OF UTAH
SALT LAKE CITY, UTAH 84112
(801) 581-6911



ENGINEERING RESEARCH

The College of Engineering at the University of Utah is a major center for engineering research in the western United States. In 1983, it ranked among the top 20 engineering schools nationwide in terms of level of research support. During the last four years, the annual research budget has grown at a rate of more than 15 percent.

The research budget of the college is composed of funds from grants, contracts with governments agencies and industrial concerns, and gifts. Annual research expenditures exceeded $8 million in 1983-84. In addition, research funded by unrestricted external gifts and funds exceed $1 million annually.

Research in the College of Engineering is primarily multidisciplinary. Faculty members from the seven departments (Bioengineering, Chemical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Materials Science and Engineering, and Mechanical and Industrial Engineering) interact regularly through established research consortia and centers as well as individually. This interaction allows them to apply their skills synergistically to tackle problems that are often beyond the traditional scope of academic institutions.

In addition to the strong interaction among faculty members, the college promotes applications of engineering research to solve problems of interest to the faculties of other colleges within the University. This is particularly true of the School of Medicine. Much of the work on artificial organs and medical devices at the Medical Center was carried out by faculty members in the College of Engineering in association with their colleagues in medicine and pharmacy. Strong collaborations also exist with the State College of Mines and Mineral Industries and the College of Science.

Off campus, the College of Engineering is vitally interested in helping not only government agencies and large industrial firms but small businesses as well. For several years, the college operated the Utah Innovation Center, funded in part by the National Science Foundation. Today the Utah Innovation Center is privately funded and operated and occupies facilities in the University Research Park.

The College of Engineering encourages entrepreneurship. The faculty have registered numerous patents, many of which are available for private sector licensing and commercial development. The strong interest in interdisciplinary research--together with the atmosphere of innovation and commercial application of research findings--makes the University an ideal source of technical assistance for both large and small businesses.

With an eye to the future, the college is heavily involved in the high technology fields of microelectronics, polymer science, ceramics, CAD-CAM, computer science, robotics, energy systems, earthquake engineering, and advance process development. The college also has sustained a continuous effort in defense-related research including the development of advanced composite materials, stability characteristics of solid propellant rocket motors, high-power electron tubes, special sensors and microelectronics.

The college is dedicated to maintaining an engineering research profile which will not only sustain the preeminence of the United States among industrial nations but also provide for the research education of future industrial and engineering leaders.

FACILITIES AND RESOURCES

The College of Engineering is based in the four-story Merrill Engineering Building in the northwest corner of the University of Utah campus. This 140,000-square-foot facility houses all seven departments and the bulk of the research and teaching activities.

A new building, specifically designed for engineering research, was recently occupied in July 1984. This structure, shared with the State College of Mines and Mineral Industries, provides 23,000 square feet for College of Engineering activities.

In addition, a major remodeling effort of a five-building complex is now nearing completion and will permit the consolidation of the Department of Materials Science and Engineering in one location. This 20,000 square-foot building will provide administration, office, and extensive research space.

Ground was broken recently for a new building which will provide 60,000 square feet of lecture and laboratory space, including advance computer-aided design and computer-aided engineering laboratories. This facility should be ready for occupancy by late 1986. Transferring a significant part of the teaching activities now located in the Merrill Engineering Building to this complex will permit remodeling and preparation of space in the Merrill Building to house the rapidly growing research programs.

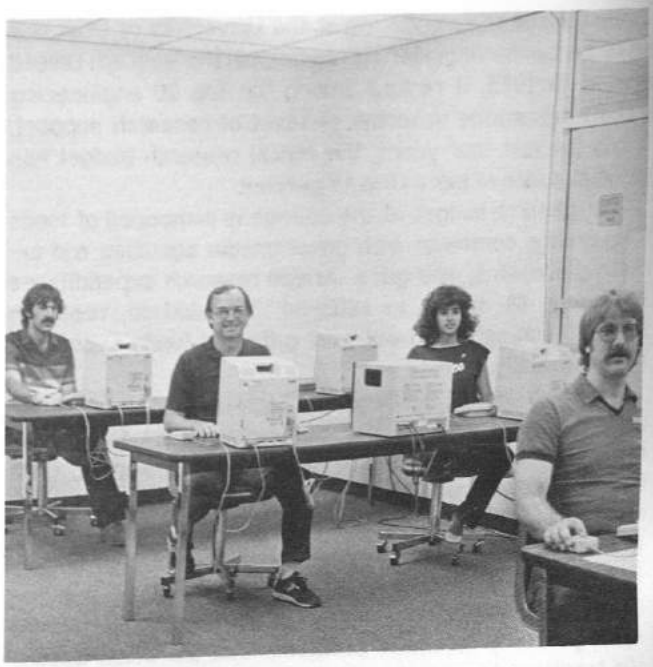
Plans are now being formulated for a totally new structure specifically designed for advanced engineering research. A program is under way to raise the funds for that facility.

The college and the University are progressing rapidly to provide expanded and improved facilities to permit the faculty to continue, and indeed expand, their outstanding research activities.

Computer facilities and laboratories are available in all parts of the college and in the Computer Center. Major computational capability includes a DEC System 20, VAX 780, several VAX 750s, and a Univac 1120 system. In addition, HP9000, 1000, and 3000 systems are also available. Considerable computer graphics facilities are also available, both for fundamental graphics research as well as for basic research and application of computer-aided design. The University is a member of the consortium with the Apple Computer Corporation and is acquiring Macintosh and Lisa machines for routine instruction and selected research programs.

Computing facilities are presently being coordinated for collegewide use and a VAX 785 or equivalent system will be on line shortly. CAD/CAM equipment includes a variety of CAD stations and the facilities of the graphics laboratory as well as a five-axis, fully computer-controlled mill.

Microelectronics facilities include the HEDCO(Foundation)



View of an Apple Macintosh teaching laboratory.

Laboratory for the design and fabrication of large-scale integrated circuits, silicon devices and other structures. Facilities for VLSI design and the fabrication of custom sensors are also available.

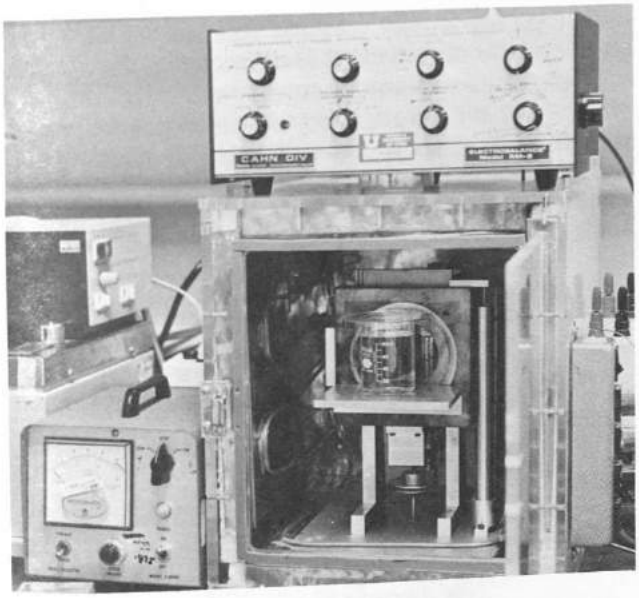
Bioengineering laboratories include facilities for medical imaging based on ultrasound and NMR techniques; sensor development, based on field effect transistor and optical technologies; biomaterials and bio-polymer laboratories; orthopedic bioengineering lab; and vision research laboratory. Bioengineering research activities make extensive use of laboratories in the Medical School, particularly in the departments of anesthesiology, physiology, surgery, orthopedics, ophthalmology, and pathology.

Electronics laboratories incorporate a sophisticated microwave tube development facility, equipment for measuring the bio-environmental effects of microwaves, digital electronics laboratory, laboratory for physical electronics, digital systems laboratory, and facilities for digital signal analysis.

The nuclear laboratory includes a 100 kw Triga reactor, small training reactor, Californium radiation facility, neutron generator, and various radiation sources and detection equipment.

The biochemical engineering and biotechnology laboratory encompasses the environmental engineering waste water laboratories of civil engineering, a mammalian

FACILITIES AND RESOURCES



Specialized equipment for measuring wetting dynamics of solid surfaces.

cell culture facility, and bio-separations laboratory. Related biochemical engineering and biotechnology facilities are being developed.

Process engineering facilities include kinetics and process dynamics, coal combustion and shale oil development laboratories, tar sands extraction facility, and general thermal science and energy systems laboratories.

Wind tunnels and other facilities for gas flow visualization are available, including high-temperature processes, an extensive hydrology facility, and other facilities for general fluid mechanics, aerodynamics, and turbulence studies.

Laboratories and instrumentation are available for the study of mechanical properties: mechanical property measurement, including mechanical and dielectric relaxation, fatigue, fracture, impact, and other measurements.

Rheology facilities include a mechanical spectrometer and a rheogoniometer as well as other standard facilities for viscoelastic flow and related rheologic measurements. A unique positron annihilation facility for defect analysis is available. Facilities for the preparation, fabrication and testing of composite materials are also included.

Physical properties equipment includes dielectric relaxation, thermal analysis, optical spectroscopies-- including Raman and infrared spectroscopy. Other equipment is available for electron spin resonance spectroscopy, X-ray diffraction, conventional and pyrolysis mass spectrometry, X-ray photoelectron spectroscopy, analysis of electrical and magnetic properties, molecular weight distribution and related methods for the characterization of high polymers. NMR spectroscopy capability is available in the Department of Chemistry.

The optical engineering laboratory provides laser sources, monochronometers and spectrometers, and light detection systems for a variety of optical and spectroscopic studies. The lab is also used for optical device development, including optical sensors, Raman spectroscopy, ultra violet and fluorescence studies as well as for characterization of basic materials.

Electron microscopy equipment includes a 1.4 Å resolution scanning transmission electron microscope, two transmission electron microscopes, and one scanning electron microscope. Sample preparation and fabrication facilities and optical microscopy equipment are available also.

The surface analysis laboratories include a monochromatic X-ray photoelectron spectrometer for surface elemental and chemical bonding studies, an automatic ellipsometer, reflectance Fourier transform infrared spectrometer, and equipment for surface-enhanced Raman scattering, total internal reflection fluorescence spectroscopy, interface electrical measurements, and surface wetting and wettability properties.

The ceramics fabrication and testing laboratories have grinding and powder equipment, high-temperature furnaces, facilities for extrusion melting and casting, and equipment for ceramic characterization.

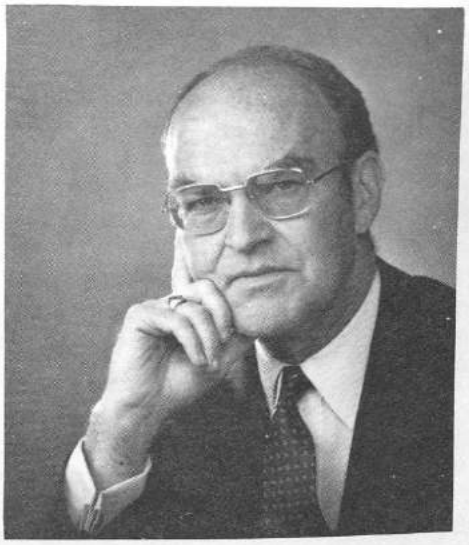
The polymer fabrication and processing laboratory has facilities for both research and teaching of basic polymer processing, fabrication, and molding as well as for machining and bonding.

UNIVERSITY ADMINISTRATION

The University of Utah is fortunate to be part of a higher education system with significant public and state support.

One of the many advantages of the University of Utah is that the individuals who run the administration do so with a minimum of bureaucracy and maximum of efficiency. They are all highly supportive of engineering education and research and possess a deep understanding of its problems and opportunities.

Dr. Chase N. Peterson assumed the presidency of the University in August 1983, after having served as vice president for health sciences. Dr. Peterson's background in medical education and research has prepared him for issues relating to engineering education and research. He is well aware of the costs of high technology, education, training, and research activities, and he is actively encouraging industrial interactions and faculty entrepreneurial interests.



Dr. Chase N. Peterson

Dr. Irwin Altman, vice president for academic affairs and former dean of the College of Social and Behavioral Science, is an accomplished scientific researcher in psychology. He is aware of, and sympathetic to, the needs, opportunities, and challenges of modern research and technical education.

Dr. Irwin Altman

Dr. James Brophy, vice-president for research, has Ph.D.'s in electrical engineering and physics with considerable academic teaching and research experience in solid state electronics and microelectronics. He is the author of a number of very popular textbooks in those areas. He is also a member of the electrical engineering faculty and an active researcher.

Dr. James Brophy

COLLEGE ADMINISTRATION

Dr. Joseph Andrade, Ph.D., has served as dean of the College of Engineering since July 1983, succeeding Dr. Laurence H. Lattman. Andrade's training is in metallurgy and materials science with an emphasis on polymers. He has joint academic appointments in bioengineering and materials science and engineering and is on leave from his appointments in the College of Pharmacy and School of Medicine. He has worked extensively in the field of medical polymers, surface chemistry, polymers as sensors, and medical devices. He brings to the college a genuine interest in fostering interdepartmental and interdisciplinary programs and activities, not only within the College of Engineering but among the various colleges of the University as well.

Dr. Joseph Andrade

Dr. Robert E. Stephenson, Ph.D. and associate dean for academic affairs, is a member of the electrical engineering faculty and former director of the Computer Center. He is an accomplished engineering educator. In addition to his responsibilities for academic affairs, he also serves as associate dean for facilities and planning.

Dr. Larry DeVries, professor of mechanical engineering, serves as associate dean for research. Dr. DeVries assists and encourages faculty in obtaining support for their research programs. He is a talented engineering educator and researcher and has served as a program manager for the National Science Foundation.

Mr. Guil Funston serves as assistant dean for industrial relations, facilitating and encouraging communication and interaction with industry, practicing professional engineers, and alumni.

Dr. Robert E. Stephenson

Dr. Larry DeVries

Mr. Guil Funston

Mrs. Marvel Leader, administrative officer, is responsible for the conduct of the Dean's Office and the college administration.

Mr. Briant Smith, accounting services, maintains and supervises all accounts in the college, and advises the deans on all financial matters.

Mrs. Marvel Leader

Mr. Briant Smith

DEPARTMENTS

The College of Engineering consists of seven academic departments offering 10 degree programs ranging from Bachelor of Science to Doctor of Philosophy. All departments have major research efforts and research facilities which are briefly described below. The individual faculty profiles which follow include information on research interests, publications, and patents. Most of the faculty regularly consult with industry--both locally and nationally.

The Department of Bioengineering emphasizes graduate education and research. The main research activities within the department are concentrated in the areas of bioinstrumentation, biomaterials, biomechanics and prostheses.

Other current programs include medical imaging, biomedical device design, and the effects of microwaves on man, including development of a microwave hyperthermia system for use in cancer therapy. Also being studied is the biocompatibility of polymeric materials, including studies on physico-chemical aspects of protein adsorption, cell adhesion and related interactions, and the development of modified or new polymers for specific implant applications. Nerve regeneration, vision research and information processing, mammalian cell culture, thin film electrodes for neurostimulation, and analysis of expired air by ultrasensitive spectroscopic methods are other ongoing activities.

The Chemical Engineering faculty concentrate their research activities in fluid mechanics, mass transfer, heat transfer, thermodynamics, process control and chemical-reaction kinetics.

Specific projects include ignition and burning of western coals and coal chars, study of the connection between the structure of macromolecules and macroscopic properties of polymeric materials, and food production in relationship to energy and heat transfer. Air pollutant formation, controlled combustion, diffusional processes and computer-aided process synthesis are also current research areas.

Research interests of the Department of Civil Engineering faculty include mechanics--emphasizing composite materials, fracture mechanics, and fatigue--computer-aided design of both dynamically and statically loaded structures and earthquake engineering. Another area of interest is geotechnical engineering, including the response of soils to dynamic loading, the stability of slopes and the properties of soils, especially clays and weak weathered rock. Water treatment and chemistry, hydrology, computational fluid mechanics, water resources, and system optimization and transportation are also current research areas.

Faculty in the Department of Computer Science, which was recently ranked 18th in the nation, are conducting extensive research in computer-aided geometric design, particularly on a spline-based solid modelling system called Alpha 1, and on other aspects of computer graphics.

Artificial intelligence and symbolic computation are also being studied, including transportable LISP systems. There is a growing emphasis on computer and machine vision for smart robot applications as well as on full text information processing. Other research areas include computer-aided VLSI design (NMOS, CMOS, and GaAs), logic programming languages, multiprocessor systems, parallel processing, distributive and parallel computing, and programming language structures.

Currently, undergraduate as well as graduate students work with Department of Electrical Engineering faculty in a number of research areas. Among them is electromagnetic theory, emphasizing the biological effects and applications of electromagnetic radiation as well as electromagnetic techniques for energy and defense applications. Microwave tube research and design, semiconductors, applied optics, microelectronics, signal processing, and opto-electronic systems are also areas of student-faculty interest.

Other projects involve signal restoration, adaptive filtering, modelling of the eye and ear, and design of communication systems for a variety of purposes.

Research investigations in the Department of Materials Science and Engineering are concerned with how solids can be utilized for man's benefit, by modifying and optimizing their structure to further improve and custom design their properties.

Emphasis areas include ceramics--including processing, synthesis and characterization techniques--metals and physical metallurgy, solid state physics, and VLSI. Biomaterials, polymers, semiconductors and surface science are also current research areas.

Research interests in the Department of Mechanical Engineering cover three basic areas: mechanics, systems and design, and the thermal-fluid-energy sciences. In conjunction with these, engineering materials, power generation, energy utilization, product safety, combustion, heat transfer and acoustics are also studied. Particular research thrust areas are robotics, turbulence and vibrations, fracture mechanics, composite materials, nuclear engineering and biomedical engineering.

Industrial engineering research interests include engineering economics, human factors, operation research, production, materials handling and robotics, and factory automation.

FACULTY

Most of the College of Engineering faculty are housed in the Merrill Engineering Building (MEB), the Mines Building (MINES), and the Medical Center (MC). For further information, please contact the professors directly (use 801 area code for all Utah numbers) or Mr. Guil Funston, Assistant Dean for Industrial Relations, 2000 MEB, College of Engineering, University of Utah, Salt Lake City, Utah, 84112, (801) 581-6911.

BIOENGINEERING

JIRI JANATA
CHAIRMAN AND PROFESSOR

Ph.D. 1965, Charles University
At Utah Since 1976

Research Area

Solid state chemical sensors, electrochemistry, analytical chemistry.

Publications

Janata, J., "Electrochemistry of Chemically Sensitive Field Effect Transistors," Sensors and Actuators, 4(1983): 255-265.

Blackburn, G.F., M. Levy and J. Janata, "Field Effect Transistors Sensitive to Dipolar Molecules," Appl. Phys. Lett., 43(1983): 700-701.

Janata, J. and R.J. Huber, Ion Sensitive Electrodes, H. Freiser (ed.), Vol. 2, Plenum Press, New York, 1980.

Haemmerli, A., J. Janata and J. Brophy, "Equilibrium Noise in ISFETs," J. Electrochem. Soc., 129(1982): 2306.

Janata, J. and J. Ruzicka, "Combination of Voltammetry and Flow Injection Analysis," Anal. Chim. Acta., 139(1982): 105.

Current Activities

Development and application of multisensor systems.

Patents

Janata, J. Selective Chemical Sensitive FET Transducers. U.S. Patent 4, 020, 830. 1977.

Janata, J. Novel Protein Immobilizing Hydrophobic Polymeric Membrane. U.S. Patent 3,966,580. 1976.

Janata, J. Method of Sterilizing Reference Electrodes and the Like. U.S. Patent 4, 175, 020. 1978.

Office: 2059 MEB 581-3837
Home: 2231 Logan Ave., 84108 583-5210

JOSEPH D. ANDRADE
PROFESSOR

Ph.D. 1969, University of Denver
At Utah Since 1969

Research Area

Polymer surface chemistry, surface and interface engineering, biotechnology, medical devices.

Publications

Andrade, J.D. (ed.), Surface and Interfacial Aspects of Biomedical Polymers, Vol. 1 and 2, Plenum Press, New York, 1984, in press.

Rockhold, S.A., R.D. Quinn, R.A.Van Wagenen and J.D. Andrade, "Total Internal Reflection Fluorescence (TIRF) as a Quantitative Probe of Protein Adsorption," J. Electroanal. Chem. Interfacial Electrochem., 150(1983): 261-275.

Elliott, I., J.D. Andrade and C. Doyle, "Core-Level Sensitivity Factors for Quantitative XPS Analysis-Data Bank," J. Electron Spectros. Relat. Phenom., 28(1983): 303.

Coleman, D.L., D.E. Gregonis and J.D. Andrade, "Blood-Material Interactions: The Minimum Interfacial Free Energy and Polar/Apolar Ratio Hypotheses," J. Biomed. Mater. Res., 16(1983): 381.

Andrade, J.D., V.L. Hlady and R.A. Van Wagenen, "Effects of Plasma Protein Adsorption on Protein Conformation and Activity," Pure Appl. Chem., 1984, in press.

Current Activities

Sensors for specific chemicals based on antibody, fiber optic and waveguide technologies, conducting polymers, interface electronic and vibrational spectroscopy of adsorbed proteins, biotechnology.

Patents

Andrade, J.D. and R.A. Van Wagenen. Process for Conducting Fluorescence Immunoassays Without Added Labels and Employing Attenuated Internal Reflection. U.S. Patent 4, 368, 047. 1983.

Awards

University of Utah Distinguished Research Award, 1981; Ebert Prize, 1978; Outstanding Utah Engineering Educator, 1977.

Office: 2000 MEB 581-6911
Home: 6009 Highland Dr., 84121 277-1259

BIOENGINEERING

MICHAEL J. BERGGREN
RESEARCH ASSISTANT PROFESSOR

Ph.D. 1969, Stanford University
At Utah Since 1978

Research Area

Ultrasound imaging and algorithm development.

Publications

Johnson, S.A., Y. Zhou, M.J. Berggren and M.L. Tracy, "Acoustic Inverse Scattering Solutions by Moment Methods and Back Propagation," Conference on Inverse Scattering: Theory and Application, J.B. Bednar, R. Redner, E. Robinson and A. Weglein (eds.), SIAM, Philadelphia, 1983, pp. 144-155.

Johnson, S.A., F. Stenger, C. Wilcox, J. Ball and M. Berggren, "Wave Equations and Inverse Solutions for Soft Tissue," Acoustical Imaging, J.P. Powers (ed.), Plenum Press, New York, 1982, pp. 409-424.

Johnson, S.A., M.J. Berggren, D.A. Christensen, F. Stenger, J. Ball and C. Wilcox, "A Three-Dimensional Reflection and Diffraction Tomography Scanner," Ultrasonic Imaging, 3 (1981): 200.

Current Activities

Diffraction tomography, synthetic focus imaging and corrections for compound B-scans, inverse scattering solutions by moment methods.

Awards

Phi Beta Kappa; Phi Kappa Phi.

Office: 2359 MEB 581-7064
Home: 123 Q Street, #8, 84103 363-8012

A.U. "DAN" DANIELS
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1966, University of Utah
At Utah Since1972

Research Area

Design of orthopedic implants, orthopedic implant materials, mechanical properties of tissues, orthopedic biomechanics.

Publications

Daniels, A.U., K.M. Samuelson and K.A. Rusin, "Talonavicular Joint Surface Anatomy and Prototype Resurfacing Prostheses," Foot and Ankle, 2(1981): 5-14.

Dunn, H.K. and A.U. Daniels, "The Mechanics of the Surgical Treatment of Scoliosis," Clincal Biomechanics: A Case History Approach, J.A. Black and J. Dumbleton (eds.), Churchill-Livingstone, New York, 1981, pp. 335-358.

