Recent Awards: January-March 1980

NATIONAL SCIENCE FOUNDATION
Division of Problem-Focused Research
Directorate for Engineering and Applied Science
Washington, D.C. 20550

INTRODUCTION

Recent Awards keeps researchers, research users and policy makers informed about projects being supported by NSF's Division of Problem-Focused Research (PFR).

This brochure describes awards made by PFR primarily during the period January 1 through March 31, 1980 (second quarter, Fiscal Year 1980). Awards made before January 1, 1980 are included here if they were not reported in a previous issue of *Recent Awards.* The data have been reconciled with the NSF's Management Information System.

HOW TO OBTAIN RESEARCH REPORTS

One of the most important objectives of PFR is the timely and widespread dissemination of the results of PFR-supported research to potential users. The name and mailing address of the Principal Investigator and Grantee Institution is contained in each project description in this brochure. Persons wishing to obtain information on project findings, including project reports, monographs, journal articles, technical reports, and other materials should write to the Principal Investigator at the Grantee Institution to determine what information is available and at what, if any, cost it may be obtained. The Grantee Institution may charge a nominal amount for the dupliction and mailing of such materials to cover costs. The Principal Investigator may furnish information on how interested persons may acquire reports and other materials from the National Technical Information Service (NTIS) of the Department of Commerce in lieu of furnishing the report or other material directly. NTIS is the central point in the United States for the public sale of Government-funded research and development reports and other analyses prepared by Federal agencies, their contractors, and grantees. The Principal Investigator may also cite journals or other publications where project information may be found instead of furnishing a copy of the article.

DEFINITIONS AND EXPLANATION OF FORMAT

Study of Earthquake-Induced Bond Deterioration;[1] Neil M. Hawkins;[2] University of Washington, Department of Civil Engineering, Seattle, WA 89195;[3] **AWARD #76-15366 AO2[4]; $59,647 for 12 months beginning May 15, 1979.[5]**

1. **Title of the Award**
2. **Principal Investigator:** the chief scientist or administrator who is responsible for the research plan and fiscal expenditures as an NSF awardee.
3. **Institution Conducting the Research:** any college, university, laboratory, industry, or other organization, whether operating on a profit or nonprofit basis, as well as State governments and Federal organizations.
4. **Award Number:** the award number and amendment number, if applicable.
5. **Amount, Duration and Starting Date of the Award** (a duration of 0 months means the amount awarded is a supplement to an existing award).

ALTERNATIVE BIOLOGICAL SOURCES OF MATERIALS

The Alternative Biological Sources of Materials program deals with selected aspects of the problem of meeting the Nation's future needs for raw materials. This program is directed toward alleviating national dependence on selected scarce resources by making alternative biological sources of materials available in the United States. Three topics have been selected for investigation in Fiscal Year 1980: Biological conversion of lignocellulosic materials to useful chemicals; production of speciality chemicals from arid land plants; and biosaline resources.

1. Isolation of Lignocellulose-Transforming Microorganisms; Dale M. Norris, University of Wisconsin, Department of Entomology, Madison, WI 53706; **Award #77-08279 A02;** $108,095 for 12 months beginning February 15, 1980

   Cellulose and lignin, the two most abundant naturally-occurring organic materials on earth, are used presently for a variety of purposes. However, these organic materials potentially represent even more important sources of industrial materials if more efficient processes for converting them can be developed. Such a possibility exists with biological systems based on lignocellulose-transforming microorganisms.

   The objectives of this project are to isolate symbiotic lignocellulose-transforming microbes from wood-

degrading insects and to characterize the transformation of lignin with the free-living microbes. Research for this, the award's final period, continues to focus on optimizing the culture conditions for the microbial transformations of lignin and investigating the animal feeding stimulant activity of the resultant products.