Dunn, H.K., A.U. Daniels, and G.G. McBride, "Intraoperative Force Measurements During Correction of Scoliosis," Spine, 7(1982): 448-455.

France, E.P., A.U. Daniels, E.M. Goble and H.K. Dunn, "Simultaneous Quantitation of Knee Ligament Forces," J. Biomechanics, 16(1983): 553-564.

Patents

Daniels, A.U. Nitride-Oxide Refractories. U.S. Patent 3, 652, 304. 1972.

Daniels, A.U. Cutting Tool. U.S. Patent 3, 705, 025. 1972.

Office: 3b165 MC 581-7601
Home: 933 Newberry Rd., 84113 581-1021

BIOENGINEERING

DONALD K. EDDINGTON
RESEARCH ASSISTANT PROFESSOR

Ph.D. 1977, University of Utah
At Utah Since 1984

Research Area

Artificial hearing, electrical stimulation of the human nervous system, auditory physiology (modelling).

Publications

Eddington, D.K. and J.L. Orth, "Speech Recognition in a Deaf Subjects with a Portable, Multichannel Cochlear Implant System," Advances in Audiology, W.D. Keidel and P. Finkenzeller (eds.), Vol. 2, Karger, New York, 1984, pp. 61-67.

Eddington, D.K., "Speech Recognition in Deaf Subjects with Multichannel, Intracochlear Implants," Cochlear Prostheses: An International Symposium, C.W. Parkins and S.W. Anderson (eds.), Annals New York Academy of Sciences, 405, 1983, pp. 241-258.

Eddington, D.K. "Speech Discrimination in Deaf Subjects with Cochlear Implants," J. Acoust. Soc. Am., 68(1980): 885-891.

Kiang, N.Y.S., D.K. Eddington and B. Delgutte, "Fundamental Considerations in Designing Auditory Implants," Acta. Oto-Laryngol, 87(1979): 204-218.

Eddington, D.K., W. H. Dobelle, D.E. Brackmann, M.G. Mladejovsky, and J.L. Parkin, "Auditory Prostheses Research with Multiple Channel Intracochlear Stimulation in Man," Ann. Oto-Rhinol-Laryngol, 87, Suppl. 53(1978): 1-39.

Current Activities

Modelling of speech coding in auditory nerve fiber activity, stimulation of auditory nerve in deaf subjects to produce speech sounds.

Office: 2059 MEB 581-8528

STEVEN A. JOHNSON
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1971, Stanford University
At Utah Since 1978

Research Area

Medical ultrasonic imaging, nuclear magnetic resonance imaging.

Publications

Johnson, S.A., Y. Zhou, M.J. Berggren, and M.L. Tracy, "Acoustic Inverse Scattering Solutions by Moment Methods and Backpropagation," Conference on Inverse Scattering: Theory and Applications, J.B. Bedner, R. Redner, E. Robinson and A. Weglein (eds.), SIAM, Philadelphia, 1983, pp. 144-155.

Stenger, F., M.J. Berggren, S.A. Johnson and Y. Li, "An Adaptive, Noise Tolerant, Frequency Extrapolation Algorithm for Diffraction Corrected Ultrasound Tomography," 1983 Ultrasound Symposium Proceedings, IEEE, New York, 1982, in press.

Tracy, M.L., S.A. Johnson, "Inverse Scattering Solutions by a Sinc Basis, Moment Method--Part II," Ultrasound Imaging, Vol. 5, Academic Press, New York, 1983, pp. 376-392.

Johnson, S.A., Y. Zhou, M.K. Tracy, M.J. Berggren and F. Stenger, "Inverse Scattering Solutions by a Sinc Basis, Multiple Source, Moment Method--Part III," Ultrasound Imaging 6, Vol. 1, Academic Press, New York, 1984, pp. 103-116.

Current Activities

Fast methods for solving the inverse scattering problem for use in ultrasonic medical imaging, non destructive testing, and geophysical exploration, development of new nuclear magnetic resonance imaging hardware.

Patents

Johnson, S.A. Ultrasound Imaging Apparatus and Method. U.S. Patents 4, 222, 274 and 4, 317, 369. 1978.

Johnson, S.A. Inert-Gas Stripping and Distillation Apparatus and Method. U.S. Patent 4, 327, 184. 1979.

Awards

Career Development Award, University of Utah College of Engineering Patent Award.

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Home: 1155 East 300 South, #8, 84102 583-2679

BIOENGINEERING

KRISTINE KNUTSON
RESEARCH ASSISTANT PROFESSOR

Ph.D. 1981, University of Utah
At Utah Since 1981

Research Area

Structure and property relationships of synthetic polymers, interactions between biopolymers and polymers within living systems, Fourier Transform Infrared Spectroscopy.

Publications

Knutson, K. and D.J. Lyman, "The Effect of Polyether Segment Molecular Weight on the Bulk and Surface Morphologies of Copolyether-urethane-ureas," Biomaterials: Interfacial Phenomena and Applications, S.L. Cooper and N.A. Peppas (eds.), ACS Advancement in Chemistry Series 199, Washington D.C., 1981, pp. 109-132.

Knutson, K. and D.J. Lyman, "Morphology of Block Copolyurethanes. II. FTIR and ESCA Techniques for Studying Surface Morphology," Biomedical and Dental Applications of Polymers, C.G. Gebelein and F.F. Koblitz (eds.), Plenum Press, New York, 1981, pp. 173-188.

Knutson, K. and D.J. Lyman, "Surface Infrared Spectroscopy," Surface and Interfacial Aspects of Biomedical Polymers, J.D. Andrade (ed.), Plenum Press, New York, 1984, in press.

Knutson, K. and D.J. Lyman, "The Influence of Water Absorption and Steam Sterilzation of Bulk and Surface Morphologies of Copolyurethanes," SPIE Proceedings of the 1981 International on Fourier Transform Infrared Spectroscopy, H. Sakai (ed.), Vol. 289, 1981, pp. 172-174.

Benson, R. , S. Yoshikawa, K. Knutson and D.J. Lyman, "Hydrogel Formation from Copolyether-urethane-ureas Salt Complex. II. Morphology Effects of Lithium Bromide," Biomaterials: Interfacial Phenomena and Applications, S.L. Cooper and N.A. Peppas (eds.), ACS Advancements in Chemistry Series 199, Washington D.C., 1981, pp. 133-145.

Current Activities

Protein/polymer interactions, drug delivery devices.

Office: 301 Skaggs Hall 581-6654
Home: 2527 East Capricorn Way, 84117 272-5507

WILLEM J. KOLFF
RESEARCH PROFESSOR

Ph.D. 1946, University of Groningen
At Utah Since 1967

Research Area

Artificial hearts and assist devices, artificial kidney and plasmapheresis.

Publications

Kolff, W.J., "Artificial Organs - Forty Years and Beyond," ASAIO Transactions, 29(1983): 6-24.

Kolff, W.J., "Past, Present and Future of Dialysis and Transplantation," Transplant. Proc., 13(1981): 35-40.

Kolff, W.J., "Lack of Correlation of Expenditures for Research with Expenditures for Patient Care: Suggestions for a Solution," Contemporary Dialysis, (1981): 8-12.

Kolff, W.J., "Old, New and Revised Aspects of Artificial Organs," Int. J. Artif. Organs, 3(1980): 94-102.

Kolff, W.J., and J. Lawson, "Perspectives for the Total Artificial Heart," Transplant. Proc., 11(1979): 317-324.

Current Activities

Establishment of neuroprosthesis program.

Patents

Kolff, W.J. Ventricular Assist Device and Method of Manufacturing. U.S. Patent 4, 427, 470. 1984.

Kolff, W.J. Artificial Heart Valve made by Vacuum Forming Technique. Pending. 1984.

Awards

Cameron Prize, John Scott Medal--City of Philadelphia.

Office: Dumke Building 581-6296
Home: 2894 Crestview Dr., 84108 582-3056

BIOENGINEERING

RICHARD A. NORMANN
ASSOCIATE PROFESSOR

Ph.D. 1974, UC Berkeley
At Utah Since 1979

Research Area

Retinal electrophysiology, information processing in the vertebrate visual system, biomedical (cardiovascular) instrumentation.

Publications

Norman, R.A. and P.J. Anderson, "The Incremental Sensitivity Curve of Turtle Cone Photoreceptors," Vision Res., 23(1983): 1731-1733.

Ives, J.T., R.A. Normann and P. Barber, "Light Energy Intensification by Cone Oil Droplets: Electromagnetic Consideration," J. Opt. Soc. Am., 73(1983): 1725-1731.

Normann, R.A., B.S. Baxter, H. Ravindra and P.J. Anderson, "Photoreceptor Origins of Contrast Sensitivity: Applications to Radiological Diagnosis," IEEE Trans. Syst. Man Cybern., SMC-13(1983): 944-953.

Kolb, H. and R.A. Normann, "A-Type Horizontal Cells in the Superior Edge of the Linear Visual Streak of the Rabbit Retina Have Oriented, Elongated Dendritic Trees," Vision Res., 22(1982): 905-916.

Normann, R.A., I Perlman, H. Kilb, J. Jones and S.J. Daly, "Direct Excitatory Interactions Between Cones of Different Spectral Types in the Turtle Retina," Science, 224(1984): 625-627.

Awards

President, Utah Chapter Sigma XI Science Society.

Office: 2057 MEB 581-7645
Home: 1454 Yale Ave., 84105 581-1879

CATHERINE RAPPAPORT
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1952, University of Pennsylvania
At Utah Since 1978

Research Area

Determining properties of materials required for adhesion and growth of neuronal cells, developing prosthetic devices to stimulate regeneration of injured nervous tissue.

Publications

Rappaport, C., "An Hypothesis on the Role of Cellular Colloid Osmotic Pressure in Determining Behavior of Cells in vitro Including Anchorage Dependency and Maintenance of the Differentiated State," J. Theoret. Biol., in press.

Rappaport, C., "New Methods for Culture of Cells from Normal Adult Nerve Tissue I, Minimal Requirements with Sodium Tetraphenyl Boron (TPB)," Brain Res., in press.

Rappaport, C., "New Methods for Culture of Cells from Normal Adult Nerve Tissue II, Colloid Sensitive Pressure," Brain Res., in press.

Rappaport, C., "New Methods for Culture of Cells from Normal Adult Nerve Tissue III, Culture System for Cortical Neurons," Brain Res., in press.

Office: Building 419 581-7190
Home: 2908 Morgan Dr., 84117 272-0067

BIOENGINEERING

WILLIAM M. REICHERT
RESEARCH ASSISTANT PROFESSOR

Ph.D. 1981, University of Michigan
At Utah Since 1983

Research Area

Raman spectroscopy of polymers.

Publications

Reichert, W.M. and J.D. Andrade, "Surface Raman Spectroscopy," Surface and Interfacial Aspects of Biomedical Polymers, Vol. 1 Surface Chemistry and Physics, J.D. Andrade (ed.), Plenum Press, New York, 1984, in press.

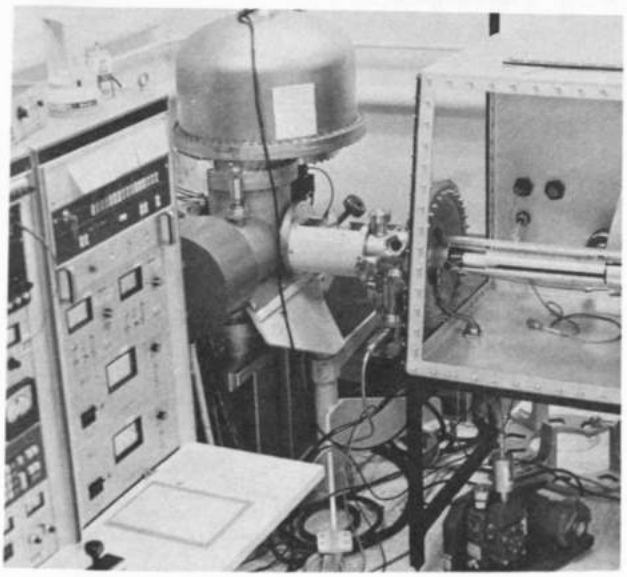
Reichert, W.M., F.E. Filisko and S.A. Barenberg, "Polyphosphazenes: Effect of Molecular Motions on the Polymer Interface," J. Biomed. Mater. Res., 16(1982): 301-312.

Reichert, W.M., F.W. Filisko and S.A. Barenberg, "Homocompatibility: Effect of Molecular Motions on the Polymer Interface," Biomaterials: Interfacial Phenomenon and Applications, S.L. Cooper and N. Peppas (eds.), ACS Advancements in Chemistry Series 199, 1982, pp. 177-194.

Awards

Macromolecular Science Fellow, 1980-81.

Office: 2059 MEB 581-8528



X-ray photoelectron spectrometer in the surface analysis laboratory.

LEE M. SMITH
RESEARCH ASSISTANT PROFESSOR

Ph.D. 1973, University of Utah
At Utah Since 1969

Research Area

Biomaterials, surface characterization, prosthetic device design and development.

Publications

Smith, L.M., L. Bowman and J.D. Andrade, "Contact Angle Analysis of Hydrated Contact Lenses," Proceedings of the International Symposium of Contact Lenses and Artificial Eyes, 1982, p. 279.

Andrade, J.D., L.M. Smith and D.E. Gregonis, "The Contact Angle and Interface Kinetics," Surface and Interfacial Aspects of Biomedical Polymers, Vol. 1 Surface Chemistry and Physics, J.D. Andrade (ed.), Plenum Press, New York, 1984, in press.

Smith, L.M., C. Doyle, D.E. Gregonis and J.D. Andrade, "Surface Oxidation of Cis-Trans Polybutadiene," J. Appl. Polym. Sci., 27(1982): 1269-1276.

Andrade, J.D., D.E. Gregonis and L.M. Smith, "Polymer Surface Dynamics," Surface and Interfacial Aspects of Biomedical Polymers, Vol. 1 Surface Chemistry and Physics, J.D. Andrade (ed.), Plenum Press, New York, 1984, in press.

Andrade, J.D., D.E. Gregonis and L.M. Smith, "Polymer-Water Interface Dynamics," Physicochemical Aspects of Polymer Surfaces, K.L. Mittal (ed.), Vol. 2, Plenum Press, New York, 1983, Pg. 211.

Current Activities

Commerical developments of biotechnology, drug delivery systems.

Office: 2059 MEB 583-8444
Home: 2400 Sunnyside Ave, 84108

BIOENGINEERING

RICHARD A. VAN WAGENEN
RESEARCH ASSISTANT PROFESSOR

Ph. D. 1976, University of Utah
At Utah Since 1977

Research Area

Biomedical materials, clinical diagnostics development utilizing fluorescence and Raman spectroscopy.

Publications

Van Wagenen, R.A., and J.D. Andrade, "Flat Plate Streaming Potential Investigation: Hydrodynamics and Electrokinetic Equivalency," J. Colloid Interface Sci., 76(1980): 305-314.

Andrade, J.D., D.L. Coleman and R.A. Van Wagenen, "Perspectives and Future Developments in the Field of Blood-Materials Interactions," Interaction of the Blood with Natural and Artificial Surfaces, E. Salzman (ed.), Marcel Dekker, New York, 1981, pp. 201-227.

Van Wagenen, R.A., S. Rockhold and J.D. Andrade, "Probing Protein Adsorption: Total Internal Reflection Intrinsic Fluorescence," Biomaterials: Interfacial Phenomena and Applications, S.L. Cooper, A.S. Hoffman, N.A. Peppas and B.D. Ratner (eds.), Advances in Chemistry Series 199, American Chemical Society, Washington D.C., 1982, pp. 351-370.

Van Wagenen, R.A. and J.D. Andrade, "Potential Sensor Applications of Total Internal Reflection (TIRF) Spectroscopy," Fed. Proc., 41(1982): 1983.

Schupp, H., R.A. Van Wagenen, J.D. Andrade, and H. Ringsdorf, "Surface Characterization of Functional Poly(diacetylene) and Poly(butadiene) Mono- and Multi- layers," Colloid Polym. Sci., 260(1982): 262-267.

Current Activities

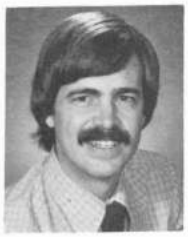
Protein adsorption on biomaterial surfaces using TIRF spectroscopy, protein surface interactions using interfacial and surface Raman scattering.

Patents

Andrade, J.D. and R.A. Van Wagenen. Process for Conducting Fluorescence Immunoassays Without Added Labels and Employing Attenuated Internal Reflection. U.S. Patent 4, 368, 047. 1983.

Office: 2347 MEB 581-5042
Home: 2173 Preston St., 84106 467-5758

DWANE WESTENSKOW
RESEARCH ASSOCIATE PROFESSOR



Ph.D. 1976, University of Utah
At Utah Since 1975

Research Area

Biomedical instrumentation for the measurement and closed-loop control of anesthesia delivery and intensive care therapy.

Publications

Westenskow, D.R., J.K. Hayes and W.S. Jordan, "Inspired vs. End-Tidal Control of Enflurane Anesthesia in Dogs," Anesth. Analg., 62(1983): 836-840.

East, T.D., N.L. Pace and D.R. Westenskow, "Synchronous Versus Asynchonous Differential Lung Ventilation with PEEP Following Unilaterial Acid Aspiration in the Dog," J. Crit. Care., 11(1983): 441-444.

Pace, N.L. and D.R. Westenskow, "Computer Regulated Sodium Nitroprusside Infusion for Blood Pressure Control," Computers in Anesthesia and Critical Care, O. Prakash (ed.),, Martin Nijhoff, Rotterdam, 1983, pp. 292-301.

Westenskow, D.R., and W.S. Jordan, "The Utah System: Computer Control of Fresh Gas Flows for Feedback Controlled Anesthesia Delivery," Contemporary Anesthesia Practice, Vol. 8, Burnell R. Brown, Jr., F.A. Davis Co., Philadelphia, 1984, pp. 221-233.

Westenskow, D.R., C.A. Cutler and W.D. Wallace, "Instrumentation for Monitoring Gas Exchange and Metabolic Rate in Critically Ill Patients," Crit. Care. Med., 12(1984): 183-187.

Current Activities

Bioinstrumentation for controlled ventilation and differential lung ventilation, computer-aided control of blood pressure and neuromuscular blockade during anesthesia, feedback control of anesthesia delivery.

Awards

AAMI Career Achievement Award, 1980.

Office: 3C205 MC 581-6393
Home: 3439 Winesap Rd., 84121 942-4654

BIOENGINEERING

JOHN E. WOOD
ASSISTANT PROFESSOR

Ph.D. 1976, MIT
At Utah Since 1978

Research Area

Robotics, biomechanics, actuation systems.

Publications

Wood, J.E., "A Statistical-Mechanical Model of the molecular Dynamics of Striated Muscle During Mechanical Transients," Amer. Math. Soc. Lect. Appl. Math., 19(1981): 213-259.

Wood, J.E. and R.W. Mann, "A Sliding-Filament Cross-Bridge Ensemble Model of Muscle Contraction for Mechanical Transients," Math. Biosci., 57(1981): 211-263.

Jacobsen, S.C., J.E. Wood, D.F. Knutti and K.B. Biggers, "The Utah/MIT Dextrous Hand: Work in Progress," Robotics Research, Brady and Paul (eds.), MIT Press, Boston, Mass., 1984.

Current Activities

Utah/MIT dextrous robotic hand project, microfield actuation systems.

Office: 2059 MEB 581-8528
Home: P.O. Box 8642, 84108

JOINT APPOINTMENTS

CHRISTENSEN, Associate Professor; Primary Appointment in Electrical Engineering.

DANIELS, Research Associate Professor; Primary Appointment in Surgery.

DURNEY, Research Professor; Primary Appointment in Electrical Engineering.

GREGONIS, Research Associate Professor; Primary Appointment in Materials Science and Engineering.

JACOBSEN, Research Professor; Primary Appointment in Mechanical Engineering.

KNUTSON, Research Assistant Professor; Primary Appointment in Pharmaceutics.

KOLFF, Research Professor; Primary Appointment in Surgery.

LYMAN, Professor; Primary Appointment in Materials Science and Engineering.

CHEMICAL ENGINEERING

PETERS, Research Associate Professor; Primary Appointment in Surgery.

WESTENSKOW, Research Associate Professor; Primary Appointment in Anesthesiology.

AUSTIN LAMONT TYLER
CHAIRMAN AND PROFESSOR

Ph.D. 1965, University of Utah
At Utah Since 1970

Research Area

Chemical reactions in oil production from oil shale, catalysis, diffusion in solids, supercritical steam in formation of synthetic fuels.

Publications

Tyler, A.L., H.R. Jacobs and E.A. Bullen, "Laboratory Study of the Effects of Combustion Gases on Retorting of Green River Oil Shale with Superheated Steam," Proceedings of the 16th Oil Shale Symposium, Apr. 1983, pp. 189-198.

Tyler, A.L. and H.R. Jacobs, "Laboratory Modeling of In-Situ Retorting by Steam Injection and Steam Cracking of Shale Oil Liquids," Isr. J. Technol., 20(1983): 87.

Tyler, A.L. and R.F. Cane, "Pyrolysis of Oil Shale and Related Organic Compounds in Supercritical Steam," Energy Technology IX--Proceedings of the Ninth Energy Technology Conference, Feb. 1982, pp. 578-587.

Moore, H.J. and A.L. Tyler, "The Effects of an Acidic Catalyst on Simultaneous HDS and HDN of Heterocyclic Sulfur and Nitrogen (Thiophine and Pyridine)," Proceedings of the 14th Oil Shale Symposium, Apr. 1981, pp. 212-219.

Current Activities

Synthetic fuels from oil shale by thermal solution, use of supercritical steam to form petroleum-like pyrolyzates from kerogen, heterogeneous catalysis in magnetic fields, control of noxious emissions during combustion.

Patents

Tyler, A.L. Method of Mounting Beam Lead Semiconductor Devices Precision Shaping. U.S. Patent 3,494,017. 1967.

Awards

Outstanding Student Chapter Counselor, AIChE, 1978.

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Home: 3810 Eastwood Lane, 84109 272-1218

CHEMICAL ENGINEERING

RICHARD C. AIKEN
ASSOCIATE PROFESSOR

Ph.D. 1973, Princeton University
At Utah Since 1977

Research Area

Mathematical modelling, estimation and solution of dynamic systems, mass transfer and reaction in dispersed phases, multiphase flow, space tethers.

Publications

Aiken, R.C. Stiff Computation, Oxford University Press, New York, 1984.

Aiken, R.C., "Approximate Numerical Solution to Explosive Kinetics," AIChE J., 28(1982): 637.

Aiken, R.C., "A Criterion for the Isothermal First Explosion Limit," Combust. Flame, 47(1982): 281.

Bendall, E. and R.C. Aiken, "Selective Absorption of H2S form CO2 by Absorption and Reaction in Fine Sprays," AIChE J., 29(1983): 66.

Current Activities

Modelling of artificial heart, software development for stiff computation using parallel computer architecture. Emphasis on biomedical simulations.

Awards

Phi Beta Kappa; Phi Kappa Phi; Tau Beta Pi.

Office: 3095 MEB 581-5742
Home: 30 Payday Dr., Park City, 84060 649-9288

ALVA D. BAER
PROFESSOR

Ph.D. 1959, University of Utah
At Utah Since 1959

Research Area

Combustion, heat transfer, fluid dynamics, chemical process control.

Publications

Baer, A.D., "Pyrolysis Films in Air at High Temperatures and at High Heating Rates," J. Fuel and Flammability, 12(1981): 214-227.

Baer, A.D. and C.A. Dahl, "A Simple Semi-Steady-State Model of the Combustion Retort, " In Situ, 4(1980): 79-101.

Hedges, J.H., A.D. Baer and N.W. Ryan, "Pyrolysis and Ignition of Polymers under Approximated Fire Conditions," 17th International Symposium on Combustion, The Combustion Institute, Aug. 1979, pp. 1173-1181.

Baer, A.D., "The Periodic Sublayer and Heat Transfer to High Prandle Number Fluids," AIChE J., 22(1976): 806-807.

Current Activities

Simulation program to verify experimental data concerning the effect of oxygen in the retorting gas of a combustion retort, evaluation of a possible adaptive regulator for chemical process control, characterization of suspensions in which the solid-to-fluid mass ratios are greater than 100, method for measurement of the temperature of decomposing films of polymers.

Office: 3059 MEB 581-6918
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CHEMICAL ENGINEERING

E.B. CHRISTIANSEN
PROFESSOR

Ph.D. 1945, University of Michigar.
At Utah Since 1947

Research Area

Viscoelastic flow dependence on polymer topology, processing of municipal wastes and agricultural production wastes into more useful products.

Publications

Ramachandran, S. and E.B. Christiansen, "The Dependence of Viscoelastic Flow Properties on the Structure for Styrene-Butadiene Copolymers," J. Non-Newtonian Fluid Mech., 13(1983): 21-32.

Ramachandran, S., H.W. Gao and E.B. Christiansen, "The Dependence of Viscoelastic Flow Functions on Molecular Structure for Linear and Branching of Polymers," Proceedings of the 3rd Pacific Chemical Engineering Congress, Vol. 2, May 1983, pp. 104-108.

Ramachandran, S., H.W. Gao and E.B. Christensen, "The Dependency of the Steady-State and Transient Viscosity and First and Second Normal Stress Difference Functions on Molecular Weight for Linear Mono and Polydisperse Polystyrene Solutions," J. Rheol., 25(1981): 213-235.

Christiansen, E.B. and D.H. Mitchell, "The Production of Protein from Municipal Sewage," Food, Pharmaceutical and Bioengineering AIChE Symposium Series 172, 74(1978): 175-181.

Christiansen, E.B. and T. Shinohara, "Combined Forces and Natural Convection Entrance Region Heat Transfer," Can. J. Chem. Eng., 54(1976): 626-630.

Current Activities

Utilization of thermophillyic microorganisms.

Awards

AIChE Founders Award, 1978; AIChE Fellow, 1971; University of Utah Distinguished Research Award, 1977; Utah Engineering Council Award 1966.

Office: 3093D MEB 581-6129
Home: 3025 South 1935 East, 84106 467-2482

DONALD A. DAHLSTROM
RESEARCH PROFESSOR

Ph.D. 1949, Northwestern University
At Utah Since 1984

Research Area

Liquid-solid separation, filtration, sedimentation, classification expression, minerals processing, hydraulics.

Publications

Dahlstrom, D.A., "Recent Developments in Gravitational Sedimentation," Proceedings of the Thermal Energy Society of Taiwan, National Science Foundation, May 1983.

Dahlstrom, D.A. and C. MacDonald, "Dewatering Pipeline Coal with Vacuum Filtration," Proceedings of the Slurry Transport Association Annual Meeting, March 1983.

Crawford, R.F., D.A. Dahlstrom and G. Minear, "Utilization of Horizontal Belt Filters for Washing Fine Alumina Seed and Kiln Feed Products," Proceedings of the Light Metal Symposium, Metallurgical Society of AIME, March 1984.

Dahlstrom, D.A., "Research Needs in Liquid-Solid Separation," Proceedings of the Mining Society of Mexico, National Science Foundation, 1983.

Current Activities

Working to obtain an Engineering Research Center.

Awards

AIME Taggart Award, 1983; AIChE Environmental Award, 1977; AIChE Founders Award, 1972; AIChE Fellow, 1971.

Office: 3062 MEB 581-3586
Home: 5340 Cottonwood Lane, 84117 272-0064

CHEMICAL ENGINEERING

NOEL H. DE NEVERS
PROFESSOR

Ph.D. 1959, University of Michigan
At Utah Since 1963

Research Area

Fluid mechanics, thermodynamics, energy policy, air pollution.

Publications

de Nevers, N., "The Second Way to Use the Second Law," Chem. Technol., 12(1982): 306-317.

de Nevers, N., and A. Day, "Packing and Drafting in Natural Gas Pipelines," J. Petroleum Tech., 35(1983): 655-658.

de Nevers, N., "Measuring and Managing Pollutants," Environment, 24(1981): 25-35.

de Nevers, N., "Community Air Pollution," Environmental and Occupational Medicine, Wm N. Rom (ed.), Little Brown & Co., Boston, Mass., 1983.

de Nevers, N., "Man and His Designs," Proceedings of the Third International Banff Conference on Man and His Environment, Vol. 4, May 1978, 1980.

Current Activities

Solid-solid heat transfer, countercurrent hydrogen exchange reactors, air pollution control engineering.

Patents

de Nevers, N. and J.H. Gardner. Countercurrent Solid-to-Solid Heat Transfer Apparatus and Method. U.S. Patent 4, 207, 943. 1980.

Awards

USEPA Region VIII Citizen Participation Award, 1980.

Office: 3055 MEB 581-6024
Home: 1416 Butler Ave., 84102 328-9376

GEORGE R. HILL
EIMCO PROFESSOR

Ph.D. 1946, Cornell University
At Utah Since 1977 (also 1946-1972)

Research Area

Kinetics of conversion of coal and oil shale kerogen to liquid and gaseous products, characterization of components from coal conversion reactions and from coal and petroleum weathering processes.

Publications

Hill, G.R., Chemistry of Coal Utilization, Martin A. Elliot (ed.), Second Supplementary Volume, John Wiley and Sons, New York, 1981.

Hill, G.R., "Pyrolysis Route for Coal Liquids Production," Energy Technology VIII, New Fuels Era, Richard F. Hill (ed.), Government Institutes, Inc., Rockville, Md., 1981, pp. 720-725.

McClenman, W., H.C.L. Meuzelaar, S. Metcalf, G.R. Hill, "Characterization of Phenols and Indanols in Coal Derived Liquids. Use of Curie Point Vaporization Gas Chromatography/Mass Spectrometry," Fuel, 62(1983): 1422-1429.

Meuzelaar, H.L.C., A. Harper, G.R. Hill and P. Given, "Characterization and Classification of Rocky Mountain Coals by Curie Point Mass Spectrometry," Fuel, 63(1984): 640-652.

Current Activities

Kinetics of bituminous coal, characterization of PyMS of coal and coal derived liquids, oxidative changes in liquid fuels, solution of the U.S. energy dilemma.

Awards

Honorary D.Sc., BYU, 1980; Chmn., Fuel Chemistry Division, Amer. Chem. Soc., 1978; Henry H. Storch Award, American Chemical Society, 1971; Board of Energy Studies, Natural Resources Council, 1977-80; Director, U.S. Office of Coal Research, 1972-1973.

Office: 2012 MEB 581-7547
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CHEMICAL ENGINEERING

DAVID W. PERSHING
ASSOCIATE PROFESSOR

Ph.D. 1976, University of Arizona
At Utah Since 1976

Research Area

Combustion of coal and biomass fuels, formation and control of NOx and SOx emissions.

Publications

Slaughter, D.M., S.W. Pershing, D.C. Drehmel and G.B. Martin, "Parameters Influencing the Evolution and Oxidation of Sulfur in Suspension--Phase Coal Combustion," Ninteenth International Symposium on Combustion, The Combustion Institute, Pittsburgh, 1983.

Chen, S.L., M.P. Heap, D.W. Pershing and G.B. Martin, "Influence of Coal Combustion on the Fate of Volatile and Char Nitrogen During Combustion," Ninteenth International Symposium on Combustion, The Combustion Institute, Pittsburgh, 1983.

Chen. S.L. , M.P. Heap, D.W. Pershing and G.B. Martin, "The Fate of Coal Nitrogen During Combustion," Fuel, 61(1982): 1218.

Kramlich, J.C., R.K. Nihart, S.L. Chen, D.W. Pershing and M.P. Heap, "Behavior of N2O in Staged Pulverized Coal Combustion," Combust. Flame, 48(1982): 101.

Pershing, D.W., M.P. Heap and S.L. Chen, "Bench Scale Experiments on the Formation and Control of NOx Emissions from Pulverized Coal Combustion," Pulverized Coal Combustion: Pollutant Formation and Control, A.F. Sarofim (ed.), in press.

Patents

Pershing, D.W. Low Emissions Process and Burner. U.S. Patent 4,381,718. 1983.

Awards

National Science Foundation, Presidential Fellow, 1973-76; University of Utah Distinguished Teaching Award, 1982.

Office: 3062 MEB 581-7536
Home: 1582 Tomahawk, 84103 355-7734

DALE L. SALT
PROFESSOR

Ph.D. 1959, University of Delaware
At Utah Since 1954

Research Area

Fluid and particle dynamics, diffusional operations, separation processes, pollution abatement.

Publications

Salt, D.L., C.D. Denson and E.B. Christiansen, "Particle Migration in a Shear Field," AIChE J., 12(1966): 589-595.

Tyler, A.L. and D.L. Salt, "Periodic Discontinuities in the Acceleration of Spheres in Free Flight," J. Fluids Eng., 100 (1978): 17-21.

Current Activities

SO2 absorption with simultaneous catalyzed oxidation, centrifugal gas absorption; these two projects may merge and have important applications in "acid rain" abatement.

Awards

DuPont Faculty Research Fellow, Summers 1964-66; National Science Foundation Faculty Fellow, 1967-68; University of Utah College of Engineering Outstanding Teaching Award, 1982.

Office: 3065 MEB 581-6917
Home: 1571 Logan Ave., 84105 466-7157

CHEMICAL ENGINEERING

J.D. SEADER
PROFESSOR

Ph.D. 1952, University of Wisconsin
At Utah Since 1966

Research Area

Recovery of bitumen from tar sands in Utah, computer-aided process design, process synthesis, solution of systems of nonlinear equations by differential homotopy-continuation.

Publications

Kalb, C.E. and J.D. Seader, "Entrance Region Heat Transfer in a Uniform Wall-Temperature Helical Coil with Transition from Laminar to Turbulent Flow," Int. J. Heat Mass Transfer, 26(1983): 23-32.

Kim, J.M. and J.D. Seader, "Pressure Drop for Cocurrent Downflow of Gas-Solids Suspension," AIChE J., 29(1983): 353-360.

Kim, J.M. and J.D. Seader, "Heat Transfer to Gas Solids Suspension Flowing Concurrently Downward in a Circular Tube," AIChE J., 29(1983): 306-312.

Seader, J.D., "Distillation," Perry's Chemical Engineer's Handbook, 6th edition, McGraw-Hill, New York, 1983, Section 13.

Current Activities

Distillation, computer modeling of chemical processes.

Patents

Seader, J.D. Inert-Gas Stripping. U.S. Patent 4, 327, 184. 1982.

Seader, J.D. Continuous Distillation Apparatus. U.S. Patent 4, 234, 391. 1980.

Seader, J.D. Process and Apparatus to Produce Synthetic Crude Oil. U.S. Patent 4, 160, 720. 1977.

Awards

University of Utah Distinguished Teaching Award, 1975; AIChE Director, 1983; AIChE Fellow, 1983.

Office: 3062 MEB 581-6916
Home: 3786 View Crest Drive, 84109 277-9465

EDWARD M. TRUJILLO
ASSOCIATE PROFESSOR

Ph.D. 1975, University of Utah
At Utah Since 1984

Research Area

Biochemical engineering, flow through porous media, enhanced oil recovery, enzymes, fermentation, interfacial phenomena, non-Newtonian fluid flow.

Publications

Trujillo, E.M., "The Static and Dynamic Interfacial Tensions Between Crude Oils and Caustic Solutions," Soc. Petrol. Eng. J., (1983): 645-656.

Office: 3062 MEB 581-4460
Home: 9950 Falcon View Dr., Sandy, 84092 572-1297

JOINT APPOINTMENTS

BOYD, Professor; Primary Appointment in Materials Science and Engineering.

CIVIL ENGINEERING

E.S. FOLIAS
ACTING CHAIRMAN AND PROFESSOR

Ph.D. 1963, Calif. Inst. of Technology
At Utah Since 1966

Research Area

Prediction of material failures as a result of fracture and general stress analysis.

Publications

Folias, E.S., "Method of Solution of a Class of Three-Dimensional Elastostatic Problems Under Mode I Loading," Int. J. Fract., 16(1980): 335-348.

Folias, E.S., "On the Three-Dimensional Theory of Cracked Plates," J. Appl. Mech., 42(1975): 663-674.

Folias, E.S., "Asymptotic Approximations to Crack Problems in Shells," Fracture, G. Sih (ed.), Vol. IV, Nordhoff International Publishing, Leyden, 1977, pp. 117-160.

Folias, E.S., "Fracture in Pressure Vessels," Thin Shell Structures, Y.C. Fung and E.E. Sechler (eds.), Prentice-Hall, 1971, pp. 483-518.

Folias, E.S., "On the Fracture of Nuclear Reactor Tubes," Transactions of the Third International Conference on Structural Mechanics in Reactor Technology, Vol. 1, Aug. 1975, Part C, 4/5.

Current Activities

Fracture prevention in energy and transport systems.

Office: 4009W MEB 581-8452
Home: 1764 Fort Douglas Cir., 84113 583-9949

CLIFFORD G. BRYNER
PROFESSOR

Ph.D. 1957, University of Utah
At Utah Since 1948

Research Area

Photogrammetry and remote sensing in solving problems, earth's crust creep measurements.

Current Activities

Development of a construction management program.

Office: 4002A MEB 581-8363
Home: 2948 Filmore St., 84106 467-8978

REAZ A. CHAUDHURI
ASSISTANT PROFESSOR

Ph.D. 1983, UCLA
At Utah Since 1983

Research Area

Linear and nonlinear finite element analysis of fiber reinforced laminated shells and shear deformation, interlaminar cracking of composites.

Publications

Chaudhuri, R.A., "Analysis and Design of Pultruded Composite Bearingless Rotors for a 80 kW Wind Turbine," CEC-STR-83-1, Compositek Engineering Corporation Report, Sept. 1983.

Current Activities

CAD, development of composite materials laboratory facilities, nonlinear finite element program for laminated composities, damage tolerance of composites.

Office: 2009 MEB 581-6931
Home: 2529 Melbourne St., 84106 485-4413

CIVIL ENGINEERING

ALAN G. HERNRIED
ASSISTANT PROFESSOR

Ph.D. 1982, UC Berkeley
At Utah Since 1983

Research Area

Structural engineering and structural mechanics, equipment-structure systems, CAD/analysis of structural systems.

Current Activities

Secondary and tertiary systems, earthquake engineering, structural dynamics, structural mechanics.

Awards

Regents Fellow, University of California at Berkeley, 1977-78 (also, Alternate Regents Fellow, 1978-79); Chi Epsilon, Tau Beta Pi.

Office: 3025 MEB 581-4378
Home: 76 G St., 84114 328-1021

MACK S. KESLER
ASSOCIATE PROFESSOR

M.S. 1948, University of Colorado
At Utah Since 1939

Research Interests

General contracting.

Patents

Kesler, M.S. Methods & Apparatus for Galvanizing Sheet Metal Vessels. U.S. Patent 2,477,684. 1949.

Kesler, M.S. Drafting Device. U.S. Patent 2,512,786. 1950.

Office: 3130 MEB 581-6069
Home: 1421 East 3000 South, 84106 487-1908

UPMANU LALL
ASSISTANT PROFESSOR

Ph.D. 1981, University of Texas
At Utah Since 1981

Research Area

Surface and groundwater hydrology, operations research, probability and statistics, water resource systems analysis.

Publications

Lall, U. and L.R. Beard, "Estimation of Pearson Type III Moments," Water Resour. Res., 18(1982): 1563-1570.

Lall, U. and L.W. Mays, "Model for Planning Water-Energy Systems," Water Resour. Res., 17(1981): 853-866.

Lall, U., "Bayesian Estimation of Probability of Rare Events," Proceedings of 2nd AGU Hydrology Days, April 1982, pp. 21-43.

Lall, U., "A Model for Optimal Pumped Dewatering of Open Pit Mines," Proceedings of the 19th AWRA Symposium, Oct. 1983, in press.

Current Activities

Optimal transit operation for minimizing operating deficits, optimal conjunctive use of surface and ground waters, models for mine water control, Bayesian estimation of time series, estimating prior distributions for Bayesian estimation of flood frequency.

Office: 2222 MEB 581-6701
Home: 3380 E. Ash Circle, 84109 272-0685

CIVIL ENGINEERING

NASER MOSTAGHEL
PROFESSOR

Ph.D. 1968, UC Berkeley
At Utah Since 1980

Research Area

Isolation of structures from earthquake, construction of site dependent spectra, earthquake duration, pneumatic roofs for rural housing in seismic areas, strengthening protective facilities.

Publications

Mostaghel, N., and J. Tanbakuchi, "Response of Sliding Structures to Earthquake Support Motion," Earthquake Eng. Struct. Dyn., 11(1983): 729-748.

Mostaghel, N., M. Hejazi and J. Tanbakuchi, "Response of Sliding Structures to Harmonic Support Motion," Earthquake Eng. Struct. Dyn, 11(1983): 355-366.

Mostaghel, N. and G. Ahmadi, "Estimation of the Peak Horizontal Ground Acceleration Based on Peak Accelerations of the Components," Bull. Seismol. Soc. Am., 72(1982): 637-642.

Ahmadi, G. and N. Mostaghel, "Bounds on Earthquake Response of Elastic Columns," Earthquake Eng. Struct. Dyn., 10(1982): 769-777.

Current Activities

Development of an earthquake simulator facility and a structural behavior laboratory, earthquake engineering courses, computer use in design and analysis courses.

Office: 4002B MEB 581-7871
Home: 3611 S. Choke Cherry, 84109 278-3033

EDWIN C. NORDQUIST
ASSOCIATE PROFESSOR

M.S. 1951, University of Iowa
At Utah Since 1946

Research Area

Geotechnical engineering.

Awards

Chi Epsilon National President, 1980-82; Fellow American Society of Civil Engineers.

Office: 4007W MEB 581-6934
Home: 3810 Ash Circle, 84109 277-1258

Five-axis computer controlled milling machine for computer-aided manufacturing (CAM) research.

CIVIL ENGINEERING

JOSEPH M. OLSEN
ASSOCIATE PROFESSOR

Ph.D. 1978, MIT
At Utah Since 1976

Research Area

Geotechnical engineering, soil mechanics, rock mechanics, foundation engineering, flow in porous media and earthquake engineering, behavior of compacted soils, response of soils to dynamic loading.

Publications

Olsen, J.M. and R.T. Martin, "Feasibility of Sealing Boreholes with Compacted Earth to Protect Underground Nuclear Waste Repositories," Siting of Underground Nuclear Waste Disposal Repositories, American Society of Civil Engineering, New York, 1980, pp. 136-151.

Olsen, J.M., "The Effect of Lateral Stress Changes Around a Borehole in Shale During Plugging on Plug Adequacy," Weak Rock: Soft, Fractured and Weathered Rock," A.A. Balkema (ed.), Rotterdam, Netherlands, 1981, pp. 819-824.

Olsen, J.M. and B. Leonard, "Strength of Compacted Specimens of Calcareous Playa Lake Clay," Geotechnical Properties, Behavior and Performance of Calcareous Soils, ASTM STP 777, American Society for Testing Materials, Philadelphia, 1981, pp. 310-319.

Current Activities

Behavior of clays under earthquake loading, response of compact soils to blast loadings, properties of compacted soils with time and environmental changes, use of the split-Hopkinson bar for measuring dynamic properties of soils, geotechnical feasibility of placing a high energy partical accelerator on the Great Salt Lake Desert.

Office: 4002C MEB 581-6536
Home: 6302 Howey Dr., 84121 272-2128

DAVID R. SCHAMBER
ASSOCIATE PROFESSOR

Ph.D. 1979, UC Davis
At Utah Since 1979

Research Area

Schamber, D.R., B.E. Larock and B.A. DeVantier, "Continuation Methods for the Finite Element Solution of Turbulent Flow," Finite Elements in Water Resources, K.P. Holz et al. (eds.), Springer Verlag, 1982, pp. 3.23-3.32.

Schamber, D.R., "Solution Methods for Turbulent Flow via Finite Elements," Applying Research to Hydraulic Practice, P.E. Smith (ed.), ASCE, 1982, pp. 55-64.

Katopodes, N.D. and D.R. Schamber, "Applicability of Dam-Break Flood Wave Models," Hydraul. Eng., 109(1983): 702-721.

Schamber, D.R. and B.E. Larock, "Particle Concentration Predictions in Settling Basins," J. Envir. Eng., 109(1983): 753-764.

Larock, B.E., W.K.C. Chun and D.R. Schamber, "Computation of Sedimentation Basin Behavior," Water Res., 17(1983): 861-867.

Current Activities

Theoretical and experimental analysis for flow through a partial dam failure.

Office: 4002D MEB 581-3906
Home: 450 Woodland Dr. 649-6126
Summit Park, 84060

CIVIL ENGINEERING

JOHN R. SCHULTZ
ASSISTANT PROFESSOR

Ph.D. 1982, Clemson University
At Utah Since 1982

Research Area

Water and wastewater treament, environmental chemistry.

Publications

Schultz, J.R. and T.M. Keinath, "Powdered Activated Carbon Treatment Process Mechanisms," J. Water Pollut. Control Fed., 56(1984): 143-151.

Current Activities

Removal mechanisms in biophysical treatment systems, phosphorous removal by biological treatment, analysis of organic pollutants by gas chromatography, biomass determinations in biophysical treatment systems, fixed film anaerobic treatment processes.

Office: 3020 MEB 581-7262
Home: 2461 Stringham Ave, #212, 84109 277-6267

RAVINDRA K. VYAS
ASSOCIATE PROFESSOR

Ph.D. 1966, Stanford University
At Utah Since 1968

Research Area

Thermally induced stresses in plates and shells, membrane forces in parachute-like shells, singular solutions in plates and shells in doubly connected domains.

Publications

Vyas, R.K., "Membrane Analysis of Scalloped Shells," NASA TN-D4687, July 1968.

Vyas, R.K., "Analysis of Elastomeric Pavement Seals," Highway Research Record, No. 357, National Academy of Sciences, Washington D.C., 1971, pp. 72-80.

Vyas, R.K., "A Viscoelastic Model for Elastomeric Pavement Joint Seals," Highway Research Record, No. 389, National Academy of Sciences, Washington D.C., 1972, pp. 40-48.

Vyas, R.K., "Membrane Statics of Parachute-Like Shells," Comput. Struct., 3(1973): 771-783.

Vyas, R.K. and S.H. Do, "Structural Economy of Certain Scalloped Shells," Proceedings of the ASCE National Structural Engineering Conference, Vol. 1, Aug. 1976, pp. 205-221.

Office: 2220 MEB 581-8453
Home: 1032 Revere Circle, 84084 266-3747

CIVIL ENGINEERING

JASON C. YU
PROFESSOR

Ph.D. 1969, West Virginia University
At Utah Since 1974

Research Area

Transportation system planning and management, mass transit design and operations, traffic engineering and safety, energy conservation, airport planning, air traffic control system.

Publications

Yu, J.C., Transportation Engineering, Elsevier Science Publishing Co., Inc., New York, 1982.

Ou, F.L. and J.C. Yu, "Tranferabilities of Urban Travel Demand Models," Transp. Eng. J., 109(1983): 579-595.

Yu, J.C. and L.M.G. Pang, "Concrete Barriers at Transit Zones Adjacent to Two-Way Traffic Operation on Normally Divided Highways," Trans. Res. Rec. No. 874, Transporation Research Board, National Research Council, 1983, pp. 5-12.

Current Activities

Bi-level optimization model for integrating fare and service structures to minimize urban transit operating deficits, an analytical method to forecast land use changes in beltway corridors.