2. Chemicals from Western Hardwoods and Agricultural Residues; Kyosti V. Sarkanen, University of Washington, Department of Chemical Engineering, Seattle, WA 98195; **Award #77-08979 A04;** $43,299 for 3 months beginning January 1, 1980

   This award supplements a continuing grant whose objective is to assess the potential of under-utilized renewable resources, such as hardwoods and argricultural residues, for the production of useful chemicals. Specific objectives are to: (a) characterize the essential properties of cellulose, hemicellulose, lignin and extractive components of red alder wood and wheat straw; (b) examine novel methods for converting red alder wood and wheat straw to fibrous products in combination with by-product recovery; and (c) convert the lignin and carbohydrate by-products to chemicals using microwave degradation. Research for this period focuses on organic solvent separations of hardwood components and the characterizations of derived lignins.

3. Pyrolytic Conversion of Lignocellulosic Materials; Fred Shafizadeh, University of Montana, Department of Chemistry, Missoula, MT 59801; **Award #78-18096 A01;** $13,012 for 0 months beginning November 1, 1979

   This award supplement provides additional manpower and equipment to pursue unexpected results obtained in the hydrolytic studies on cellulose: specifically, the finding that wet-milling cellulose with the cellulase enzymes produces twice as much glucose as can be obtained from ball-milled cellulose, and four times as much glucose as can be obtained from untreated substrate. This method of hydrolysis could improve the economic feasibility of converting cellulose to glucose.

4. Guayule By-Products, Rubber Analysis and Seed Selection; Anthony J. Verbiscar, Anver Bioscience Design, 160 East Montecito Avenue, Sierra Madre, CA 91024; **Award #79-10187;** $99,970 for 12 months beginning January 15, 1980

   The objectives of this research project are the investigation of the guayule rubber plant as a source of potentially valuable by-products, and the development of analytical methods for assaying the quantity and quality of rubber in individual plants as a basis for seed selection.

   Guayule seeds will be examined as a source of edible oil and meal. The leaves will be processed and studied as a source of wax, essential oils, and as a possible livestock feed ingredient. Bagasse (residue) from the woody tissue will also be evaluated as an animal feed additive. A new infrared spectrophotometric method will be developed for quantitating natural rubber in plant tissue, and this novel method will be compared with earlier methods. Gel permeation chromatography will be utilized for molecular weight determinations (an indication of rubber quality). Individual plants will be assayed and seeds collected in an attempt to identify superior rubber producers. Agronomic studies will be initiated on the effects of irrigation and nitrogen fertilization on plant growth and regrowth of harvested guayule plants.

EARTHQUAKE HAZARDS MITIGATION

The goals of the Earthquake Hazards Mitigation (EHM) program are to develop an understanding of earthquakes in relation to constructed facilities, and to reduce casualties, damage and social and economic disruption which are the result of earthquakes. The actions necessary to attain these goals are heavily dependent upon technical capabilities which require development through research.

Primary objectives of EHM-supported research are: to determine the nature of strong ground shaking during earthquakes; to develop analytical procedures to predict the spatial and temporal distribution of strong ground motion at different sites; to understand the dynamic behavior of soil and rock subjected to strong shaking; to determine the nature of the interaction of structures and their supporting soil during earthquakes; to determine the engineering aspects of reservoir-induced seismicity; to develop procedures for performing dynamic analyses of proposed or existing construction under earthquake loadings; to develop an understanding of materials and structural components subjected to damaging dynamic loads; to develop procedures for analysis and design of non-structural and architectural systems for earthquake effects; and to study the influences of architecture and urban planning activities on the earthquake vulnerability of regions.

1. Dynamic Soil-Pipe Axial Interaction for Full-Scale Buried Pipelines; G.R. Abrahamson, SRI International, 333 Ravenwood Avenue, Menlo Park, CA 94025; **Award #79-17019;** $132,834 for 12 months beginning January 15, 1980

   This research measures soil-pipe axial interaction forces, pipe displacements, and soil strains for a section of full-scale buried pipe under dynamic loads similar to those expected in earthquakes. The pipe, 18 inches in diameter and 15 to 20 feet long, will be laid in a trench and backfilled as in a typical water distribution system. Sinusoidal excitation forces will be applied to the pipe in the axial direction by an inertial shaker inside the pipe.

   These tests are the first to measure equivalent spring constants and damping for the soil, which are needed for use in analyses under development elsewhere. Hysteresis loops are measured over a wide range of force levels. Excitation frequencies ranging from 2 to 12 Hz are used to explore strain-rate effects and radiation damping. Soil strains and possible slip between pipe and soil are also monitored.

2. Seismic Resistance of Precast Concrete Panel Buildings; James M. Becker, Massachusetts Institute of

Technology, Department of Civil Engineering, Cambridge, MA 02139; **Award #78-18742 A01;** $295,110 for 12 months beginning January 1, 1980

Large panel precast concrete building systems were originally developed for use in regions that were essentially nonseismic. However, these systems are now being used in seismic regions in the United States and throughout the world. This project initiates an experimental program to explore the inelastic response of dry-type vertical connections subjected to seismic reversals.

Analytical work is currently being performed in three areas: development of a detailed nonlinear dynamic program capable of modeling two-dimensional assemblages of large panels; a simplified program to allow for more design-oriented analysis; and, the extension of previous three-dimensional linear-elastic models to incorporate certain aspects of inelastic response. In the first two areas, the modeling efforts will use information developed in the experimental portion of the program. The final phase of the project incorporates the interaction of the experimental and analytical efforts, combined with parametric studies, to develop information relevant to the aseismic design of large panel structures.

3. Tall Buildings and Urban Habitat: Impact on the Urban Environment and Planning for Natural Disasters; Lynn S. Beedle, Lehigh University, Engineering Laboratory, Bethlehem, PA 18015; **Award #78-16324 A01;** $179,935 for 12 months beginning March 1, 1980

   This research utilizes a comprehensive collection of information assembled by the Council on Tall Buildings and Urban Habitat. Over 1200 voluntary participants from 52 countries and a wide variety of professional disciplines prepared a five volume monograph on the subject of Urban Habitat and Tall Buildings.

   This research effort is concerned with the overall process of planning for natural disasters for high-rise structures, and for assessing the impact of disasters on urban environments. The project was three phases: utilization/implementation research, which examines mechanisms to get material in the monograph on Tall Buildings into standards, model codes and specifications; the development of an improved data base on dynamic forces and loads on tall buildings due to natural hazards; and a study to redefine critically needed research topics related to tall building construction.

4. The Impact of Disaster Aid Programs on Long-Term Family Recovery: A Longitudinal Comparison of a Rural and an Urban Site; Robert Bolin, North Dakota State University, Department of Sociology/Anthropology, Fargo, ND 58105; **Award #79-20959;** $103,015 for 18 months beginning January 15, 1980

   This study examines the role of local, State and Federal relief programs in facilitating family recovery from natural disaster. Differences between rural and urban families regarding the availability and utilization of relief and recovery aid will be studied, as will differences between age and socioeconomic groups. Two disaster sites in Texas (struck by tornados) have been selected for study, one urban and one a smaller community. Data gathering will include interviews with victim families and officials in relief agencies. The research should produce recommendations on how aid programs might be modified to promote faster and more complete family recovery following natural disasters, including earthquakes.

5. Numerical and Experimental Study of Earthquake Strong Motion; James N. Brune, University of California, San Diego, Institute of Geophysics and Planetary Physics, La Jolla, CA 92093; **Award #79-26539;** $350,073 for 24 months beginning March 15, 1980

   The basic thrust of this research is to use developed theoretical and numerical modeling capabilities to study various parameters of ground motion including source rupture, earth structure and attenuation. Objectives are to further physical interpretations; to reliably retrieve information about earthquake source; and to better predict ground motion for future earthquakes. Research tasks include detailed study of specific strong motion records; development of an improved structural model for the Imperial Valley; further data collection through continued operation of the Baja California strong motion array; and, further development of foam rubber modeling capabilities.

6. Earthquake Behavior of Techi Dam; Ray W. Clough, University of California, Department of Civil Engineering, Berkeley, CA 94720; **Award #78-19333 A01;** $8,371 for 0 months beginning January 15, 1980

   This project is to conduct U.S.-Republic of China cooperative research to obtain seismic response information from the Techi Dam in Taiwan. The Techi Dam is a modern, thin shell concrete arch structure located in a region of significant seismicity, and thus offers a unique opportunity to obtain data on the actual seismic behavior of arch dams. The project will install instrumentation in the dam; calculate and measure dam vibration properties; refine the mathematical model through numerical analysis, observations and correlation study; evalute the seismic response; and perform table tests of scaled dam models. The project will demonstrate the effectiveness of current response analysis procedures, and will provide improved techniques for treating reservoir and foundation interaction as well as better understanding of expected failure mechanism.