Office: 3018 MEB 581-5556
Home: 4845 Bron Breck St., 84117 278-8927

COMPUTER SCIENCE

RICHARD F. RIESENFELD
CHAIRMAN AND PROFESSOR

Ph.D. 1973, Syracuse University
At Utah Since 1972

Research Area

Computer-aided geometric design, CAD/CAM, computer graphics.

Publications

Riesenfeld, R.F., E. Cohen and T. Lyche, "An Application of Discrete B-Splines to Computer-Aided Geometric Design and Computer Graphics," Computer Graphics and Image Processing, Vol. 14, No. 2, 1980, 87-111.

Riesenfeld, R.F. and J.M. Lane, "A Geometric Proof of the Variation Diminishing Property of B-Splines," J. Approx. Thy, 37(1983): 1-4.

Current Activities

Theoretical, algorithmic and organizations issues involved in the development of a spline-based solid modelling system called Alpha 1.

Office: 3160 MEB 581-7026
Home: 1337 Harrison Ave., 84105 583-2815

COMPUTER SCIENCE

ROBERT E. BARNHILL
PROFESSOR

Ph.D. 1964, University of Wisconsin
At Utah Since 1964

Research Area

Computer-aided geometric design.

Publications

Surfaces in Computer-Aided Geometric Design, R.E. Barnhill and W. Boehm (eds.), North-Holland, Amsterdam, 1983.

Barnhill, R.E., "Coons' Patches," Computers in Industry, 3(1982): 37-43.

Barnhill, R.E. and G.M. Nielson, "Representation and Approximation of Surfaces," Mathematical Software III, J.R. Rice (ed.), Academic Press, New York, 1977, pp. 69-120.

Current Activities

Representation and approximation of surfaces.

Office: 127 Widtsoe Bldg. 581-7916
Home: 3389 East Bernada Dr., 84124

BRENT BAXTER
RESEARCH ASSISTANT PROFESSOR

Ph.D. 1975, University of Utah
At Utah Since1977

Research Area

Medical imaging, visual perception, digital signal processing.

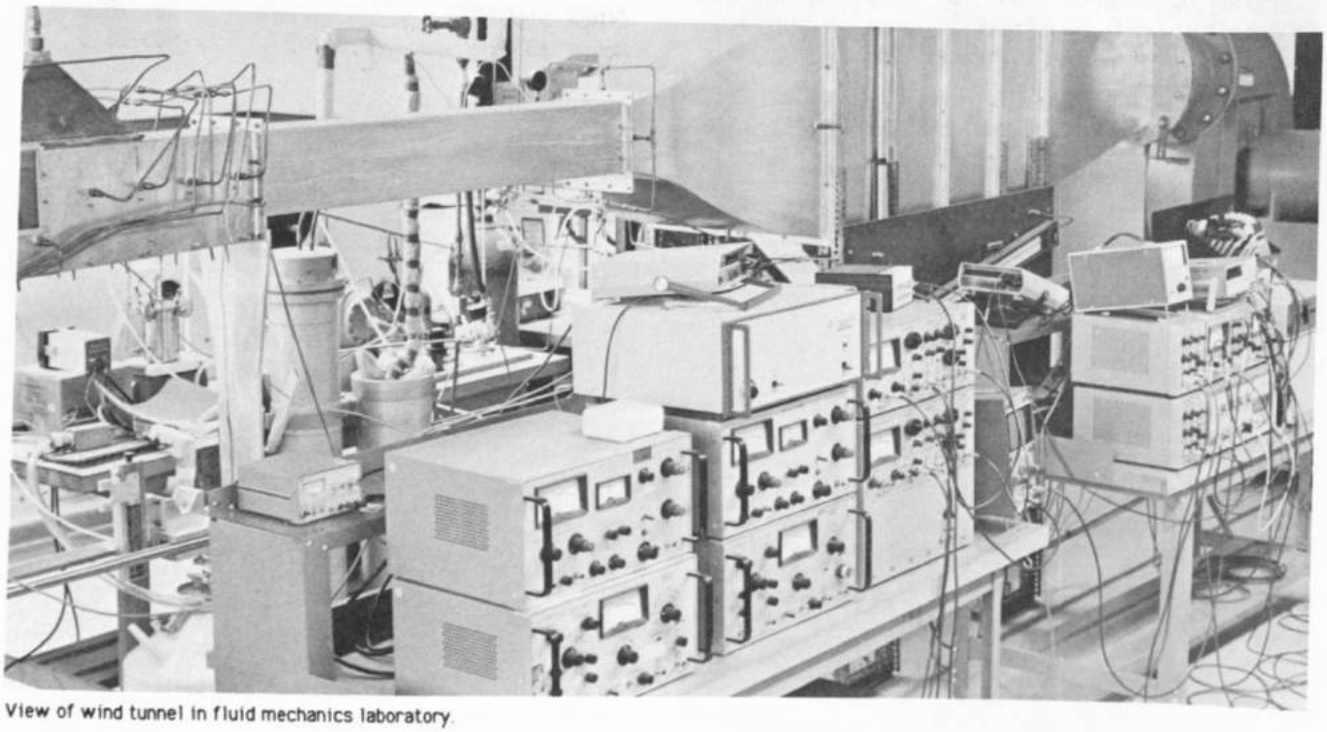
Publications

Baxter, B., L. Hitchner and R.E. Anderson, "Application of a 3-Dimensional in Diagnostic Imaging," J. Comp. Asst. Tomography, 6(1982): 1000-1005.

Baxter, B., L. Hitchner, R.E. Anderson, R. Shorthill and S.A. Johnson, "3-Dimensional Viewing System for Tomographic Scar Interpretation," Radiology, 145(1982).

Ravindra, H., R.A. Normann and B. Baxter, "The Effect of Extraneous Light on Lesion Detectability: A Demonstration," Invet. Radiology, 18(1983): 105-106.

Office: Ac225 MC 581-3475
Home: 2027 Wilmington Ave., 84109 485-3304



View of wind tunnel in fluid mechanics laboratory.

COMPUTER SCIENCE

BIR BHANU
ASSISTANT PROFESSOR

Ph.D. 1981, USC
At Utah Since 1984

Research Area

Computer vision, robotics, pattern recognition, artificial intelligence, image processing, signal processing, VLSI, industrial applications.

Publications

Bhanu, B., "Representation and Shape Matching of 3-D Objects," IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. PAMI-6, No. 3, May 1984, pp. 340-351.

Bhanu, B. and O.D. Faugeras, "Shape Matching of Two-Dimensional Objects," IEEE Transactions on Pattern Anaylsis and Machine Intelligence, Vol. PAMI-6, No. 2, March 1984, pp. 137-156.

Bhanu, B. and O.D. Faugeras, "Segmentation of Images Having Unimodal Distribution," IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. PAMI-4, No. 4, July 1982, pp. 408-419.

Bhanu, B. and J.H. McClellan, "On the Computations of Complex Cepstrum," IEEE Transactions on Acoustics, Speech and Signal Processing, Vol. ASSP-28, No. 5, Oct. 1980, pp. 583-585.

Current Activities

CAD/CAM models in vision and robotics, multi-fingered hand control and manipulation using vision and tactile sensors, evaluation of multi-sensor algorithms, segmentation of images, recognition algorithms, expert systems, visual models, shape matching and pattern recognition algorithms, parallel algorithms and architectures.

Awards

IBM Project Award for Outstanding Contribution.

Office: 3114 MEB 581-4787
Home: 5313 Cobble Creek Rd., #27F 277-4609
84117

RICHARD C. BRANDT
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1967, University of Illinois
At Utah Since 1971

Research Area

Implementation and authoring tools for computer-based learning.

Publications

Brandt, R.C. and B.H. Knapp, "Interactive Videodisc's Authoring Concepts," Videodisc/Microcomputer Courseware Design, M.V. DeBloois (ed.), Educational Technology, Englewood Cliffs, N.J., 1982, pp. 89-100.

Brandt, R.C., "Courseware Transportability Issues," Proceedings of the 1982 ADCIS Conference, June, 1982, pp. 193-196.

Knapp, B.H. and R.C. Brandt, VCIS User's Manual, University Press, Salt Lake City, Utah, 1983.

Brandt, R.C., "Interactive Video in Engineering Education," Proceeding of the FIE 13th Annual Conference, Oct. 1983, pp. 233-237.

Office: 3136 MEB 581-6076
Home: 2059 East 900 South, 84112 582-1102

COMPUTER SCIENCE

TONY M. CARTER
ASSISTANT PROFESSOR

PhD. 1983, University of Utah
At Utah Since 1984

Research Area

Computer-aided design of structured, integrated circuits.

Publications

Carter, T.M. and L.A. Hollaar, "The Implementation of a Radix-16 Digit-Slice Using a Cellular VLSI Technique," Proceedings of the 1983 IEEE International Conference on Computer Design/VLSI in Computers, Nov. 1983, pp. 688-691.

Carter, T.M., "ASSASSIN: A CAD System for Self-Timed Control-Unit Design," UTEC-82-020, University of Utah, Salt Lake City, Utah, Oct. 1982.

Smith, K.F., T.M. Carter and C.E. Hunt, "Structured Logic Design of Integrated Circuits Using the Stored Logic Array," IEEE Transactions on Electron Devices, Vol. ED-29, No. 4, April 1982, pp. 765-776.

Hollaar, L.A., T.M. Carter, B.E. Nelson and R.A. Lorrie, "The Structure and Operation of a Relational Database System in a Cell-Oriented Integrated Circuit Design System," Proceedings of the ACM/IEEE 21st Design Automation Conference, June 1984.

Current Activities

Structured integration of arithmetic circuits, variable-precision arithmetic processor, CAD for arithmetic and self-timed finite-state machines, CAD system based on System-R, special purpose hardware for graphics.

Office: 3112 MEB 581-7755
Home: 2782 Imperial St., 84106 466-2641

ELAINE COHEN
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1974, Syracuse University
At Utah Since 1974

Research Area

Computer-aided geometric design, representational and algorithmic problems in geometric modelling.

Publications

Cohen, E., "Some Mathematical Tools for a Modeller's Workbench," Proceedings of the Symposium on Computer-Aided Geometry Modeling, IEEE Computer Graphics and Applications, Oct. 1983, pp. 63-66.

Cohen, E., T. Lyche and R.F. Riesenfeld, "Discrete B-Splines and Subdivision Techniques in Computer-Aided Geometric Design and Computer Graphics," Computer Science Technical Report, Computer Graphics and Image Processing, Vol 14, No. 2, Oct. 1980, pp. 87-111.

Cohen, E. and R.F. Riesenfeld, "An Incompatibility Projector Based on an Interpolant of Gregory," Computer Graphics and Image Processing, Vol. 8, No. 2, Oct. 1978.

Cohen, E., "On the Degree of Approximation of a Function by the Partial Sums of its Fourier Series," Transactions of the American Mathematical Society, Vol. 235, Jan. 1978, pp. 35-74.

Cohen, E., "A Spline Approach to Speech Analysis/Synthesis," Proceedings of the ICASSP, March 1981, pp. 362-365.

Current Activities

New represenational forms that are more general and suitable for specifying and analyzing the complex shapes which occur in practice.

Awards

Phi Beta Kappa.

Office: 3144 MEB 581-8235
Home: 1337 Harrison Ave., 84105 683-2815

COMPUTER SCIENCE

ERCOLINO FERRETTI
RESEARCH ASSOCIATE PROFESSOR

B.S. 1957, New England Conservatory
At Utah Since 1970

Research Area

Computer music, interdisciplinary education.

Publications

Ferretti, E., "The Computer as a Tool for the Creative Musician," Computers for the Humanities?, Yale University Press, New Haven, Connecticut, 1965, pp. 107-112.

Ferretti, E., "Some Research Notes on Music with the Computer," Proceedings of the First Annual Conference, The American Society of University Composers, April 1966, pp. 38-41.

Ferretti, E., "Sound Synthesis by Rule," Proceedings of the Second Annual Music Computation Conference, University of Illinois at Urbana, Nov. 1975, Part 1, p. 1.

Ferretti, E., "Nuance Blending for the Synthesis of a Brass Choir," Proceedings of the 1978 International Computer Music Conference, Northwestern University, Vol. 1, p. 142.

Current Activities

Design and implementation of a "Realtime Music Machine" which will enable the user to synthesize all of the parameters of music--composition, performance and instruments, algorithmic concepts of computing.

Office: 3138 MEB 581-6130
Home: 3133 South 2750 East, 84109 486-7856

RICHARD M. FUJIMOTO
ASSISTANT PROFESSOR

Ph.D. 1983, UC Berkeley
At Utah Since 1983

Research Area

Computer architecture, VLSI, parallel processing, communication networks.

Publications

Fujimoto, "Simon: A Simulator of Multicomputer Networks," ERL Report, University of California at Berkeley, 1983.

Sequin, C.H. and R.M. Fujimoto, "The Impact of VLSI on Communications in Closely Coupled Multiprocessor Networks," Proceedings COMPSAC 82, 1982.

Sequin, C.H. and R.M. Fujimoto, "X-Tree and Y-Components," VLSI Architecture, B. Randell and P.C. Treleaven (eds.), Prentice-Hall, Englewood Cliffs, N.J., 1983, pp. 299-326.

Current Activities

Parallel computer systems composed of many asynchronous microcomputers interconnected by a high-band width communications switch with tools to analyze.

Awards

IBM Faculty Development Award, University of Utah.

Office: 4011 MEB 581-4845
Home: 241 N. Vine, #807E, 84103 355-2347

COMPUTER SCIENCE

DAVID HANSCOM
UNDERGRADUATE INSTRUCTOR

Ph.D. 1970, Case Western Reserve University
At Utah Since 1982

Research Interests

Teaching computer science, developing computer literacy curriculum, data communications.

Office: 3154 MEB 581-7023
Home: 1451 Moray Ct., Park City, 84060 649-3213

THOMAS C. HENDERSON
ASSOCIATE PROFESSOR

Ph.D. 1979, University of Texas
At Utah Since 1981

Research Area

Artificial Intelligence, computer vision, robotics.

Publications

Henderson, T.C. and L. Davis, "Hierarchical Constraint Processes for Shape Analysis," IEEE Transactions on Pattern Analysis and Machine Intelligence, PAMI-3, No. 3, May 1981, pp. 265-277.

Henderson, T.C., "Efficient 3-D Object Representations for Industrial Vision Systems," IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. PAMI-5, No. 6, Nov. 1983, pp. 609-618.

Henderson, T.C., "Shape Grammar Compilers," Digital Image Processing, J.C. Simon and R.M. Haralick (eds.), Reidel Pub. Co., Nordrecht, Holland, 1981, pp. 327-336.

Henderson, T.C., "Feature-Based 2-D Shape Models," Fundamentals in Computer Vision, O.D. Faugeras (ed.), Cambridge University Press, Cambridge, Mass., 1983, pp. 263-272.

Current Activities

Robotics laboratory, integration and acquisition of multi-sensor data, role of expert systems in robotics.

Office: 3142 MEB 581-3601
Home: 2186 Emerson Ave., 84108 582-2337

COMPUTER SCIENCE

LEE A. HOLLAAR
ASSOCIATE PROFESSOR

Ph.D. 1975, University of Illinois
At Utah Since 1980

Research Area

Software and hardware support for information retrieval and management, design automation and database systems for VLSI design.

Publications

Hollaaar, L.A., K.F. Smith, W.H. Chow, R. Haskin and P. Emrath, "The Architecture and Operation of a Large, Full-Text Information Retrieval System," Advanced Database Machine Architecture, D.K. Hsiao (ed.), Prentice-Hall, Englewood, Co., 1983.

Hollaar, L.A., "The Utah Text Retrieval Project," Information Technology: Research and Development, C.J. Van Rijsbergen (ed.), Buttersworths, Kent, England, 1983, pp. 155-168.

Haskin R. and L.A. Hollaar, "Operational Characteristics of a Hardware Pattern Matcher," ACM Transactions on Database Systems, Vol. 8, March, 1983, pp. 15-40.

Hollaar, L.A., "Direct Implementation of Asynchronous Control Units," IEEE Transactions on Computers, Vol. C-31, Dec. 1982, pp. 1133-1141.

Current Activities

Implementation of a demonstration information retrieval system, including a prototype of the special purpose back-end search system.

Patents

Hollaar, L.A. Method and System for Matching Encoded Characters. U.S. Patent 4, 450, 520. 1984.

Office: 4013W MEB 581-3203
Home: 1367 East 100 South, 84102 363-8086

ROBERT M. KELLER
PROFESSOR

Ph.D. 1970, UC Berkeley
At Utah Since 1976

Research Area

Multiprocessing architectures, functional languages, asynchronous systems.

Publications

Hudak, P. and R.M. Keller, "Garbage Collection and Task Deletion in Distributed Applicative Processing Systems," Proceedings of the Conference of LISP and Functional Programming Languages, ACM, Aug. 1982, pp. 168-178.

Jayaraman, B. and R.M. Keller, "Resource Expressions for Applicative Languages," Proceedings of the International Conference on Parallel Processing, IEEE, Aug. 1982, pp. 160-167.

Davis, A.L. and R.M. Keller, "Dataflow Program Graphs," Computer, 15(1982): 26-41.

Awards

IEEE Best Paper Award, 1974; Distinguished Lecture Series Award, 1983.

Office: 3160 MEB 581-5554
Home: 2235 Belair Dr., 84109 466-1595

COMPUTER SCIENCE

ROBERT R. KESSLER
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1981, University of Utah
At Utah Since 1982

Research Area

Portable symbol manipulation systems with emphasis on architectural description drive compilation techniques, portability of LISP-like systems, adaptation of artificial intelligence to compilers.

Publications

Kessler, R.R., "PEEP - An Architectural Description Driven Peephole Optimizer," SIGPLAN '84: Symposium on Compiler Reconstruction, ACM, June 1984.

Kessler, R.R. and M. L. Griss, "Update on the PSL Development Effort," UCP-84, Utah Symbolic Computation Group, University of Utah, Salt Lake City, Utah, 1983.

Kessler, R.R., "A Comprehensive Computer Package for Ambulatory Surgical Facilities," Proceedings of the Fifth Conference on Computer Applications in Medicine, IEEE, Nov. 1980, pp. 1262-1267.

Kessler, R.R., M.L. Griss, and G.Q. Maguire Jr., "TLISP--A Portable LISP Implemented in P-Code," Proceedings of EUROSAMM 79, ACM, June 1979, pp. 490-502.

Current Activities

New compiler technology for Portable Standard LISP system, register allocation, incorporating data typing, source-to-source and target-code transformations, incorporation of architectural descriptions.

Awards

Tau Beta Pi.

Office: 3132 MEB 581-4653
Home: 6951 Pine Mountain Dr., 84121 943-1273

LEWIS C. KNAPP
RESEARCH ASSISTANT PROFESSOR

Ph.D. 1979, Syracuse University
At Utah Since 1981

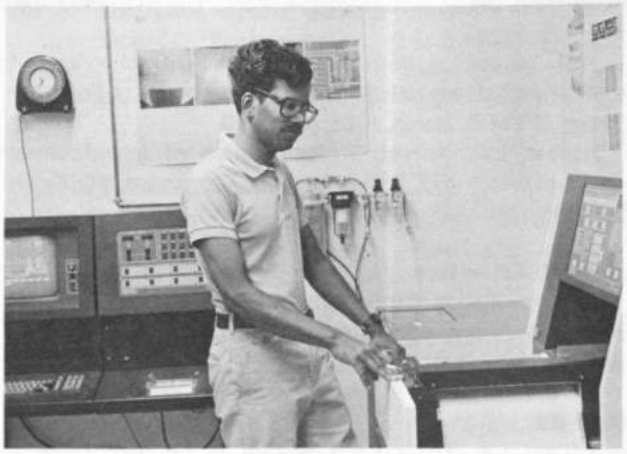
Research Area

Geometric modelling of mechanical objects, particularly those with sculptured bonding surfaces.

Current Activities

Development of the Alpha-1 geometric modelling systems and extension of its capabilities to include driving numerically controlled milling machines to make prototype parts.

Office: 3140 MEB 581-3569
Home: 1595 South 1300 East, 84105 485-9410



Mechanical engineering student operating Fourier transform infrared spectrometer.

COMPUTER SCIENCE

GARY LINDSTROM
ASSOCIATE PROFESSOR

Ph.D. 1971, Carnegie-Mellon University
At Utah Since 1977

Research Area

Programming languages and systems, software engineering, non von Neumann architectures.

Publications

Lindstrom, G. and F.E. Hunt, "Consistency and Currency in Funcational Databases," Proceedings of the IEEE Infocom 83, Apr. 1983, pp. 352-361.

Lindstrom, G. and E.I. Organick, "Mapping High-Order Language Program Units into VLSI Structures," Proceedings of the IEEE Spring 1982 Compcon Conference, Feb. 1982, pp. 15-18.

Lindstrom, G. and M.L. Soffa, "Referencing and Retention in Block-Structured Coroutines," ACM Transactions on Programming Languages and Systems 3, CR #38, , July 1981, pp. 263-292.

Current Activities

Exploitation of applicative architectures for distributed computing systems, techniques and semantic foundations for verifiable hardware simulation, development of algorithms for highly parallel execution of logic programs.

Awards

University of Utah College of Engineering Outstanding Teaching Award, 1981.

Office: 3160 MEB 581-8224
Home: 915 Third Ave., 84103 532-1259

ELLIOTT I. ORGANICK
PROFESSOR

Ph.D. 1950, University of Michigan
At Utah Since 1971

Research Area

Programming languages, systems, computer architecture and computer engineering.

Publications

Organick, E.I., A Programmer's View of the Intel 432 System, McGraw-Hill, New York, 1983.

Organick, E.I. and G. Lindstrom, "Mapping High-Order Language Units into VLSI Structures," Proceedings of the 24th IEEE Computer Society International Conference, Feb. 1982, pp. 15-18.

Organick, E.I. and M. Castan, "MU-3L: A HLL-RISC Processor for Parallel Execution of FP-Language Programs," 9th Annual Symposium on Computer Architecture, Assoc. Comp. Machinery, IEEE Comp. Sci., April 1982, pp. 239-247.

Organick, E.I., A.I. Forsythe and R.P. Plummer, Programming Language Structures, Academic Press, New York, 1978.

Office: 3152 MEB 581-6087
Home: 127 Second Ave., 84114 359-1798

WILLIAM L. SALMON
UNDERGRADUATE INSTRUCTOR

Ph.D. 1983, Iowa State University
At Utah Since 1971

Research Interests

Programming languages for scientific calculation and for computer-aided instruction.

Current Activities

Consultant, Video-Computer Instructional Systems group.

Office: 3148 MEB 581-4853
Home: 2135 S. Wellington St., 84106 486-4058

COMPUTER SCIENCE

KENT F. SMITH
ASSOCIATE PROFESSOR

Ph.D. 1982, University of Utah
At Utah Since 1979

Research Area

Development of a design methodlogy known as "structured tiling" which can be used to help bridge the gap between system-level descriptions and the composite layout of an integrated circuit.

Publications

Smith, K.F., T.M. Carter and C.E. Hunt, "Structured Logic Design of Integrated Circuits Using the Stored Logic Array," IEEE Device, 29(1982): 765-776.

Smith, K.F., B.E. Nelson, T.M. Carter and A.B. Hayes, "Computer-Aided Design of Integrated Circuits Using Path-Programmable Logic," IEEE Electro 83 Professional Program Session Record, April 1983, pp. 1-11.

Nelson, B.E., K.F. Smith and T.M. Carter, "Cost Effective VLSI Design System," IEEE International Symposium on Circuits and Systems, May 1983, pp. 505-508.

Current Activities

Definition and design of structures in processes more advanced than the presently designed NMOS structures such as short-channel CMOS and GaAs devices, development of parameterized switching and storage tiles in both NMOS and CMOS techologies, definition and implementation of CAD tools to use these structures and parameterized tiles.

Patents

Smith, K.F. Radiation Monitor with Background Compensation. U.S. Patent 3,344,277. 1965.

Smith, K.F. Electronic Shift Register System. U.S. Patent 3,683,203. 1969.

Office: 3156 MEB 581-8653
Home: 1775 Grover Ln., 84117 278-6736

P.A. SUBRAHMANYAM
ASSISTANT PROFESSOR

Ph.D. 1979, University of New York
At Utah Since 1979

Research Area

Programming and methodology, artificial intelligence, operating systems, data base systems and theory.

Publications

Subrahmanyam, P.A., "Synthesizing VLSI Circuits from Behavioral Specificiations: A Very High Level Silicon Copiler and its Theoretical Basis," VLSI 83, F. Anceau (ed.), North Holland, Amsterdam, 1983.

Subrahmanyam, P.A., "An Automatic/Interactive Software Development System: Conceptual Basis and Design," Automated Tools for Information System Design and Development, H.J. Schneider and A.I. Wasserman (eds.), North Holland, Amsterdam, 1982.

Subrahmanyam, P.A. and J.H. You, "Pattern Driven Lazy Reduction: a Unifying Evaluation Mechanism for Functional and Logic Programs," Proceedings of the Eleventh Annual ACM Symposium on Principles of Programming Languages, Jan. 1984.

Subrahmanyam, P.A., An Algebraic Basis for VLSI Design, Research Monograph, University of Utah, Salt Lake City, Apr. 1982.

Awards

IBM Fellowship, 1977-79.

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Home: 291 St., #7, 84103 363-1567

COMPUTER SCIENCE

SPENCER W. THOMAS
ASSISTANT PROFESSOR

Ph.D. 1983, University of Utah
At Utah Since 1983

Research Area

Computer-aided geometric design, computer graphics.

Publications

Thomas, S.W., R. Riesenfeld, E. Cohen, R. Fish, E. Cobb, B. Barsky, D. Schweitzer and J. Lane, "Using the Oslo Algorithm as a Basis for CAD/CAM Geometric Modelling," Proceedings of the NCGA, 1981.

Thomas, S.W. and B.A. Barsky, "TRANSPLINE--A System for Representing Curves Using Transformations Among Four Spline Formulations," Comput. J., 24(1981): 271-277.

Current Activities

Set operations of freeform-surface-bounded objects, working on VLSI implementation of some geometric modeling algorithms.

Awards

University of Utah College of Engineering Outstanding Teaching Assistant Award.

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WILLIAM VIAVANT
PROFESSOR

Ph.D. 1954, University of Texas
At Utah Since 1964

Research Interests

Small computer systems, APL processors, computer-human communication, undergraduate curriculum development.

Awards

Senior Postdoctoral Fellow at Cambridge University.

Office: 3103 MEB 581-8224
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JOINT APPOINTMENTS

BAXTER, Research Assistant Professor; Primary Appointment in Radiology.

STEPHENSON, Professor; Primary Appointment in Electrical Engineering.

ELECTRICAL ENGINEERING

CRAIG K. RUSHFORTH
CHAIRMAN AND PROFESSOR

Ph.D. 1962, Stanford University
At Utah Since 1974

Research Area

Statistical communication theory, signal processing.

Publications

Conwell, P.R., P.W. Barber and C.K. Rushforth, "Resonant Spectra of Dielectric Spheres," J. Opt. Soc. Am. A, 1(1984): 62-67.

Currie, R.J. and C.K. Rushforth, "Frame Sychronization in the Presence of Errors and Erasures," IEEE Transactions on Aerospace and Electronic Systems, Vol. AES-19, No.4, July, 1983, pp. 498-505.

Rushforth, C.K., A.E. Crawford and Y. Zhou, "Least-Squares Reconstruction of Objects with Missing High-Frequency Components," J. Opt. Soc. Am., 72(1982): 204-211.

Rushforth, C.K. and R.L. Frost, "A Comparison of Some Algorithms for Reconstructing Space-Limited Images," J. Opt. Soc. Am. A, 70(1984): 1539-1544.

Cathey, W.T., B.R. Frieden, W.T. Rhodes and C.K. Rushforth, "Image Gathering and Processing Systems for Enhanced Resolution," J. Opt. Soc. Am. A., 1(1984): 241-250.

Current Activities

Image restoration, bandwidth compression, adaptive digital filters, optical scattering.

Awards

Phi Beta Kappa; Tau Beta Pi; Bell Labs Fellow.

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Kaysville, 84037

J. MARK BAIRD
RESEARCH PROFESSOR

PhD. 1970, University of Utah
At Utah Since 1981

Research Area

Millimeter and submillimeter wave tubes, electron beam theory and E-Gun design, computer simulations of electrodynanic interactions, AFTER program.

Publications

Kim, K.J., M.E. Read, J.M. Baird, K.R. Chu, A. Drobot, J.L. Vomvoridis, A. Ganguly, D. Dialetis and V.L. Granatstein, "Design Considerations for a Megawatt CW Gyrotron," Int. J. Electron., 51(1981): 427-445.

Lau, Y.Y., J.M. Baird, L.R. Barnett, K.R. Chu and B.L. Granatstein, "Cyclotron Maser Instability as a Resonant Limit of Space-Charge Waves," Int. J. Electron., 51(1981): 331-340.

Fliflet, A.W., L.R. Barnett and J.M. Baird, "Mode Coupling and Power Transfer in a Coaxial Sector Waveguide with a Sector Angle Taper," IEEE Transactions on Microwave Theory and Techniques, Vol. MTT-28, Dec. 1980, pp. 1482-1486.

L.R. Barnett, J.M. Baird, A.W. Fliflet and V.L. Granatstein, "Circular Electric Mode Waveguide Couplers and Junctions for Use in Gyrotron Traveling Wave Amplifiers," IEEE Transactions on Microwave Theory and Techniques, Vol. MTT-28, Dec. 1980, pp. 1477-1481.

Baird, J.M., "Survey of Fast Wave Tube Developments," IEDM Technical Digest, Dec. 1979, pp. 156-163.

Current Activities

Teaching electrodynamics, plasma physics and microwave measurements in the AFTER program, 600-1800 GHz backward wave oscillator, harmonic gyrotron amplifier at 100 GHz.

Patents

Baird, J.M. Millimeter Wave Imaging System. U.S. Patent 3,824,593. 1974.

Awards

NDEA Fellowship; NASA Fellowship.

Office: 2026 MEB 581-6952
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ELECTRICAL ENGINEERING

LARRY R. BARNETT
RESEARCH ASSISTANT PROFESSOR

Ph.D. 1978, University of Tennesee
At Utah Since 1983

Research Area

Microwave tubes with current studies of millimeter wave tapered interaction gyrotron amplifiers, gyromagnetrons, submillimeter O-type backward wave oscillators.

Publications

Barnett, L.R., Y.Y. Lau, K.R. Chu and V.L. Granatstein, "An Experimental Wideband Gyrotron Traveling-Wave Amplifier," IEEE Transactions on Electron Devices, Vol. ED-28, 1981, pp. 872-878.

Barnett, L. R., D. Dialetis, Y.Y. Lau and K.R. Chu, "Tapered Interaction Gyro-TWA Experiments," IEEE Int. Elect. Dev. M. Technical Digest, Dec. 1983.

Granatstein, V.L., M.E. Read and L.R. Barnett, "Measured Performance of Gyrotron Oscillators and Amplifiers," Infrared and Millimeter Waves, K.J. Button (ed.), Vol. 5, Academic Press, New York, 1982, pp. 267-304.

Lau, Y.Y. and L.R. Barnett, "A Note on Gyrotron Traveling-Wave Amplifiers Using Rectangular Waveguides," IEEE Transactions on Electron Devices, Vol. ED-30, Aug. 1983, pp. 908-912.

Barnett, L.R., J.M. Baird, A.W. Fliflet and V.L. Granatstein, "Circular Electric Mode Waveguide Couplers and Junctions for Use in Gyro-TWAs," IEEE Transactions on Microwave Theory and Techniques, Bol. MTT-28, Dec. 1980, pp. 1477-1481.

Patents

Barnett, L.R. Cyclotron Maser Using a Nonlinear Electrostatic Field. U.S. Patent 4, 253, 068. 1981.

Barnett, L.R. Waveguide Coupler for Gyrotron Traveling-Wave Amplifiers. U.S. Patent 4, 282, 458. 1981.

Barnett, L.R. Barmetron Microwave Amplifiers and Oscillators. U.S. Patent 4, 422, 045. 1983.

Awards

Research Publication Award, Naval Research Laboratory, 1981.

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ROBERT E. BENNER
ASSISTANT PROFESSOR

Ph.D. 1978, University of Rochester
At Utah Since 1982

Research Area

Surface Raman scattering, optical gas-phase identification, small particle scattering, fiber optics and evanescent wave spectroscopy.

Publications

Benner, R.E., P.W. Barber, J.F. Owen and R.K. Chang, "Observation of Structure Resonances in the Fluorescence Spectra from Microspheres," Phys. Rev. Lett., 44(1980): 475.

Benner, R.E., R. Dornhaus, R.K. Chang and B.L. Laube, "Correlations in the Raman Spectra of Cyanide Complexes Adsorbed on Ag Electrodes with Voltammograms," Surf. Sci., 101(1980): 341.

Chang, R.K., R.E. Benner, R. Dornhaus, K.U. Von Raben and B.L. Laube, "Enhanced Raman Scattering of Molecules Adsorbed on Ag, Cu, and Au Surfaces," Lasers and Applications, W.O.N. Guimares, C.T. Lin and A. Mooradian (eds.), Springer-Verlag, Berlin, Germany, 1981, p. 55.

Hellstrom, E.E. and R.E. Benner," Preparation and Properties of Polycrystalline Divalent-Cation Beta-Alumina," Solid State Ionics, 11(1983): 125-132.

Benner, R.E., K.U. Von Rabe, K.C. Lee, J.F. Owen, R.K. Chang and G. L. Labue, "Raman Scattering from Pt(CN)2- Adsorbed on Pt. Colloids," Chem. Phys. Lett., 96(1983): 65-69.

Current Activites

Characterization of micron-sized dielectric particles by resonances in their emission spectra, analysis of respiratory and anesthetic gas mixtures by Raman scattering, Raman characterization of biological systems during microwave irradiation, enhancement methods for optic surface spectroscopies.

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ELECTRICAL ENGINEERING

JAMES J. BROPHY
PROFESSOR

Ph.D. 1951, Illinois Inst. Technology
At Utah Since 1980

Research Area

Fluctuation phenomena, semiconductor physics and devices, electrical phenomena in semiconductors and semiconductor devices with particular interest in 1/f noise, semiconductor and magnetic devices.

Publications

Brophy, J.J., Basic Electronics for Scientists, 4th Ed., McGraw-Hill, New York, 1982.

Brophy, J.J. and L.V. Azaroff, Electronic Processes in Materials, McGraw-Hill, New York, 1963.

Brophy, J.J., "Fluctuations in Magnetic and Dielectric Solids," Fluctuations Phenomena in Solids, R.E. Burgess (ed.), Academic Press, New York, 1965, pp. 1-35.

Brophy, J.J., A.M. Hammerli and J. Janata, "Equilibrium Noise in ISFETs," J. Electrochem. Soc., 129(1982): 2036.

Brophy, J.J., "Contact Noise in Superionic Ceramics," Noise in Physical Systems and 1/f Noise, M. Savellia, G. Lecoy and J.P. Nougier (eds.), Elsevier Science Publishers, B.V., 1983, pp. 351-354.

Current Activities

Electrical properties of superionic conductors, electrical noise in CHEMFETs, electronic transport in semiconductor alloys.

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TIEN-HSIN CHAO
ASSISTANT PROFESSOR

Ph.D. 1983, Penn. State University
At Utah Since 1983

Research Area

Coherent and incoherent optical signal processing, holographic optical elements, fiber optics.

Publications

Chao, T.H., A.M. Tai, M.S. Dymek, and F.T.S. Yu, "Optimum Correlation Detection by Prewhitening," Appl. Optics, 19 (1980): 2461.

Chao, T.H., S.L. Zhuang, and F.T.S. Yu, "White-Light Pseudocolor Density Encoding Through Contrast Reversal," Opt. Lett. 5(1980): 230.

Zhuang, S.L., T.H. Chao, and F.T.S. Yu, "Smeared-Photographic-Image Deblurring Utilizing White-Light-Processing Technique," Opt. Lett., 6(1981): 102.

Chao, T.H. and F.T.S. Yu, "Grating Generation with an Encoded Extended Incoherent Source," Opt. Lett., 6(1982): 251.

Chao, T.H., S.L. Zuang, S.Z. Mao, and F.T.S. Yu, "Broad Band Color Image Deblurring," Appl. Optics, 22(1983): 1439.

Current Activities

Development of a high-capacity optical/digital hybrid coherent correlator for polychromatic signals detection, multiple-imaging generation with a white-light processsing technique.

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ELECTRICAL ENGINEERING

DOUGLAS A. CHRISTENSEN
PROFESSOR

Ph.D. 1967, University of Utah
At Utah Since 1978

Research Area

Biomedical instrumentation applications of optics and ultrasound.

Publications

Christensen, D.A., "Thermal Dosimetry and Temperature Measurements," Cancer Res., 39(1979): 2325-2327.

Christensen, D.A., "A Review of Current Optical Techniques for Biomedical Physical Measurements," Physical Sensors for Biomedical Applications, CRC Press, 1980, pp. 67-81.

Christensen, D.A. and C.H. Durney, "Hyperthermia Production for Cancer Therapy: A Review of Fundamentals and Methods," J. Microwave Power, 16(1981): 89-105.

Christensen, D.A., "Current Techniques for Noninvasive Thermometry," Physical Aspects of Hyperthermia, G.H. Nussbaum (ed.), American Institute of Physics, New York, 1982, pp. 266-279.

Christensen, D.A., "Thermometry and Thermography," Hyperthermia in Cancer Therapy, F.K. Storm (ed.), G.K. Hall and Company, Boston, Mass., 1983, pp. 223-232.

Current Activities

Use of electrical engineering techniques to develop sensors for medical and physiological measurements, including optics, fiber optics, ultrasound and integrated circuits.

Patents

Christensen, D.A. Semiconductor Temperature Sensor. U.S. Patent 4, 136, 566. 1979.

Awards

NIH Special Postdoctorate Fellow, 1972-1974; Outstanding Paper Award, International Microwave Power Institute.

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Home: 8520 Top of the World Cir., 84121 943-0281

JAMES E. DALLEY
UNDERGRADUATE INSTRUCTOR

Ph.D. 1963, University of Utah
At Utah Since 1984 (also 1958-1961)

Research Interests

Design of analog, digital and microprocessor circuits, IC device characterization, instruction in microcomputers.

Publications

Dunn, C.N. and J.E. Dalley, "Computer-Aided Small Signal Characterization of IMPATT Diodes," IEEE Transactions on Microwave Theory and Techniques, Sept. 1969, pp. 691-695.

Dalley, J.E., "A Strip-Line Directional Coupler Utilizing a Non-Homogeneous Dielectric Medium," IEEE Transactions on Microwave Theory and Techniques, Sept. 1969, pp. 706-712.

Dalley, J.E., "Computer-Aided Microwave Impedance Measurements," IEEE Transactions on Microwave Theory and Techniques, Aug. 1969, pp. 572-576.

Patents

Dalley, J.E. Opto-Isolator Hybrid Circuit. U.S. Patent 4, 312, 225. 1982.

Dalley, J.E. Device Control System. U.S. Patent 4, 266, 097. 1981.

Dalley, J.E. Balanced Line Driver. U.S. Patent 3, 872, 391. 1975.

Dalley, J.E. Dial Pulse Repeating Line Circuit Using Miniature Line Transformer. U.S. Patent 4, 046, 969. 1977.

Office: 3054A MEB 581-6941

ELECTRICAL ENGINEERING

CARL H. DURNEY
PROFESSOR

Ph.D. 1964, University of Utah
At Utah Since 1963

Research Area

Electromagnetic dosimetry, applications of electromagnetics to health care, microwave biological effects, NMR imaging.

Publications

Durney, C.H., L.D. Harris and C.L. Alley, Solutions Manual for Electric Circuits: Theory and Engineering Applications, Holt, Rinehart and Winston, New York 1982.

Hayes, C.E., T.A. Case, D.C. Ailion, A.H. Morris, A. Cutillo, C.W. Blackburn, C.H. Durney and S.A. Johnson, "Lung Water Quantitation by Nuclear Magnetic Resonance Imaging," Science, 216(1982): 1313-1315.

Lakhtakia, A., M.F. Iskander and C.H. Durney, "An Iterative Extended Boundary Condition Method for Solving the Absorption Characteristics of Lossy Dielectric Objects of Large Aspect Ratios," IEEE Transactions on Microwave Theory and Techniques, Vol. MTT-31, Oct. 1982, pp. 640-647.

Hill, S.C., D.A. Christensen and C.H. Durney, "Power Deposition Patterns in Magnetically Induced Hyperthermia: A Two-Dimensional Quasi-Static Analysis," Int. J. Radiat. Oncol., 9(1983): 893-904.

Cutillo, A.G., C.H. Durney and A.D. Renzitti Jr., "Mechanical and Gas-Distribution Behavior of a Collateral-Ventilation Model," J. Appl. Physiol: Respiratory, Environmental and Exercise Physiology, 55(1983): 503-511.

Current Activities

Advanced theoretical techniques for calculating power absorption in models of humans exposed to electromagnetic fields, new electromagnetic techniques for generating hyperthermia electromagnetically for cancer therapy, new techniques for application of NMR imaging to pulmonary physiology.

Patents

Rozell, T.C., C.C. Johnson, C.H. Durney and J.L. Lords. Optical Temperature Probe. U.S. Patent 4, 016, 761. 1977.

Iskander, M.F. and C.H. Durney. Electromagnetic Energy Coupler/Receiver Apparatus and Method. U.S. Patent 4, 240, 445. 1980.

Awards

University of Utah Distinguished Research Award, 1980; American Society for Engineering Education Western Electric Fund Award for Excellence in Teaching, 1982; Utah State University Distinguished Alumnus, 1983.

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OM P. GANDHI
PROFESSOR

Ph.D. 1961, University of Michigan
At Utah Since 1966

Research Area

Biological effects and medical applications of electromagnetic energy, microwave engineering and applications.

Publications

Gandhi, O.P., Microwave Engineering and Applications, Pergamon Press, New York, 1981.

Biological Effects of Electromagnetic Radiation, O.P. Gandhi and J.M. Osepchuk (eds.), IEEE Press, New York, 1983.

"Biological Effects and Medical Applications of Electromagnetic Energy," Proceedings of the IEEE, O.P. Gandhi (ed.), Vol. 68, No. 1, Jan. 1980, pp. 1-192.

Gandhi, O.P., "Biological Effects and Medical Applications of RF Electromagnetic Fields," IEEE Transactions on Microwave Theory and Techniques, Vol. MTT-30, Nov. 1982, pp. 1832-1847.

Gandhi, O.P., "State of the Knowledge for Electromagnetic Absorbed Dose in Man and Animals, Proceedings of the IEEE, Vol. 68, 1980, pp. 24-32.

Current Activities

Electromagnetic dosimetry, evaluation of the electromagnetic safety standard and biological effects, industrial applications of microwaves.

Patents

Gandhi, O.P. and L.S. Metz. A High-Gain Solid-State Distributed Interaction Microwave Amplifier," U.S. Patent 3, 833, 858. 1974.

Awards

IEEE Fellow; University of Utah Distinguished Research Award, 1979-80.

Office: 3032 MEB — 581-7743
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Ten years in its inception and design, the "Utah Arm" has in the past three years been successfully fitted to over 100 amputees in the United States and Europe. Utilizing advanced technology and the amputee's remnant musculature, it proves a valuable rehabilitative tool. Research toward greater efficacy is ongoing at the Center for Biomedical Design. New developments which will be implemented to upgrade arm capabilities include: a powered hand, expanded control capabilities (i.e., wrist rotation and humeral rotation) and a microprocessor based control system.

ELECTRICAL ENGINEERING

DIETRICH K. GEHMLICH
PROFESSOR

Ph.D. 1956, University of Utah
At Utah Since 1956

Research Area

Automatic control systems, medical instrumentation.

Current Activities

Organophosphate detectors, pressure transducer catheters.

Patents

Gehmlich, D.K. Neonatal Oxygen Consumption Monitor. U.S. Patent 4, 211, 239. 1980.

Gehmlich, D.K. Apparatus for Measurement of Expiration Fluids. U.S. Patent 4, 233, 842. 1980.

Office: 3050 MEB 581-3630
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RICHARD W. GROW
PROFESSOR

Ph.D. 1955, Stanford University
At Utah Since 1958

Research Area

Microwave tubes, solid-state and quantum electronic devices, plasmas, microwave biological effects.

Publications

Grow, R.W. and U.A. Shrivastava, "Impedance Calculations for Traveling-Wave Gyrotrons Operating at Harmonics of the Cyclotron Frequency in Magnetron Circuits Operating in the π-Mode," Technical Digest of IEEE International Electron Device Meeting, Dec. 1982, pp. 384-387.

Grow, R.W. and R.B. Marks, "Impedance Calculations for Traveling-Wave Gyrotrons Operating at Harmonics of the Cyclotron Frequency in Circular and Rectangular Overmoded Waveguides," Technical Digest of IEEE International Electron Device Meeting, Dec. 1982, pp. 380-383.

Grow, R.W. and U.A. Shrivasta, "Impedance Calculations for Traveling-Wave Gyrotrons Operating at Harmonics of the Cyclotron Frequency in Magnetron Type Circuits," Int. J. Electron., 53(1982): 699-707.

Marks, R.B. and R.W. Grow, "Harmonic Gyrotron Interaction in Circular and Rectangular Waveguides," Int. J. Electron., 54(1983): 733-748.

Grow, R.W., "The Development of a New Analytical Wave Analysis of a Free Electron Laser or Ubitron," Technical Digest of IEEE International Electron Device Meeting, Dec. 1982, pp. 444-447.

Current Activities

Program Manager, AFTER program, millimeter wave tubes up to 1800 GHz and high-power gyrotrons with 1 megawatt beam power at 100 GHz.

Awards

IEEE Elected Fellow, 1972; University of Utah Distinguished Research Award, 1982-83.

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ELECTRICAL ENGINEERING

ROBERT J. HUBER
PROFESSOR

Ph.D. 1961, University of Utah
At Utah Since 1977

Research Area

Semiconductor devices.

Publications

Janata, J. and R.J. Huber, "Ion Sensitive Field Effect Transistors," Ion Selective Electrode Reviewer, J.D.R. Thomas (ed.), Vol. 1, Pergamon Press, New York, 1979, pp. 31-78.

Smith, R.L., J. Janata and R.J. Huber, "Transient Phenomena in Ion Sensitive Field Effect Transistors," J. Electrochem. Soc., 127(1980): 1599-1603.

Janata, J. and R.J. Huber, "Chemically Sensitive Field Effect Transistors," Ion Selective Electrodes in Analytical Chemistry, H. Freiser (ed.), Plenum Press, New York, 1980, pp. 107-174.

Huber, R.J., "Static Induction Transistor," Yearbook of Science and Technology, McGraw-Hill, New York, 1980, pp. 402-404.

Current Activities

Fabrication and characterization of CHEMFETs, fabrication of high electron mobility field effect transistors using GaIn/InP heterojunctions and isolation methods for scaled CMOS integrated circuits.

Patents

Huber, R.J. System for Measuring the Concentration of Chemical Substances. U.S. Patent 4, 397, 714. 1983.

Huber, R.J. Method of Manufacturing MOS Integrated Circuit of Reduced Size. U.S. Patent 3, 874, 937. 1975.

Awards

Utah Section IEEE Technical Achievement Award, 1975; Utah Section IEEE Outstanding Achievement, Engineering Excellence, 1980.