7. Earthquake Engineering Research Facility Support; Ray W. Clough, University of California-Berkeley, College of Engineering, Berkeley, CA 94720; **Award #77-21787 A01;** $55,612 for 12 months beginning January 15, 1980

   NSF-supported experimental facilities for measuring inelastic seismic performance of structures at the University of California, Berkeley have been used extensively for research projects conducted by Berkeley and other research groups. This project provides continuing support for the maintenance and operation of the Earthquake Simulator Laboratory at the Richmond Field Station, dynamic controlled test systems at the laboratories in Richmond and Berkeley, high speed digital data acquisition systems for both laboratories, and field vibration test systems.

8. Study of the Role of the Mass Media in Disaster Reporting; Charles E. Fritz, National Academy of Sciences, 2101 Constitution Avenue, Washington, D.C. 20418; **Award #78-20365 A02;** $150,485 for 12 months begining October 15, 1979

   With NSF support, NAS's Committee on Disasters and the Mass Media will continue to assess the use of the various mass media, including radio, television, and newspapers, in educational and informational programs aimed at mitigating the effects of disasters, promoting disaster preparedness, and helping in the tasks of rescue, relief, recovery and rehabilitation.

9. Reliability of Structures Retaining Soil under Earthquake Loadings; Milton E. Harr, Purdue University, Department of Civil Engineering, West Lafayette, IN 47907; **Award #79-06295;** $110,701 for 24 months beginning January 15, 1980

   This study assesses the reliability of earth-retaining structures subjected to a seismic environment. The seismic load on a retaining structure is expressed with the aid of two parameters: the peak ground acceleration, and the duration of the event. In addition, the use of the root-mean-square (RMS) of the acceleration peaks will be explored as an alternative to the peak acceleration. Duration will be introduced through an equivalent number of cycles (N). The influence of the duration of the event on the safety of structures is explored with the aid of a relationship between the soil's shear strength and the number of cycles.

   The total force on earth-retaining structures during an earthquake is determined during a quasi-static stability analysis. Experimental studies with rigid retaining walls under dynamic loading have indicated that the shape of the pressure distribution along a wall is more parabolic than customarily assumed. This study expresses the distribution of lateral pressures along a structure with the aid of the "method of redistribution of pressure" (Dubrova's method). This research is conducted as a joint effort between Professor Milton E. Harr at Purdue University and Professor Dimitrios Athanasiou-Grivas at Rensselaer Polytechnic Institute.

10. Introduction of Earthquake Hazard Mitgation through Multi-Hazard Techniques in Areas of Low Concern for Seismic Risk; John Loss, University of Maryland-College Park, School of Architecture, College Park, MD 20742; **Award #79-26700;** $15,110 for 10 months beginning February 15, 1980

    This research investigates the possibility of introduction of earthquake hazard mitigation into the codes, ordinance, and construction practices of a region as part of the hurricane, storm surge, and flash flood considerations currently recognized. Two communities of typical but diverse climatic/geographic conditions will be selected to test a multi-hazard mitigation technique. An integration of seismic concern with the other concerns will be attempted. Government agencies, professional associations and university departments in architecture and engineering will be the principal users of the results of this research.

11. Analysis of Mechanical Equipment under Earthquake Excitation; Sami F. Masri, University of Southern California, Department of Engineering, Los Angeles, CA 90007; **Award #79-19888;** $110,960 for 24 months beginning February 1, 1980

    This research formulates analytical and experimental studies using a consistent probabilistic approach to (a) describe earthquake loads, (b) model typical mechanical equipment components, and (c) determine system response parameters for the reliability analysis under seismic conditions. To provide design engineers with needed tools for performing probabilistic reliability analysis leading to the establishment of margins of safety for mechanical systems (equipment, piping, etc.), the following areas will be studied: (1) covariance kernels of representative earthquake records and probabilistic design spectra; (2) simple physical models that represent the essential features of component behavior; and (3) analytical and experimental studies of probabilistic responses of generic nonlinear equipment models subjected to earthquake-like, nonstationary random vibration. The studies will proceed along related but parallel paths: (a) statistics of the response due to randomness in the excitation, and (b) variability of the responses due to randomness in system properties.