Office: 1016C MEB 581-6696
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MAGDY F. ISKANDER
ASSOCIATE PROFESSOR

Ph.D. 1976, Univeristy of Manitoba
At Utah Since 1977

Research Area

Scattering and diffraction of electromagnetic waves, numerical techniques in electromagnetics, antenna design, medical and industrial applications of electromagnetic energy.

Publications

"Electromagnetic Techniques in Energy Applications," J. Microwave Power, M.F. Iskander (Guest ed.), 18(1983).

Iskander, M.F. and J.B. DuBow," Time- and Frequency-Domain Techniques for the Dielectric Properties of Rocks: A Review," J. Microwave Power, 18(1983): 55-74.

Iskander, M.F., A. Lakhtakia and C.H. Durney, "A New Procedure for Improving the Solution Stability and Extending the Frequency Range of EBCM," IEEE Transacitons on Antennas and Propagation, Vol. AP-31, 1983, pp. 317-324.

"Electromagnetic Techniques in Medical Diagnosis and Imaging," J. Microwave Power, M.F. Iskander and C.H. Durney (Guest eds.), 18(1983).

Iskander, M.F. and C.H. Durney, "Microwave Methods of Measuring Changes in Lung Water," J. Microwave Power, 18(1983): 265-275.

Current Activities

Iterative Extended Boundary Condition technique in calculating scattering and absorption by dielectric objects, development of a new EM tool for well logging, use of the passive EM techniques (radiometry) for measuring changes in lung water content.

Patents

Iskander, M.F. and C.H. Durney. Electromagnetic Energy Coupler/Receiver Apparatus and Method. U.S. Patent 4, 240, 445. 1980.

Iskander, M.F. Apparatus and Method for Time-Domain Tracking of High-Speed Chemical Reactions. U.S. Patent 4, 396, 062. 1983.

Awards

Utah Section IEEE Engineer of the Year; University of Utah College of Engineering Outstanding Teaching Award, 1983; University of Utah College of Engineering Patent Award, 1983.

Office: 3040 MEB 581-6944
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ELECTRICAL ENGINEERING

HABIB MASSOUDI
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1976, University of Utah
At Utah Since 1971

Research Area

Electromagnetic theory, mathematical methods, numerical computation.

Publications

Massoudi, H., C.H. Durney, P.W. Barber and M.F. Iskander, "Electromagnetic Absorption in Multilayered Cylindrical Models of Man," IEEE Transactions on Microwave Theory and Techniques, Vol. MTT-27, Oct. 1979, pp. 825-830

Massoudi, H., C. Durney and M.F. Iskander, "Comparison of the Absorption Characteristics of a Block and Prolate Spheroidal Model of Man Exposed to Near Fields of a Short Electric Dipole," Proceedings of the IEEE, Vol. 69, No. 8, 1981, pp.1086-1087.

Massoudi, H., C.H. Durney, P.W. Barber and M.F. Iskander, "Postresonance Electromagnetic Absorption by Man and Animals," J. Bioelectromagnetics Soc., 3(1982): 333-339.

Barber, P.W. and H. Massoudi, "Recent Advances in Light Scattering Calculations for Nonspherical Particles," Aerosol Sci., 1(1982).

Barber, P.W., R.K. Chang and H. Massoudi," Electrodynamics Calculations of the Surface-Enhanced Electric Intensities on Large Ag Spheroids," Phys. Rev. B, 27(1983): 7251-7261.

Current Activities

Electrodynamics, electromagnetic radiation, scattering and interactions with biological systems, electromagnetic scattering by aerosols.

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Home: 674 1st Ave., #2, 84103 521-3273

FORREST L. STAFFANSON
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1970, University of Utah
At Utah Since 1964

Research Area

High-altitude meteorological sensors and measurement systems, mathematical modelling and simulation, systems analysis.

Publications

Staffanson, F.L., "UMET-1, A Portable Real-Time Data Processing System for Standard Meteorological Radiosondes," Final Technical Report under National Aeronautics and Space Administration Research Grant NAG6-15, University of Utah College of Engineering, Salt Lake City, Utah, Nov. 1982.

Staffanson, F.L., "RAWINPROC Computer Program for Decommutating, Interpreting and Interpolating RAWINSONDE Meteorological Balloon Sounding Data," UTEC MR 81-031, University of Utah College of Engineering Report, Salt Lake City, Utah, Feb. 1981.

Staffanson, F.L. "DECM Computer Program for Decommutating Interpreting, and Interpolating ECC Ozonesonde Sounding Data--Software Documentation," UTEC MR 80-111, University of Utah College of Engineering Report, Salt Lake City, Utah, July 1981.

Staffanson, F.L. "METROC-K Algorithms," UTEC MR 76-161, University of Utah College of Engineering Report, Salt Lake City, Utah, Jan. 1980.

Staffanson, F.L., "Meteorological Rocket Data Processor and Results from the March 7, 1970, Solar Eclipse," J. Appl. Meteorol., 11(1972): 722-730.

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Home: 1039 10th St., Ogden, 84404 394-0554

ELECTRICAL ENGINEERING

ROBERT E. STEPHENSON
PROFESSOR

Ph.D. 1952, Purdue University
At Utah Since 1946

Research Interests

Computer simulation, power systems analysis.

Publications

Stephenson, R.E., "Diagnosis of Congenital Heart Disease from Clinical Data with a Digital Computer," Circulation, 22(1960): 829.

Stephenson, R.E., "A Mathematical Approach to Medical Diagnosis," J. Am. Med. Assoc., 177(1961): 177-183.

Stephenson, R.E. and L.D. Harris, Power System Analysis, a college-level textbook written in English and translated into Indonesian by R.E. Stephenson and T.M. Soelaiman, published under the title Analisa Sistim Tenaga Listrik, University Press, Institut Teknolgi Bandung, 1962.

Stephenson, R.E., Computer Simulation for Engineers, Harcourt, Brace, Jovanovich, Inc., New York, 1971.

Stephenson, R.E., M.C. Dewsnup and F.E. Templeton, "A Beet Sugar Refinery Simulation Model," Proceedings of the 1978 Summer Computer Simulation Conference, July 1978, pp. 307-311.

Office: 2000 MEB 581-6911
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THOMAS G. STOCKHAM JR.
PROFESSOR

Ph.D. 1959, MIT
At Utah Since 1983 (also 1968-75)

Research Area

Digital signal processing, sensory information processing, vision research.

Publications

Stockham, T.G, "The Promise of Digital Audio," Digital Audio, AES Premier Conference, Rye, New York, June 1982, pp. 12-22.

Stockham, T.G, "Records of the Future," J. Audio Eng. Soc., 25(1977): 892-895.

Stockham, T.G., T.M. Cannon and R.B. Ingebretsen, "Blind Deconvolution Through Digital Signal Processing," Proceedings of the IEEE, Vol. 63, No. 4, April 1975, pp. 678-692.

Stockham, T.G., "Image Processing in the Context of a Visual Model," Proceedings of the IEEE, Vol. 60, No. 7, July 1972, pp. 828-842.

Stockham, T.G., A.V. Oppenheim and R.W. Schafer, "Non-Linear Filtering of Multiplied and Convolved Signals," Proceedings of the IEEE, Vol. 56, No. 8, Aug. 1968, pp. 1264-1291.

Current Activities

Synthetic retina research and development, development of Digital Signal Processing Research Center.

Patents

Stockham, T.G. Uniform Speed Control for a Multi-channel Digital Recorder. U.S. Patent 4, 446, 494. 1984.

Stockham, T.G. Apparatus and Method for Requiring Proper Synchronization of a Digital Data Flow. U.S. Patent 4, 433, 348. 1984.

Stockham, T.G. Apparatus and Improved Method for Processing Digital Information. U.S. Patent 4, 328, 580. 1982.

Awards

IEEE Senior Award, Audio and Electroacoustics, 1969; IEEE Fellow, 1977.

Office: 3041 MEB 581-8541
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ELECTRICAL ENGINEERING

LAMAR K. TIMOTHY
ASSOCIATE PROFESSOR

Ph.D. 1960, University of Utah
At Utah Since 1964

Research Area

Signal processing, navigation, perception and stochastic processes.

Publications

Cox, B.V. and L.K. Timothy, "Nonparametric Rank-Order Statistics Applied to Robust Voiced-Unvoiced-Silence Classification," IEEE Transactions on Acoustics, Speech, and Signal Processing, Vol. ASSP-28, Oct. 1980, pp. 550-561.

Timothy, L.K. and B.E. Bona, State Space Analysis, McGraw-Hill, New York, 1968.

Office: 3034 MEB 581-6946
Home: 663 Oak Lane, Kaysville, 84037 544-4534

CLAY D. WESTLUND
PROFESSOR

Ph.D. 1961, University of Illinois
At Utah Since 1961

Research Area

Digital systems and microprocessors.

Current Activities

Microprocessor and digital design, synthesis of passive and active filter networks, communication electronics with emphasis on analog systems.

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JOINT APPOINTMENTS

SMITH, Research Associate Professor; Primary Appointment in Computer Science.

STRINGFELLOW, Professor; Primary Appointment in Materials Science and Engineering.

MATERIALS SCIENCE

GERALD B. STRINGFELLOW
CHAIRMAN AND PROFESSOR

Ph.D. 1968, Stanford University
At Utah Since 1980

Research Area

New semiconductor materials and devices-III/V compounds and alloys, thermodynamics crystal growth (OMVPE), optical and electrical properties.

Publications

Stringfellow, G.B., "Immiscibility and Spinodal Decomposition in III/V Alloys," J. Cryst. Growth, 65(1983): 454.

Kuo, C.P., J.S. Yuan, R.M. Cohen, J. Dunn and G.B. Stringfellow, "Organometallic Vapor Phase Epitaxial Growth of High Purity GaInAs Using TM In," Appl. Phys. Lett., 44(1984): 550-552.

Hsu, C.C., R.M. Cohen and G.B. Stringfellow, "OMVPE Growth of GaInP," J. Cryst. Growth, 62(1983): 648-650.

Stringfellow, G.B., "Thermodynamic Aspects of Organometallic Vapor Phase Epitaxy," J. Cryst. Growth, 62(1983): 225-229.

Stringfellow, G.B., "Miscibility Gaps and Spinodal Decompositon in III/V Quaternary Alloys," J. Appl. Phys., 54(1983); 404-409.

Current Activities

OMVPE of BaAsSb looking particularly at solid phase miscibility gaps and their consequences in terms of clustering, optical and electrical properties, OMVPE of GaInAs particularly dopant incorporation of obtaining high mobility materials for high speed Fets, OMVPE of AlGaIn P, a new quaternary alloy for semiconductor laser LEDs.

Patents

Stringfellow, G.B. Method for VPE Deposition of III/V Materials Utilizing Organometallic Compounds. U.S. Patent 4, 147, 571. 1979.

Awards

Von Humbolt U.S. Senior Scientist Award, 1979.

Office: 2008 MEB 581-8387
Home: 2650 Eagle Wy., 84108 582-9217

MATERIALS SCIENCE AND ENGINEERING

ROBERTO S. BENSON
RESEARCH ASSISTANT PROFESSOR

Ph.D. 1978, Florida State University
At Utah Since 1978

Research Area

Structure-property relationships of biomedical polymers.

Publications

Mandelkern, L, M. Glotin and R. Benson, "Supermolecular Structure and Thermodynamic Properties of Linear and Branched Polyethylenes under Rapid Crysallization Conditions," Macromolecules, 14(1981): 22.

Mandelkern, L., M. Glotin, R. Popli and R. Benson, "Influence of Crystalline Morphology (Supermolecular Structure) on the Dynamic Properties of Polyethylene," J. Polym. Sci., 19 (1981):435.

Benson, R., S. Yoshikawa, K. Knutson and D.J. Lyman, "Hydrogel Formation from Copolyether-Urethane-Ureas Salt Complex. II. Morphology Effects of Lithium Bromide," Biomaterials: Interfacial Phenomena and Applications, S.C. Cooper and N.A. Peppas (eds.), Adv. Chem. Ser. 199, 1982, pp. 133-146.

Current Activities

Development of better techniques to study the morphology of the ABC block copolymers, effects of salts on the morphology of polyurethanes.

Office: 2084 MEB 581-3413
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RICHARD H. BOYD
PROFESSOR

Ph.D. 1955, MIT
At Utah Since 1967

Research Area

Polymers and plastics, structure-property relations, especially molecular basis of relaxation processes, molecular structure and thermodynamic properties of organic molecules.

Publications

Boyd, R.H. and L. Kesner, "Polar Bonds and Polarizability in Conformational Energy Calculations. Application of a Polarization Model to Alkyl Halides," J. Chem. Phys., 71(1980): 2179.

Boyd, R.H. and L. Kesner, "Conformational Properties of Polar Polymers I: Polyvinylchloride," J. Polym. Sci., 19 (1981): 375.

Boyd, R.H., "The Dielectric Constant of Lamellar Semicrystalline Polymers," J. Polym. Sci., 21(1983): 505.

Boyd, R.H., "The Mechanical Moduli of Lamellar Semicrystalline Polymers," J. Polym. Sci., 21(1983): 493.

Wallraff, G.M., R.H. Boyd and J. Michl, "Conformational Mobility in theTrans-Cyclohexane Copper (I) Triflate Complex," J. Am. Chem. Soc., 105(1983): 14550.

Current Activities

Experimental studies of anelastic and dielectric relaxations in crystalline thermoplastics, modelling of molecular structure and molecular motion in polymers via conformational energy calculations and computer simulation.

Awards

University of Utah Distinguished Research Award, 1979; Swedish Natural Science Research Council Fellow, 1980; American Physical Society Fellow.

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Home: 4497 Roger, 84117 278-5642

MATERIALS SCIENCE AND ENGINEERING

J.G. BYRNE
PROFESSOR

Ph.D. 1960, Northwestern University
At Utah Since 1966

Research Area

Positron annihilation studies of hydrogen embrittlement and shock damage, thermomechanical processing of steels to improve fatigue resistance.

Publications

Kim, J.J. and J.G. Byrne, "Hydrogen/Dislocation Studies by Positrons in Cathodically Charged Cu and Cu-Al Samples," Scr. Metall., 17(1983): 773-778.

Byrne, J.G., "Dislocation Studies with Positrons," Dislocations in Solids, F.R.N. Nabarro, Vol. 6, North Holland, Amsterdam, 1983, pp. 261-318.

Panchanadeeswaran, S., M.R. Plichta and J.G. Byrne, "Pre-Precipitation Studies in an Al-Zn Alloy by Positron Doppler Broadening Measurements," Philos. Mag., 49(1984): 111-137.

Kao, P.W., S. Panchanadeeswaran and J.G. Byrne, "Positron Trapping at Phase Intefaces and Dislocations in Pearlite," Metall. Trans., 13A(1983): 1177-1180.

Kao, P.W. and J.G. Byrne, "Fatigue Initiation Study of TMT Eutectoid Steel," Metall. Trans., 13A(1982): 855-864.

Current Activities

Hydrogen effects in alloys of various stacking fault energy, projecting past TMT studies of fatigue to optimal alloy steels, projecting positron studies to shock studies with SANDIA Natl. Labs., amorphous refractory coatings.

Patents

Byrne, J.G. Non-Destructive Detection and Measurement of Hydrogen Embrittlement. U.S. Patent 4,064,438. 1977.

Awards

American Society for Metals Fellow, 1982; Appointment to the Government-Energy-Materials Committee of the Metallurgical Society of AIME, 1982; National Materials Advisory Board Panel, 1972.

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Home: 1159 1st Ave., 84103 532-4561

RICHARD M. COHEN
RESEARCH ASSISTANT PROFESSOR

Ph.D. 1982, University of Utah
At Utah Since 1982

Research Area

Growth and optical and electrical characterization of new III/V semiconductor alloy systems, high quality epitaxial layers grown by MOCVD and the effects of metastable materials on electrical properties.

Publications

Kuo, C.P., J.S. Yuan, R.M. Cohen, J. Dunn and G.B. Stringfellow, "Organometallic Vapor Phase Epitaxial Growth of High Purity GaInAs Using TMIn," Appl. Phys. Lett., 44(1984): 550-552.

Cherng, M.J., G.B. Stringellow and R.M. Cohen, "Organometallic Vapor Phase Epitaxial Growth of GaAsSb," Appl. Phys. Lett., 44(1984): 677-679.

Kuo, C.P., R.M. Cohen and G.B. Stringfellow, "OMVPE Growth of GaInAs," J. Cryst. Growth, 64(1983): 461-470.

Hse, C.C., R.M. Cohen and G.B. Stringfellow, "OMVPE Growth of InP Using TMIn," J. Cryst. Growth, 63(1983): 8-11.

Hse, C.C., R.M. Cohen and G.B. Stringfellow, "OMVPE Growth of GaInP," J. Cryst. Growth, 62(1983): 648-650.

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MATERIALS SCIENCE AND ENGINEERING

IRINA M. CURELARU
ASSOCIATE PROFESSOR

Ph.D. 1980, Chalmers University
At Utah Since 1981

Research Area

Electronic properties and surface reactivity of advanced electronic ceramics and related materials, basic and applied solid state physics, surface science.

Publications

Curelaru, I.M., E. Suoninen, E. Minni, K.G. Strid and T. Ronnhult, "Electron Energy Loss Spectra and X-ray Photoelectron Spectra of Ca2V2O7," J. Lumin., 28(1983): 123-133.

Curelaru, I.M., E. Suoninen, E. Minni, K.G. Strid and T. Ronnhult, "A Multispectroscopic Investigation of the Electronic Structure of Luminescent, Tetrahedrally Coordinated Vanadium-Oxygen Compounds: Case of YVO4," J. Lumin., in press.

Curelaru, I.M., E. Suoninen and E. Minni, "An APS-XPS Study of Vanadium Pentoxide," J. Chem. Phys., 78(1982): 2262-2267.

Curelaru, I.M., D.G. Strid, E. Suoninen, E. Minni and T. Ronnhult, "The Electronic Structure of Excited Configurations in Calcium Divanadate Studied by Electron Induced Core Ionization Spectroscopy and X-ray Photoelectron Spectoscopy," Phys. Rev. B, 23(1981): 3700-3709.

Curelaru, I.M., "Electron Beam Induced Decomposition of V2O5 as seen in Appearance Potential Spectroscopy," Solid State Commun., 34(1980): 729-732.

Current Activities

Electronic structure and surface/interface properties of advanced electronic cermaics and related materials by the use of multispectroscopic (electron, X-ray and optical) techniques, order-disorder and particle induced phase transitions in non-stoichiometric oxide-based materials, low-to-high temperature surface reactivity of solids.

Awards

International Atomic Energy Agency Fellow, 1972 and 1974.

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RAMESH M. GOHIL
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1974, Sardar Patel University
At Utah Since 1982

Research Area

Morphology-property relationship in high modulus fibers and polymer blends, molecular mechanisms of plastic deformation in polymers, crystal growth process, strain induced crystallization and phase transformation and multiple melting in polymers, lattice and conformational defects in polymers.

Publications

Gohil, R.M. and J. Petermann, "Application of Fiber-Reinforced Composite Theory to the Polybutene-1 Films Containing Extended Chain Needle Crystals," J. Mater. Sci., 18(1983): 1719.

Gohil, R.M. and J. Petermann, "Strain Induced Oriented Polymer Blending: Morphology-Property Relationship in Polybutene-1-Polyethylene System," J. Colloid Polym. Sci., 260(1982): 312.

Gohil, R.M. and J. Petermann, "Chain Conformation Defects in Polyvinylidine Fluoride," Polymer, 22(1981): 1612.

Gohil, R.M., M.J. Miles and J. Permann, "On the Molecular Mechanism of the Crystal Transformation (Tetragonal to Hexagonal) in Polybutene-1," J. Macromol. Sci.-Phys. B, 21 (1982) 189.

Petermann, J., R.M. Gohil, J.M. Schultz, R.W. Hendricks and J.S. Lin, "The Kinetics of Defects Clustering in Fibrillar Polypropylene Crystals by SAXS," J. Polym. Sci., 20(1982): 523.

Current Activities

Mechanisms of synergism in mechanical properties in polypropylene-polyethylene blends, methods to produce ultra high modulus materials from semicrystalline flexible chain polymers, morphology-property relationship in cross-linked polyethylene, methods of characterizing morphology of bulk polymer samples using transmission electron microscope.

Awards

Alexander von Humboldt Award, West Germany; Inter-University Trust Award and Prize for research work in polymer science; Prof. Mankad Award and Prize for Best Ph.D. Thesis.

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MATERIALS SCIENCE AND ENGINEERING

RONALD GORDON
PROFESSOR

Sc.D. 1964, MIT
At Utah Since 1964

Research Area

Ceramics and processing techniques, synthesis and characterization of powders, grain growth and microstructure development, high temperature mechanical properties of polycrystalline ceramics.

Publications

Gordon, R., K.A. Philpot, Y. Ikum and G.R. Miller, "High Temperature Steady-State Creep of Polycrystalline Rutile, Pure and Doped with Tantalum," J. Mater. Sci., 18(1983): 1698-1708.

Gordon, R., B.J. McEntire, R.A. Bartlett and G.R. Miller, "The Effect of Decomposition on the Densification and Properties of NASICON Ceramic Electrolytes," J. Am. Ceram. Soc., 66 (1983): 738-742.

Gordon, R., B.J. McEntire and G.R. Miller, "The Roles of Raw Material Selection, Powder Preparation and Sintering Processes on the Physical Properties of Beta-Alumina Ceramic Electrolytes," Processing of Metal & Ceramic Powders, The Metallurgical Society of AIME, 1982, pp. 215-240.

Gordon, R. and Y. Ikuma, "Effect of Doping Simultaneously with Iron and Titanium on the Diffusional Creep of Polycrystalline Al2O3," J. Am. Ceram. Soc., 66(1983), 139-147.

Current Activities

Processing and characterization of beta-alumina electrolytes and structure ceramics such as silicon nitride, SiALON, etc.

Patents

Gordon, R. Method for Preparing Dense, Beta-Alumina Ceramic Bodies by Liquid Phase Sintering. U.S. Patent 4, 138, 455. 1979.

Gordon, R. Method of Preparing Dense, High Strength & Electrically Conductive Ceramics Containing Beta-Alumina. U.S. Patent 4, 113, 928. 1978.

Gordon, R. Method for Preparing Shaped Green Ceramic Compacts. U.S. Patent 4, 020, 134. 1977.

Awards

American Ceramic Society Fellow.

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DONALD E. GREGONIS
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1972, University of Utah
At Utah Since 1975

Research Area

Biomedical polymers, protein adsorption to surfaces, medical diagnostics, analytical separation procedures, sustained drug release and blood-materials interactions.

Publications

Hunter, S.K., D.E. Gregonis, D.L. Coleman, B. Hanover, R.L. Stephan and S.C. Jacobsen, "Surface Modification of Polyurethane to Promote Long-Term Potency of Peritoneal Access Devices," Trans. Am. Soc. Artif. Intern. Organs, 29 (193):250.

Gregonis, D.E., R. Hsu, D.E. Buerger, L.M. Smith and J.D. Andrade, "Wettability of Polymers and Hydrogels as Determined by Wilhelmy Plate Technique," Solvent-Property Relationships in Polymers, R.B. Seymour and G.A. Stahl (eds.), Pergamon Press, New York, 1982, 120-133.

Andrade, J.D., D.E. Gregonis and L.M. Smith, "Biomedical Aspects of Polymer Surfaces," Physiochemical Aspects of Polymer Surfaces, E.L. Mittal (ed.), Vol. 1, Plenum Press, New York, 1983, p. 911.

Hunter, S.K., D.E. Gregonis, D.L. Coleman, J.D. Andrade and T. Kessler, "Molecular Weight Characterization of Pre- and Post-Implant Artificial Heart Polyurethane Materials," Trans. Am. Soc. Artif. Intern. Organs, 28(1982): 473.

Coleman, D.L., D.E. Gregonis and J.D. Andrade, "Blood-Materials Interactions: The Minimum Interfacial Free Energy and the Optimum Polar/Apolar Ratio Hypothesis," J. Biomed. Mater. Res., 16(1982): 381.

Current Activities

Synthesis and characterization of new and modified polymer systems for the study of specific blood interactions, the role between blood interactions and protein adsorption at surfaces using polymers which show minimal or selective protein adsorption characteristics, covalent bonding of proteins at surfaces to investigate protein-protein interactions at surfaces, thermoplastic elastomers for cardiovascular prothetics and sustained drug release.

Patents

Gregonis, D.E. Timed Release Chemical Delivery System. U.S. Patent 4, 356, 166. 1982.

MATERIALS SCIENCE AND ENGINEERING

Awards

University of Utah College of Engineering Patent Award, 1983; NASA Creative Development of a Technical Innovation Award, 1982.

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DONALD J. LYMAN
PROFESSOR

Ph.D. 1952, University of Delaware
At Utah Since 1969

Research Area

Polymer synthesis, structure/property relationships in block copolymer systems, biomedical polymers and polymeric implants.

Publications

Lyman, D.J., "Membranes," Replacement of Renal Function by Dialysis, W. Druller, F.M. Parsons and J.F. Maher (eds.), 2nd ed., Marnius Nijoff BV Publishers, Netherlands, 1983, pp. 97-105.

Lyman, D.J., "Structural Order and Blood Compatibility of Polymer Prostheses," Structural Order in Polymers, C.F. Ciardelli and P. Giusti (eds.), Pergamon Press, Oxford, 1981, pp. 205-220.

Baszkin, A., and D.J. Lyman, "The Interaction of Plasma Proteins with Polymers," J. Biomed. Mater. Res., 14(1980): 393-404.

Yoshikawa, S. and D. J. Lyman, "Hydrogel Formation for Copolyether-Urethane-Urea Complex with Lithium Bromide," J. Polym. Sci., 18(1980): 411-416.

Chiu, T.C., L.C. Metcalf and D.J. Lyman, "Electrophoretic Analysis of Protein Adsorbed on Polymer Surfaces," J. Biomed. Mater. Res., 15(1981): 781-784.

Patents

Lyman, D.J. Synthetic Polymer Prostheses Material. U.S. Patent 4, 173, 689. 1979.

Lyman, D.J. and R. Middleton. Prosthetic Devices for Urinary Systems. U.S. Patent 4, 334, 327. 1982.

Awards

Society of Biomaterials International "Clemson Award" for Basic Research, 1982; University of Utah Distinguished Research Award, 1982; American Society for Artificial Internal Organs Fellow, 1969.

Office: 2084 MEB 581-8432
Home: 646 7th Ave., 84103 532-1594

HENDRIK L.C. MEUZELAAR
RESEARCH PROFESSOR

Ph.D. 1974, University of Amsterdam
At Utah Since 1978

Research Area

Analytical pyrolysis techniques such as Py-GC, Py-MS and Py-MS/MS in combination with computerized data analysis techniques for the characterization of polymeric and other complex organic materials.

Publications

Meuzelaar, H.L.C., J. Haverkamp and F.D. Hileman, Curie-Point Pyrolysis Mass Spectrometry of Recent and Fossil Biomaterals; Compendium and Atlas, Elsevier, Amersterdam, 1982.

Harper, A.M., H.L.C. Meuzelaar, G.S. Metcalf and D.L. Pope, "Numerical Techniques for Processing Pyrolysis Mass Spectral Data," Analytical Pyrolysis Techniques and Application, K. Voorhees (ed.), Butterwort Publisher, London, 1984.

Current Activities

Role of preasphaltenes in coal conversion reactions, characterization of polymer implants, rapid diagnosis of urinary infections, detection, characterization and classification of biological components in aerosols by time-resolved laser pyrolysis mass spectrometry, weathering losses in coal storage piles.

Patents

Meuzelaar, H.L.C. Modular Pyrolysis Inlet and Method for Pyrolyzing Compounds for Analysis by Mass Spectrometer. U.S. Patent 4, 408, 125. 1983.

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Summit Park, 84060

MATERIALS SCIENCE AND ENGINEERING

PAUL J. PHILLIPS
PROFESSOR

Ph.D. 1968, University of Liverpool
At Utah Since 1977

Research Area

Crystallization of polymers at atmospheric and elevated pressures, influence of morphology on mechanical and electrical properties, crosslinked polymers, mechanism of electric breakdown in polymers, behavior or organic solutes in polymers.

Publications

Phillips, P.J., "Morphology and Molecular Structure of Polymers and Their Dielectric Behavior," Engineering Dielectrics, Vol. IIIA., ASTM, 1983, pp. 119-237.

Dalal, E.M. and P.J. Phillips, "Pressure Dependence of the Glass Transition in cis-Polyisoprene as Studied by Dielectric Relaxation," Macromolecules, 16(1983): 890-897.

Jang, Y.T., P.J. Phillips and E.W. Thulstrup, "Some Comments on the Mechanism of Orientation of Organic Solutes in Stretched Polyethylene," Chem. Phys. Lett., 93(1982): 66-73.

Naylor K.L., and P.J. Phillips, "Optimization of Permanganic Etching of Polyethylenes for Scanning Electron Microscopy," J. Polym. Sci., in press.

Dalal, D.M. and P.J. Phillips, "An Analysis of the Pressure Dependence of the Crystallization Kinetic of cis-Polyisoprene," Macromolecules, in press.

Current Activities

Morphological structure of reinforced plastics and its relation to mechanical properties.

Office: 2008 MEB 581-8574
Home: 1679 Julho, Sandy, 84092 561-7692

ANIL V. VIRKAR
PROFESSOR

Ph.D. 1973, Northwestern University
At Utah Since 1973

Research Area

Fracture mechanics, processing of structural ceramics, rapid-ion conductors, use of solid electrolytes in electrochemical systems, phase transformations in ionic solids.

Publications

Virkar, A.V., "Application of Electrical Analog in Fracture Mechanics," Int. J. Fract., 21(1983): 15-30.

Virkar, A.V. and L. Viswanathan, "A Three Dimensional Approach to the Electrolytic Degradation of Solid Electrolytes," J. Mater. Sci., 18(1983): 1202-1212.

Virkar, A.V. and M.R. Plichta, "Spinodal Decomposition in Ionic Solids," J. Am. Ceram. Soc., 66(1983): 451-456.

Viswanathan, L. and A.V. Virkar, "On Crack Propagation Rates in ß-Al2O3," J. Am. Ceram. Soc., 66(1983): 159-162.

Virkar, A.V., "Application of Electrical Analog in Composite Plates," J. Am Ceram. Soc., 66(1983): C87-C88.

Current Activities

Electrical analogs, failure prediction in composites, crack tip interaction with interfaces, toughening of ceramics, failure mechanisms, transport properties, use of solid electrolytes to study transport properties in solid and molten alloys, secondary batteries, role of defect chemistry on kinetics of phase transition, phase transitions in ferroelectrics.

Patents

Virkar, A.B., M.L. Miller, I.B. Cutler and R.S. Gordon. Method of Preparing Dense, High-Strength and Electrically Conductive Ceramic Containing ß-Alumina. U.S. Patent 4, 113, 928. 1978.

Office: 212 Old Mines Bldg. 581-5396
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MATERIALS SCIENCE

HISAO YAMADA
ASSOCIATE PROFESSOR

Ph.D. 1971, University of Utah
At Utah Since 1981

Research Area

Ceramic processing, electrically conductive oxide materials, viscous creep deformation of oxides, oxide catalysis.

Publications

Yamada, H., "Neutron-Induced Helium Implantation in the Helium Collant Pipes of Fusion Reactors," J. Nucl. Mater., 103/104(1981): 615.

Yamada, H., "Effect of Axial Stress on the Transient Mechanical Response of 20% Cold-Worked Type 316 Stainless Steel Cladding," Nucl. Tech., 42(1979): 324.

Huang, F.H., C.Y. Li and H. Yamada, "Constitutive Relations Based on State Variables for Nonelastic Deformation in Type 316 Stainless Steel," Characterization of Materials for Services at Elevated Temperatures, G.V. Smith (ed.), ASME-MPC-7, 1978.

Yamada, H., "Failure of Type 316 Stainless Steel Cladding During Thermal Transients," J. Nucl. Mater., 78(1978): 24.

Current Activities

Electrically conductive materials for electrochemical cells, viscous creep deformation of polycrystalline ternary oxides at elevated temperatures.

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JOINT APPOINTMENTS

ANDRADE, Professor; Primary Appointment in Bioengineering.

HUBER, Research Professor; Primary Appointment in Electrical Engineering.

MECHANICAL ENGINEERING

GARY M. SANDQUIST
ACTING CHAIRMAN AND PROFESSOR

Ph.D. 1964, University of Utah
At Utah Since 1964

Research Area

Nuclear engineering, high level nuclear waste, activation analysis, system engineering, computer modelling, system analysis and control.

Publications

Sandquist, B.M., Introduction to System Science, Prentice-Hall, Englewood Cliffs, New York, 1984.

Sandquist, G.M., D. Olsen and W.J. Kolff, "Ann. Biomed. Eng., 10(1982): 1-33.

Sandquist, G.M., C. Jensen and V. Rogers, "Detection of Plutonium Fallout by Fission Tracks Produced with Selected Neutron Spectra," Trans. Am. Nucl. Soc., 34(1980): 69.

Sandquist, G.M. and B. Church, "Radiation Monitoring," Health Phys., 72(1982): 310.

Sandquist, G.M. and V. Rogers, "Graphical Solutions for the Characteristic Roots of the First Order Differential-Difference Equation," J. Dyn. Syst. Meas. Control., (1979): 37-49.

Current Activities

Alternate energy technologies, TRIGA nuclear reactor.

Awards

Tau Beta Pi; Tau Sigma; Alpha Nu Sigma Honoraries; AEC Fellow.

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MECHANICAL AND INDUSTRIAL ENGINEERING

SANFORD BAUM
PROFESSOR

Ph.D. 1975, Stanford University
At Utah Since 1975

Research Area

Engineering economics, industrial engineering applications to pharmacy organizational efficiency, multi-criterion decision making.

Publications

Baum, S., "Differential Rates of Inflation," Proceedings of the 1978 Fall Industrial Engineering Conference.

Baum, S., "Engineering Economy and the Two Rates of Return-Mixed Mode Computations," AIIE Transactions, March 1978.

Current Activites

Moderator of panel of future directions in engineering economics research, efficiency of VA Pharmacy, an algebra based computer routine for engineering economics.

Office: 2022C MEB 581-7565
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University of Utah Computer Center.

ROBERT F. BOEHM
PROFESSOR

Ph.D. 1968, UC Berkeley
At Utah Since 1968

Research Area

Heat transfer, energy conversion, renewable energy studies, design of thermal systems, computational aspects of these topics, heat transfer in bio systems.

Publications

Boehm, R.F., S.T. Swanson and M. Pullman, Solar Design Manual for Utah, University Press, Salt Lake City, Utah, 1984.

Newell, T.A. and R.F. Boehm, "Gradient Zone Constraints in a Salt-Stratified Solar Pond," J. Sol. Energy Eng., 104(1982): 180-285.

Brandle, K. and R.F. Boehm, "Air-flow Windows: Performance and Applications," Proceedings of the ASHRAE/DOE Conference on Thermal Performance of the Exterior Envelopes in Buildings, Dec. 1982.

Jacobs, H.R. and R.F. Boehm, "Direct Contact Binary Cycles," Sourcebook on the Production of Electricity from Geothermal Energy, Kestin, et al., (eds.), DOE/RA/4051-1, U.S. Department of Energy, March 1980, pp. 413-471.

Current Activities

Computational fluid mechanics and heat transfer augmented with computer graphics approaches, direct contact heat exchangers (including applications to energy conservation), change of phase phenomena (particularly freezing).

Awards

ASME Fellow; Distinguished Lecturer of Sigma Xi; Invited Lecturer to the People's Republic of China.

Office: 3006 MEB 581-7104
Home: 2217 E. Bryan Circle, 84102 581-1427

MECHANICAL AND INDUSTRIAL ENGINEERING

M. QUINN BREWSTER
ASSISTANT PROFESSOR

Ph.D. 1981, UC Berkeley
At Utah Since 1982

Research Area

Heat transfer, flame radiation, combustion optical scattering.

Publications

Brewster, M.Q. and Kunitomo, T., "The Radiative Properties of Particulates in Fluidized-Bed Coal Combustion," Proceedings of the 1983 ASME-ISME Thermal Engineering Joint Conference, Vol. 4, 1983, pp. 21-26.

Brewster, M.Q. and C.L. Tien, "Radiative Transfer in Packed/Fluidized Beds: Dependent vs. Independent Scattering," J. Heat Transfer, 104(1982): 573-579.

Brewster, M.Q. and C.L. Tien, "Examination of the Two-Flux Model for Radiative Transfer in Particulate Systems," Int. J. Heat Mass Transfer, 25(1982): 1905-1907.

Current Activities

Infrared optical properties of selectively absorbing solid propellants, radiative heat transfer in fluidized-bed combustors, 3-D computer-aided heat transfer design.

Awards

Japan Ministry of Education Scholarship, 1982; National Science Foundation Presidential Young Investigator Award, 1984.

Office: 1002 MEB 581-7105
Home: 2762 Hartford, 84106 487-1479

WAYNE S. BROWN
PROFESSOR

Ph.D. 1960, Stanford University
At Utah Since 1964 (also 1953-1957)

Research Area

Heat transfer, rock mechanics, dental engineering, technical innovation.

Publications

"Rock Fragmentation," Proceedings of a special seminar in conjunction with the 17th Symposium on Rock Mechanics, W.S. Brown, S.J. Green, W.W. Hakala, W.A. Hustrulid and W.C. Maurer (eds.), National Science Foundation/RANN and the University of Utah, Aug. 1976.

Brown, W.S., B.A. Lloyd and J.A. Rich, "Effect of Cooling Techniques on Temperature Control and Cutting Rate for High Speed Dental Drills," J. Dent. Res. 57(1978).

Brown, W.S., B.A. Lloyd and D.A. Christensen, "Numerical and Experimental Evaluation of Energy Inputs, Temperature Gradients and Themal Stresses During Resotrative Procedures," J. Amer. Dental Assoc., 96(1978).

Brown, W.S., R.E. Johnson and W.R. Bowen, "University Interaction in Technological Innovation," 79-WA/Mgt.-12, ASME Annual Meeting, New York, Dec. 1978.

Brown, W.S., "A Proposed Mechanism for Commercializing University Technology," Proceedings of Babson College 1984 Entrpreneurship Research Conference, April 1984.

Awards

ASME Fellow.

Office: 3164 MEB 581-6835
Home: 1630 Arlington Dr., 84103 532-3510

MECHANICAL AND INDUSTRIAL ENGINEERING

KUAN CHEN
ASSISTANT PROFESSOR

Ph.D. 1981, University of Illinois
At Utah Since 1981

Research Area

Thermal and hydrodynamic instability, computational heat and mass transfer.

Publications

Chen, K., M.M. Chen, and C.W. Sohn, "Thermal Instability of Two-Dimensional Stagnation-Point Boundary Layers," J. Fluid Mech. 132(1983): 49-63.

Chen, K., "The Influence of Loop Configuration on Closed - Loop Thermosyphons," 82-WA/HT 63, ASME.

Chen, M.M., K. Chen and C.W. Sohn, "Thermal Instability of Stagnation-Point Boundary Layers," 80-HT-76, ASME.

Current Activites

Analysis of temperature rise and thermal stress in semiconductor diodes under pulse load, fluid dynamics of spinning rocket motors.

Office: 3000 MEB 581-5649
Home: 1415 East 4045 South, 84117 277-2180

K. L. DEVRIES
PROFESSOR

Ph.D. 1962, University of Utah
At Utah Since 1966

Research Area

Mechanical properties of polymers, adhesive analysis testing and design, failure of materials, materials usage in design.

Publications

Anderson, G.P., S.J. Bennett, K.L. DeVries, Analysis Testing and Designing with Adhesives, Academic Press, New York, 1979.

Igarashi, M. and K.L. DeVries, "An Investigation of Environmental Effects in Polymers: I Nylon," Polymer, 24 (1983): 769.

Miles, M.H. and K.L. DeVries, "Generation of Free Radicals in RDX and HMX, Propellants Explosives and Compositions," Pyrotechnics, 1(1982): 100.

Fanconi, B.M., K.L. DeVries and R.H. Smith, "Free Radical and New End Group Resulting from Chain Sessions: Part II Mechanical Degradation of Polyethylene," Polymer, 23 (1982): 1027.

DeVries, K.L, "Testing and Predicting Strength of Adhesive Bonds," Proceedings of the Symposium--An Overview of the Durability of Adhesives and Sealants, Adhesive and Sealants Council, 1982.

Patents

DeVries, K.L. A Blood Leak Detector for Artificial Kidney-Opacity Comparison Apparatus. U.S. Patent 3, 576, 558. 1971.

Awards

University of Utah Distinguished Research Award, 1978; University of Utah Distinguished Teaching Award, 1982.

Office: 3002 MEB 581-7101
Home: 1466 Penrose, 84103 363-1252

MECHANICAL AND INDUSTRIAL ENGINEERING

SAMUEL H. DRAKE
ASSISTANT PROFESSOR

Ph.D. 1978, MIT
At Utah Since 1982

Research Area

Robotics and automated manufacturing, robotic vehicles, CAD/CAM.

Publications

Drake, S.H., R.M. Spencer and S.N. Simunovic, "Using Compliance in Assembly--An Engineering Approach in Float," Proceedings, Autofact West, Nov. 1980.

Drake, S.H., "Using Compliance Instead of Sensory Feedback for High Speed Robot Assembly," Assemblex IV, Nov. 1977.

Drake, S.H., P.C. Watson and S.N. Simunovic, "High Speed Robot Assembly of Precision Parts Using Compliance Instead of Sensory Feedback," Proceedings of the 7th International Symposium on Industrial Robots, Oct. 1977.

Whitney, D.E., P.C. Watson, S.H. Drake and S.N. Simunovic, "Robot and Manipulator Control by Exteroceptive Sensors," Proceedings of the JACC, 1977.

Watson, P.C. and S.H. Drake, "Pedestal and Wrist Force Sensor for Automatic Assembly," Proceedings of the 5th International Symposium on Industrial Robots, Sept. 1975.

Current Activities

Computer controlled robotic material handling vehicle, automatic tool changer for a small assembly robot equipped with sensory feedback tool, integrated robotic materials, handling vehicle with 5-axis CNC machining center to form automated machining cell.

Patents

Drake, S.H. and P.C. Watson. Method and Apparatus of Six Degrees of Freedom Force Sensor. U.S. Patent 4, 094, 192. 1978.

Office: 2020 MEB 581-7933
Home: 3445 Enchanted View, 84121 943-8694

GARY A. FLANDRO
PROFESSOR

Ph.D. 1967, Calif. Inst. of Technology
At Utah Since 1967

Research Area

Unsteady fluid dynamics.

Publications

Flandro, G.A., "Generation of Vehicle Wobbling by the Unsteady Flow Field in a Spinning Rocket Motor," Proceedings of the 20th Jannaf Combustion Meeting, Oct. 1983.

Flandro, G.A., "Nonlinear Time-Dependent Combustion of a Solid Propellant with Velocity Coupling," Proceedings of the AIAA/SAE/ASME 19th Joint Propulsion Conference, Paper No. 83-1269, June 1983.

Flandro, G.A., "A Simple Conceptual Model for the Nonlinear Transient Combustion of a Solid Rocket Propellant," Proceedings of the AIAA/ SAE/ASME 18th Joint Propulsion Conference, AIAA Paper No. 82-1222, June 1982.

Flandro, G.A., "Approximate Analysis of Nonlinear Instability with Shock Waves," Proceedings of the AIAA/ SAE/ASME 18th Joint Propulsion Conference, AIAA Paper No. 82-1220, June 1982.

Flandro, G.A., "Modelling of Vortex Generated Sound in Solid Propellant Rocket Motors," Proceedings of the 1980 Jannaf Combustion Meeting, Sept. 1980.

Current Activities

Flow-induced combustion instability, vortex shedding, fluid dynamics of rotating systems.

Awards

University of Utah Distinguished Teaching Award, 1980; U.S. Air Force E.M. Glass Research Award, 1981.

Office: 2020 MEB 581-7934
Home: 375 N. Virginia, 84103 359-1196

MECHANICAL AND INDUSTRIAL ENGINEERING

L. KING ISAACSON
PROFESSOR

Ph.D. 1962, University of Utah
At Utah Since 1961

Research Area

Turbulent flow, internal flow instabilities, solid propellant rocket combustion gas dynamics, two-phase flow pheno- mena.

Publications

Isaacson, L.K. and A.G. Marshall, "Nonlinear Resonant Interactions in Internal Cavity Flows," AIAA J., 21(1983): 785-786.

Isaacson, L.K. and A.G. Marshall, "Acoustic Oscillations in Internal Cavity Flows: Nonlinear Resonant Interactions," AIAA J, 20(1983): 152-154.

Current Activities

Linear and nonlinear instabilities in internal free shear layers, nonlinear interactions within internal cavities, droplet breakup mechanisms in shear layer instabilities. Improvement of solid propellant rocket motor performance, laser scattering techniques for measuring droplet sizes.

Patents

Isaacson, L.K. Shock Induced Combustion and Ionization MHD Apparatus. U.S. Patent 3, 622, 817. 1971.

Awards

University of Utah Department of Mechanical and Industrial Engineering Outstanding Teaching Award, 1981-82.

Office: 2102 MEB 581-3503
Home: 2067 Browning Ave., 84108 583-1756

STEPHEN C. JACOBSEN
PROFESSOR

Ph.D. 1973, MIT
At Utah Since 1973

Research Area

Control systems, design, biomedical topics, robotics, manufacturing.

Publications

Jacobsen, S.C., J.E. Wood, D.F. Knutti, K.B. Biggers, "The Utah/MIT Dextrous Hand--Work in Progress," Proceedings of the Massachusetts Institute of Technology/System Development Foundation International Robotic Research Symposium, 1983.

Jacobsen, S.C, D.F. Knutti, R.T. Johnson and H.H. Sears, "Development of the Utah Artificial Arm," IEEE Biomed., 29 (1982): 249-269.

Jacobsen, S.C., B.K. Hanover, R.L. Stephen, J.G. Maxwell, C. Kablitz and J.J. Harrow, "Long-Term Intraperitoneal (IP) Insulin," Proceedings of ISAO-International Symposium on Hemoperfusion and Artificial Organs, 1982.

Glass, J.M., R.L. Stephen and S.C. Jacobsen, "The Quantity and Distribution of Radiolabelled Dexamethasone Delivered to Tissues by Iontophoresis," Int. J. Dermatol., 19(1980): 519-525.

Current Activities

Prosthetic limbs, drug delivery systems, control of robotic systems.

Patents

Jacobsen, S.C. The Electrically Driven Artificial Arm--Filed and Patent Pending.

Jacobsen, S.C. Epidermal Iontophoresis Device. U.S. Patent 4, 141, 359. 1979.

Jacobsen, S.C. Portable Artificial Kidney System. US. Patent 3, 902, 490. 1975.

Awards

Poole Prize in Rehabilitation Awarded by the Faculty of Medicine of the University of Edinburgh; University of Utah College of Engineering Outstanding Professor Award, 1979; Maurice Warshaw Award, Govenor's Committee for Employment of the Handicapped, State of Utah, 1973.

Office: 3168 MEB 581-6499
Home: 274 South 1200 East, 84102 581-0064

MECHANICAL AND INDUSTRIAL ENGINEERING

SANDFORD MEEK
ASSISTANT PROFESSOR

Ph.D. 1982, University of Utah
At Utah Since 1982

Research Area
Artificial arm control, biomechanics, robotics.