12. Nonlinear Analysis and Design of Steel Frames; William McGuire, Cornell University, Department of Structural Engineering, Ithaca, NY 14853; **Award #78-15357 A01;** $149,8877 for 12 months beginning February 15, 1980

    The basic objective of this project is the develoment of an interactive computer graphics capability for the static and dynamic nonlinear analysis and design of three-dimensional steel frame structures.

    During the first year, work was performed on three-dimensional problems. Research accomplishments fell into six task categories: (1) general planning, (2) system familiarization and conversion of previous software to a new hardware system, (3) data base planning, (4) development of a three-dimensional preprocessor, (5) selection and implementation of analysis algorithms, and (6) evaluation and development of three-dimensional beam-column elements. Tasks (2) and (4) have been essentially completed.

    The research plan for this project includes continuation of tasks (1), (3), (5), and (6) stated above plus the following: (a) development of a three-dimensional frame analysis postprocessor, (b) formulation of procedures for interactive computer graphics analysis and design of earthquake resistant steel framed structures, and (c) verification and documentation of the systems developed plus preparation of a preliminary plan for utilization.

13. Interaction of Seismic Engineering Design and Risk from other Hazards — Expansive Soil Damage to Structures and Foundations; John D. Nelson, Colorado State University, Department of Civil Engineering, Fort Collins, CO 80523; **Award #79-10337;** $209,374 for 24 months beginning February 1, 1980

Structural weakening caused over a period of time by the action of expansive soils could pose an unrecognized danger to structures subsequently subjected to earthquake shaking. This research is a first step in identifying such problems by first identifying the current state-of-knowledge concerning the engineering aspects of expansive soil action, and presenting this information in a form which will enable engineers, contractors, lenders and others to incorporate this information in their decisions and design practices.

The research will specifically 1) identify the current state-of-knowledge and engineering practice in expansive soil, 2) identify mitigating construction measures, and 3) provide this information in a semi-technical manner to users who require this information but who are not engineers. A workshop on current design practices will be held and a technical report will be prepared. In addition, a non-technical report will be prepared for distribution to users such as contractors, plant managers and operators, mortgage and insurance companies, homeowners, and governmental and private administrators and planners.

14. Conference on Research in Progress on Masonry Construction; James L. Noland, Atkinson-Noland and Associates, Inc., P.O. Box 3611, Boulder, CO 80307; **Award #79-26689;** $22,243 for 9 months beginning February 15, 1980

    The objectives of this Conference are to: (1) establish an overview on masonry research in progress and recently completed, (2) provide for in-depth presentations and discussions of masonry research in progress or recently completed by invited speakers, and (3) to foster a sense of community among masonry researchers. A portion of the Conference will be devoted to discussions of ways in which masonry researchers can better communicate on a continuing basis among themselves and with the user groups.

15. Land Management and Physical Form Guidelines for Tsunami High Hazard Areas; Rolf Preuss, Urban Regional Research, 402 Olympic National Building, Seattle, WA 98104; **Award #78-23884;** $92,579 for 15 months beginning February 1, 1980

    The research project addresses the need for development of a rational land use guidance system for tsunami hazard zones. The research includes three components. The first component involves measurement of differential susceptibility within a hazard zone. This includes development of reasonable definitions of tsunami hazard susceptibility which consider historical data on known tsunamis, geological and seismological factors, and a variety of geographical land-use considerations such as population density, extent of low-lying coastal areas, and general characteristics of the natural environment. The second research component involves preparation of land-use and physical form guidelines which can be used to guide development within the inundation zone. These guidelines will be derived through an urban design approach based on an in-depth environmental, social and economic analysis. The third component involves the development of administrative guidelines for managing the tsunami zone within the context of a community's general planning and regulatory framework.