Current Activities
Prosthetics.

Awards
Tau Beta Pi; Phi Kappa Phi.

Office: 3192 MEB 581-8562
Home: 1593 South 1000 East, 84105 466-3727

DAVID ROYLANCE
PROFESSOR

Ph.D. 1968, University of Utah
At Utah Since 1984

Research Area
Mechanics of polymers and composites, deformation and fracture mechanisms, processing, environmental degradation, ballistic impact.

Publications
Popli, R. and D. Roylance, "Observation of Molecular Chain Scission During Crazing of Polystyrene," Polym. Eng. Sci., 22(1982): 1046-1048.

Roylance, D., "Some Consequences of a Fracture Criterion for Oriented Polymers Based on Electron Spin Resonance Spectroscopy," Int. J. Fract., 21(1983): 652-656.

Allred, R.E. and D. Roylance, "Transverse Moisture Sensitivity of Aramid/Epoxy Composites," J. Mater. Sci., 18(1983): 652-656.

Current Activities
Establish new laboratory facility and teaching programs at Utah, transfer currently active programs in degradation of elastomers and fabric ballistics.

Office: 3008 MEB 581-6441

MECHANICAL AND INDUSTRIAL ENGINEERING

RICHARD W. SHORTHILL
RESEARCH ASSOCIATE PROFESSOR

Ph.D. 1960, University of Utah
At Utah Since 1982

Research Area

Thermal, photometric and radar properties of lunar, planetary satellite and asteroid surfaces, optical fibers, optical gyroscopes, 3D image devices, visible and IR light scattering, experimental optics.

Publications

Sharpton, V.L., J.W. Head and R.W. Shorthill, "Analysis and Interpretation of the Apollo Lunar Sounder Radar Data; A Status Report," Publication of the XV Lunar and Planetary Science Conference, Vol. XV, 1984, p. 762.

Anderson, R.E., B.S. Baxter, L.E. Hitchner, R.W. Shorthill and S.A. Johnson, "Three Dimensional Viewing System for Tomographic Scar Interpretation," Radiology, 145(1982): 525-527.

Shorthill, R.W., G.J. Morris and L.D. Weaver, "Optical Fiber Gyroscope," Proceedings of the 8th IFAC Syposium: Automatic Controls in Space, July 1979, pp. 247-250.

Current Activities

Spectrometric properties (visible and infrared) of faint asteroids CCD spectrometer for astronomical and laboratory measurements, large gyroscope with 5km optical fiber, laser Doppler velocimetry in spinning rocket motors, measurement of electric charge in industrial aerosol.

Patents

Shorthill, R.W., Laser Gyroscope. U.S. Patent 4, 013, 365. 1977.

Shorthill, R.W. Double Optical Fiber Waveguide Ring Laser Gyroscope. U.S. Patent 4, 120, 587. 1978.

Shorthill, R.W. Stimulated Brillouin Scattering Ring Laser Gyroscope. U.S. Patent 4, 159, 178. 1979.

Awards

NASA Public Service Award, 1977; NASA Group Achievement Award, Science Steering Group, 1977.

Office: 2047 MEB 581-4600
Home: 4562 Fortuna Way, 84117 278-7042

JAMES K. STROZIER
UNDERGRADUATE INSTRUCTOR

Ph.D. 1966, University of Michigan
At Utah Since 1984

Research Interests

Low-speed aerodynamics, aircraft control.

Publications

Faery, H. F. Jr., J.A. Ham and J.K. Strozier, "Experimental and Theoretical Study of Three Interacting, Closely-Spaced, Sharp-Edged 60º Delta Wings as Low Speeds," NASA Contractor Report 3460, Oct. 1981.

Current Activities

Artificial limb control.

Awards

Phi Kappa Phi.

Office: 3008 MEB 581-7101

MECHANICAL AND INDUSTRIAL ENGINEERING

STEPHEN R. SWANSON
ASSOCIATE PROFESSOR

Ph.D. 1969, University of Utah
At Utah Since 1970

Research Area

Composite materials, adhesives, experimental solid mechanics, finite element analysis, fracture mechanics.

Publications

Toombes, G.R., S.R. Swanson, and D.S. Cairns," Biaxial Testing of Composite Tubes," Proceedings of the SESA 1983 Annual Meeting.

Swanson, S.R. and L.W. Christensen, "A Constitutive Formulation for High Elongation Propellants," J. Spacecr. Rockets, 20(1983): 559-566.

Swanson, S.R. and R.A. Cutler, "Fracture Analysis of Ceramic Proppants," ASME J. Energy Res. Tech., 105(1983): 128-133.

Swanson S.R., G.R. Toombes and S.W. Beckwith, "In-Plane Shear Properties of Composites Using Torsion Tests of Thin-Wall Tubes," Proceedings of the 29th National SAMPE Symposium, 29(1984): 567-577.

Swanson, S.R., "Approximate Laplace Transform Inversion in Dynamic Viscoelasticity," J. Appl. Mech., 47(1980): 769-774.

Current Activities

Experimental measurement of biaxial failure properties of advanced composite materials.

Office: 3188 MEB 581-6407
Home: 2847 Commonwealth Ave., 84109 484-5808

WILLIAM K. VAN MOORHEM
ASSOCIATE PROFESSOR

Ph.D. 1971, Cornell University
At Utah Since 1973

Research Area

Fluid mechanics, particularly unsteady flow and acoustics.

Publications

Van Moorhem, W.K., "An Investigation of Acoustic Propagation in a Thermally Inhomogenous Atmosphere," UTEC ME 82-015, Mechanical Engineering Dept., University of Utah, Salt Lake City, Utah.

Van Moorhem, W.K., "Flow Turning in Solid Propellant Rocket Combustion Stability Analysis," AIAA J., 20(1982): 1420-1425.

Current Activities

Propagation of acoustic waves in the atmosphere in particular refractive effects of temperature gradients, rocket motor instabilities.

Awards

National Research Council Research Associate at NASA Langley Research Center, 1980-81; University of Utah Distinguished Teaching Award.

Office: 3198 MEB 581-7687
Home: 1322 South 1400 East, 84105 582-9223

CONSORTIA

A consortium is comprised of a group of faculty, each responsible for an individual research program. Consortium participants brainstorm, plan joint experiments, share facilities and resources, write papers and research proposals, patent products and processes, and otherwise collaborate and interact as effectively as possible. The consortium may include industrial and/or government participants and sponsors as well as faculty from other colleges and institutions. The major faculty participants constitute a committee which allocates funds, establishes instrument and laboratory use priorities, etc. Each consortium has a faculty or staff coordinator who facilitates industrial interactions, conducts meetings, oversees laboratory maintenance and operation, and undertakes general liaison activities.

A center is a research group directed by one or two faculty members, generally with considerable industrial and/or government support. A center's resources usually consist of a number of staff and student participants, and several laboratories. It often has support from several different companies and government agencies.

THE UTAH CONSORTIA

Composite Materials

The consortium on composite materials consists of faculty members in civil engineering, mechanical engineering and materials science and engineering and focuses on the design, modelling, fabrication, testing, and analysis of composite materials and structures, emphasizing metal, ceramic and polymer matrix systems.

Computer-Aided Design--Manufacturing and Robotics

Although a number of universities have developed centers in computer-assisted manufacturing (CAM), there are few schools with strengths in computer-assisted design (CAD), CAM and industrial robotics--the keys to fully automated manufacturing. CAD activities include basic algorithm and methods development in the Department of Computer Science, practical part and device design in Mechanical Engineering, and computer-aided machining/manufacturing in the Department of Mechanical and Industrial Engineering. The group includes one of the most advanced robotics research and development programs in the nation; robotics components developed by the group have been used in the most advanced artifical arm available in the world today.

Sensors

The consortium for sensor science and engineering involves a variety of optical, spectroscopic, electrochemical and other techniques which have only recently been applied to practical engineering problems. This unique combination of strengths permits the development of sensors for measurements and applications of interest to diverse industries. The techniques include light scattering, fluorescence and Raman spectroscopy, and fiber and integrated optics for the development of sensors to measure ions, biochemicals, temperature, physical properties (including pressure and acceleration), particles and particle size distributions, and infrared absorption.

Machine Vision and Image Analysis

This consortium consists of faculty working in the general area of machine and robot vision, image analysis, pattern recognition, diagnositc medical imaging, and related areas.

Energy Systems

The energy systems consortium performs basic and applied research associated with energy systems. Current interests include fossil fuel, nuclear, geothermal and solar systems. The consortium is aimed at interdisciplinary efforts directed at assessing, developing and testing energy systems and evaluating environmental, regulatory and management constraints and requirements.

Custom Consortia

A specific or custom consortium can also be formed for an individual government or industrial sponsor, which defines an area in which it will draw on College of Engineering expertise. The Dean's Office of the college will then organize a group of interested faculty (five to ten individuals) to advise the sponsor on their activities in this particular area. The faculty group will meet up to three times per year with sponsoring industry representatives. Faculty participants are considered consultants and are compensated accordingly by the sponsor firm.

THE UTAH CENTERS

Biomaterials Profiling

Hendrik L.C. Meuzelaar, Director

The Biomaterials Profiling Center is a research and service laboratory which reports to the dean of the College of Engineering. The laboratory provides analytical instrumentation and expertise for the characterization of polymeric and other complex organic materials.

Specialized facilities include: Curie-Point and laser pyrolysis mass spectrometry, thermogravimetry/mass spectrometry, tandem mass spectrometry, computerized chemometrics and controlled atmosphere materials handling facilites.

CENTERS

The laboratory is funded through research grants and contracts with government and industry as well as through service activities. Current research areas include polymer characterization (elastomeric implant materials), medical research (cell and tissue characterization and pathology), energy research (coal, coal liquid and maceral characterization) and instrumental development (mass spectrometric techniques).

Biomedical Design

Stephen C. Jacobsen, Director

The Center for Biomedical Design is an interdisciplinary applied research facility whose goal is the design, fabrication, testing and application of high technology devices. Faculty, staff, and students are selected to provide sufficient breadth to solve a diversity of engineering problems aided by an extensive computation laboratory, a CAD/CAM system, injection molding capabilities, a machine shop and a complete electronics laboratory. The "Utah Arm" typifies the capabilities of the center. Conceptualized 10 years ago, the Utah Arm has been successfully fitted to over 100 amputees during the past three years. Other successful products include the Wearable Artifical Kidney (WAK) and the Phoresor (an iontophoretic drug delivery device). Ongoing projects involve prosthetics and biomechanics, drug delivery systems, physiological monitoring and diagnostic systems, body fluid processing, surgical devices, microfield devices, and robotics.

Fluid Dynamics

G.A. Flandro, Director

The Fluid Dynamics Laboratory was founded to address practical problems of current interest to local and national industry and several government agencies. Time dependent fluid flows are of great importance in the solid propellant rocket industry; several programs of study with research funding of about $500,000 are under way. The problems cover such areas as pressure fluctuations in the Space Shuttle, solid propellant booster motors and the fluid mechanics of spinnning rockets used in communication satellite missions. The laboratory is uniquely equipped for in-depth experimentation and analysis of a wide variety of complicated fluid and gas behavior. Equipment available includes a two-component fiber optics laser-doppler anemometer employing a 15 watt argon laser, a Hewlett-Packard HP1000 data acquisition system with 132 Mbyte on-line disc storage capability, a high-speed gas flow facility with cabaility to test at temperatures as high as 3000 degrees F., multi-channel wave analyzer with full modal analysis capability, Hewlett-Packard HP9000 computer system and a variety of smaller computers and peripherals. Wind tunnel facilites cover all speed ranges to Mach 5. Instrumentation and test facilities are available for hot firing of propellants and small motors up to a mass of one kilogram.

Microelectronics

R. Huber, Director

The HEDCO (Foundation) Microelectronics Laboratory designs, builds and tests small integrated circuits. It is an excellent lab in which to experiment with such things as nonstandard integrated circuit fabrication processes, novel circuit configurations, or new semiconductor materials. The lab is also very active and internationally known in the field of semiconductor-based chemical sensors. Another area which is beginning to attract great attention in "microfabrication." This process uses techniques pioneered by the microelectronics industry to reproduce three-dimensional mechnical structures having dimensions on the order of microns. The HEDCO Laboratory is ideal for carrying out exploratory programs in these or related areas.

Microwave Devices

R. Grow, Director

The original activities of this laboratory included investigation of active devices--microwave tubes, plasmas, quantum electronics, solid-state plasmas and plasma diagnostics. Research in the areas of medical electronics and microwave biological effects, originally part of the laboratory's scope, have since become separate functions. Current research of the consortium involves physical electronics projects, including gyrotrons, millimeter wave tubes, electron guns, etc., and work with students in the Air Force Thermeonic Engineering Research (AFTER) program.

Polymer Implants

D.J. Lyman, Director

This laboratory contains equipment for polymers synthesis, implant fabrication and general polymer characterization. This includes viscometry,', X-ray, specialized infrared spectroscopy, membrane diffusion and contact angle measurements. A Digilab Fourier Transform Spectrometer and Perkin-Elmer 521 Spectrometer are available for surface and bulk studies. The laboratory is internationally known in the field of polymer implants. Separate surgical laboratories are well equipped for a variety of in vivo and ex vivo studies relating to blood interactions and tissue interactions. Facilities are also available for protein and histology studies.

INDUSTRIAL AND PUBLIC INTERACTION

INDUSTRIAL AFFILIATES PROGRAM

The Industrial Affilitates Program provides a forum for interaction between local and national industry and departments within the College of Engineering. A member firm chooses to affiliate with the department most closely allied to its corporate interest. Participation is designed to increase communication and cooperation.

The corporate technical liaison officer participates in a variety of college-sponsored activities, including an annual symposium and various visits and tours. Access to University papers, reports and related materials is also provided. Funds derived from the program are used to open new research areas, to improve training and instruction in fields of interest to industrial participants, and to upgrade facilities and faculty support.

The College of Engineering's industry/university/government interaction is designed to provide significant benefits to participants through the development of new and important multi and interdisciplinary research areas and by the rapid transfer of applicable technology into the commerical sector.

Further information on the affiliates program is available by contacting Mr. Guil Funston, Assistant Dean for Industrial Relations, 2000 MEB, College of Engineering, University of Utah, Salt Lake City, UT 84112, (801) 581-6911.

NATIONAL ADVISORY COUNCIL

The College of Engineering's National Advisory Council consists of alumni, benefactors, and friends in important industrial, governmental and academic positions. These supporters have the broad, visionary perspective needed to assist the college in planning the future of engineering education and research.

This group advises the college not only on current program plans and objectives, but, even more importantly, on five- and ten-year education and research goals.

The council brainstorms with key college faculty, chairpersons, and deans about the potential for new programs, research and teaching areas as well as about new fields and future industrial commitments.

Participants are presently considering such areas as molecular and biological circuitry and computation, intelligent robots and artificial intelligence systems, smart remote multichannel sensors for physical and chemical phenomenon, and other important topics.

UTAH INDUSTRIAL ADVISORY COUNCIL

The Utah Industrial Advisory Council is a group of representatives from Utah industries who advise the dean and faculty on the problems, needs, and opportunities of Utah's technical industries. Cooperating with the council is one way the college expresses its vital interest in maintaining the competitiveness and economic growth of Utah industries.

The group meets twice a year and participates in most college technical activities of relevance to industry. It also gives advice and input on the college's continuing engineering education program for practicing engineers. These programs enable local engineers to obtain master's degrees and take courses, workshops, and special programs to augment their technical training.

ENGINEERING EXPERIMENT STATION

The Utah Engineering Experiment Station (UEES) reports to the deans of the College of Engineering and the State College of Mines and Mineral Industries. The UEES participates in such activities as materials testing, publishing, seminars and conferences, maintenance of research laboratories, contract research, and coordination of multidisciplinary research among University professionals, industry and government. In effect, the UEES serves as an interface between the public and the campus.

Research and development by the UEES on industrial products and procedures are among the services undertaken to assist technology-oriented industry in the state of Utah. The UEES furnishes services not otherwise available to governmental agencies, industrial organizations, and private concerns and individuals.

For further information, contact Gordon Jensen, Director, 105 Applied Research Bldg., 581-6348.

THE NEXT DECADE

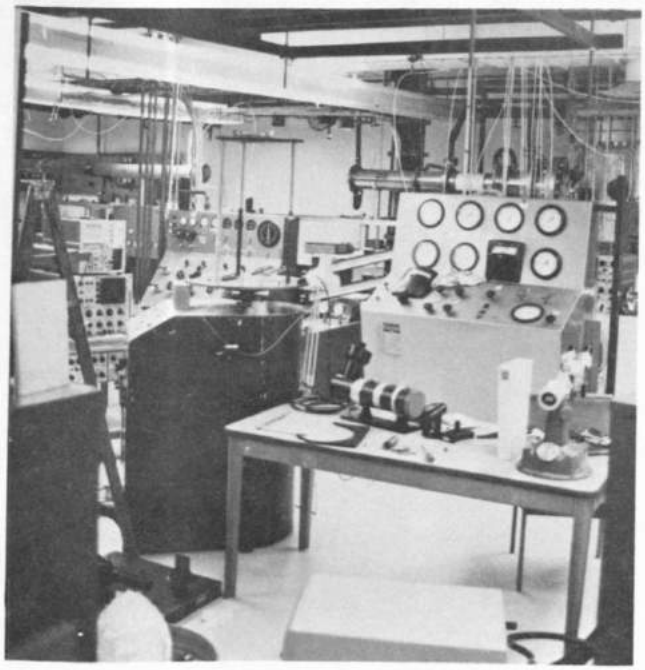
The next ten years will see dramatic changes in engineering education and research, particularly at the University of Utah. We expect our engineering enrollment to continue to increase due to the large population increase and economic development and growth of the state of Utah and the Intermountain West.

Research programs will continue to dramatically increase and move into new and uncharted areas, in most cases by hybridizing existing strength areas.

Within the next ten years, we anticipate a student enrollment of 5,000, a faculty of about 200, a number of additional new buildings and facilities, and an annual research budget in excess of $35 million. We expect to be ranked as one of the top ten graduate engineering schools in the country and among the outstanding undergraduate engineering institutions as well.

In the field of bioengineering, we are preparing to move into new areas of medical devices, particularly neuroprostheses. Sensor development will continue, and, together with multichannel circuitry, extensive computer signal processing and image and pattern recognition, will lead to novel diagnostic approaches, including non-invasive diagnosis by analysis of expired volatiles.

Bioengineering should also move into closer association with electrical engineering and computer science, primarily in the areas of molecular devices, biological devices and molecular/biological computation.



View of mechanical engineering laboratory.

We expect significant activity in the area of cell culture engineering, not only of human cells, but also of human organs, to minimize our dependency on artificial structures. Bioengineering will diversify its medical emphasis into the general area of biotechnology with application to all of the chemical process industries.

Chemical engineering is now moving rapidly into the biochemical processing and biotechnology areas. We foresee significant interactions with bioengineering in this regard. The development of synthetic fuel processing--including coal, oil, shale, and tar sands and the application of these processes--will continue to be emphasized.

Chemical engineering interaction with electrical engineering and computer science will increase significantly, primarily in the area of electronic materials processing and the rapidly growing area of computer-assisted chemical process design and simulation.

We expect civil engineering, together with mechanical engineering, to become a leader in the area of composite materials analysis, design and testing as well as in computer-aided structural design. Continued advances and developments in soil mechanics, earthquake engineering, and fluid mechanics are anticipated. Transportation engineering is expected to develop rapidly.

The environmental engineering component of civil engineering will grow significantly and interact strongly with the biochemical and biotechnology activities in other departments.

Computer science is expected to continue its national and international leadership in computer graphics and its pioneering efforts in the development and application of computer-aided design. It is expected to intensify its research in theoretical computer science.

One area of particular development will be network architectures and the modelling of networks. A significant interaction is expected to develop between computer science and bioengineering and mathematics in the area of brain modelling and parallel network theory and processing, including the general field of molecular and cellular computation.

The present VLSI design activities will certainly continue to be strong but will probably use novel semiconductor materials, perhaps organics and even biologicals for such applications.

Machine and robot vision activities should also advance dramatically.

Electrical engineering is expected to continue its experimentation in microelectronics and digital signal processing but will also see a reawakening and a strong emphasis on analog and parallel signal processing.

THE NEXT DECADE

The department's growing program in optics is anticipated to increase and become a major component in the sensor activities of the college. These include pattern recognition, optical filtering, and optical signal processing as well as integrated optics and electro-optical device activities.

Materials science and engineering is expected to continue and expand its strong emphasis on semiconductor materials, polymers and ceramics.

The current emphasis on polymers for medical applications will probably fade as biological structures begin to replace synthetic materials. We anticipate a growing emphasis on the electronic, physical and mechanical properties of polymers used in composites and other advanced geometries.

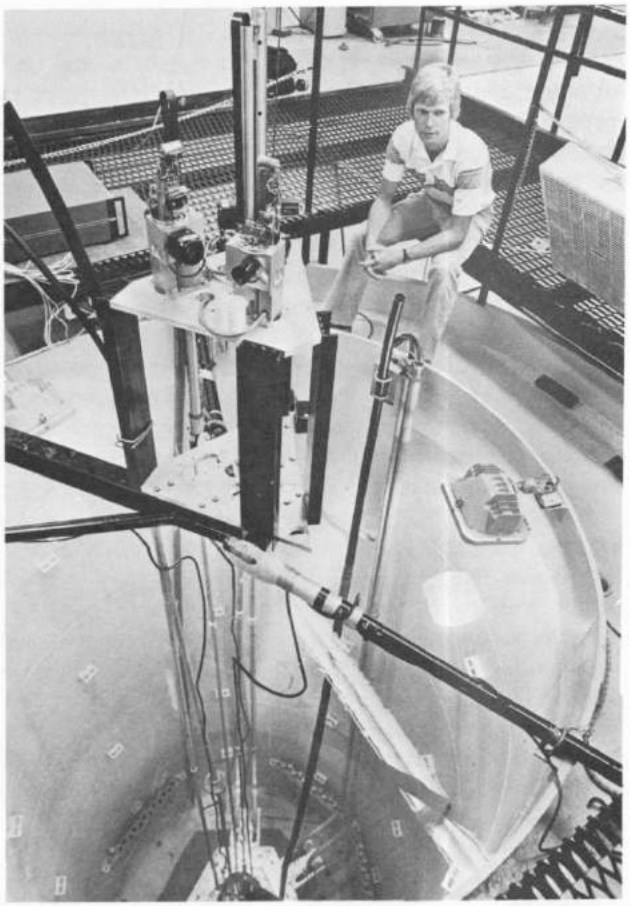
A growing emphasis on high technology ceramics will develop, and the department will continue to achieve national recognition in ceramic engineering. Composite materials based on ceramic-polymer combinations for both structural and specialty electronic and optical applications will likely be developed.

The Department of Mechanical and Industrial Engineering will be very different from what it is today. The mechanical engineering program will have achieved national recognition in the area of robotics, including direct electroneural as well as electromyographic control of remote robots by human operators. These developments will, of course, depend on strong collaboration and interaction with colleagues in bioengineering and computer science.

The department will be internationally recognized in the area of advanced composite materials for high performance applications.

It is expected that the nuclear engineering program, after many years as a small component of the curriculum, will blossom and expand in response to the economy's increasing dependence on nuclear energy and processes.

In summary, the next decade for the College of Engineering and the University of Utah is expected to be a dynamic one. Given the growth in population and economic base of the region, the college is poised for significant growth in existing areas of strength as well as in new fields. It is expected to continue its commitment to innovative, interdisciplinary research and development and to assist the state of Utah in advancing its technology-based economy. The college has embarked on a vigorous campaign of interaction and collaboration with industry, a philosophy which is expected to grow significantly in the years ahead.



Triga reactor in nuclear laboratory.

INDEX

SUBJECT INDEX

FACULTY AND STAFF