16. Design of Multi-Story Buildings by Component Mode Synthesis; Morteza A.M. Torkamani, University of Pittsburgh, Department of Civil Engineering, Pittsburgh, PA 15261; **Award #80-01506;** $22,658 for 12 months beginning February 1, 1980

    At present, the most frequently used computer program procedures for the linear dynamic analysis of earthquake-resistant design of multi-story buildings either exceed the capacity of moderate size computers or do not result in a valid mathematical model of the building. An intermediate computer program to analyze high rise buildings using a better representation of the mathematical model and a relatively small number of degrees of freedom is required.

    This project applies component mode synthesis in linear dynamic analyses of multi-story buildings subjected to earthquake ground motion in order to allow better representation of the contribution of elastic component behavior. The structure is treated as an assembly of connected components, each of which is analyzed as a separate unit for construction of mode sets. Truncation of lower interior normal modes will reduce the number of degrees of freedom. Imposition of the requirement of displacement compatibility at component interfaces leads to a synthesis of all of the component coordinates to form a set of generalized model coordinates applicable to the complete structure. Properties of the complete structure are synthesized from properties of the components.

17. Improving Productivity in Building and Construction; Edwin S. Townsley, National Academy of Sciences, Building Research Advisory Board, 2101 Constitution Avenue, N.W., Washington, D.C. 20418; **Award #79-27325;** $10,000 for 12 months begining November 1, 1979

    The construction industry accounts for about 10% of the GNP and directly employs over 4 million workers, making it the nation's largest industry and employer. In addition, an estimated 3 million additional jobs in related services are dependent on the industry. Demands placed on the building and construction community in the last decade have caused the industry to strive for greater efficiency. To meet the needs of society despite changing availability of resources, rising costs, increasing regulation, and conflicting priorities, new understanding must be developed on factors influencing construction productivity.

    These factors were the subject of a Building Futures Forum held in Washington, D.C., November 7-8, 1979. The primary objective of the Forum was to create a better climate for improving productivity in building and construction by: developing a better understanding of the factors, internal and external, influencing productivity in the built environment; determining how these factors affect productivity; determining what must be done to accommodate these factors and to improve our productivity; and making and disseminating recommendations.

HUMAN NUTRITION

An increasing percentage of the American diet comes from refined and processed foods. Concern is growing about the nutritional value of such foods and about the effects of long-term consumption of processed foods on human health and performance. The major objective of the Human Nutrition program is to evaluate nutritional changes brought about by processing, incuding refining, cooking, packaging, storage and the use of additives, supplements and substitutes. The objective is to be achieved by supporting basic and applied investigations of the physical, chemical and biological changes that occur as a result of processing. Problems at the interface of food science and nutrition are encouraged, as are proposals that stress interdisciplinary research and research in disciplines not traditionally involved in nutrition research.

1. High Performance Liquid Chromatography and Bioavailability of Vitamins; Jorg A.L. Augustin, University of Idaho, Department of Bacteriology and Biochemistry, Moscow, ID; **Award #79-19131;** $67,804 for 18 months beginning March 1, 1980

   This research develops a methodology for the determination of water-soluble vitamins by high-performance liquid chromatography (HPLC) in biological matrices such as food. Preliminary results have shown it possible to separate thiamine, riboflavin, niacin, nicotinamide, pyridoxine, pyridoxal, and pyridoxamine in an single chromatogram. HPLC analysis of water-soluble vitam ns is expected to give more accurate results than conventional analytical methods. Because several vitamins can be separated in a single chromatogram, this method will greatly facilitate the analytical work-load of those involved in multi-vitamin analyses of pharmaceutical preparations and natural products. This applies to vitamin anaysis in conjunction with plant breeding programs as well as investigations involving changes in vitamin contents of foods during processing, storage, home, or institutional preparation. Initial efforts center on yet-unresolved problem areas of the actual HPLC separation process.

2. Bioavailability to Humans of Methionine Sulfoxide and Methionine Sulfone from Processed Protein Foods; Nina L. Marable, Virginina Polytechnic Institute, Department of Human Nutrition and Foods, Blackburg, VA 24061; **Award #79-19118;** $36,413 for 12 months beginning February 1, 1980

   Absorption and metabolism by human subjects of methionine sulfoxide (and if possible, methionine sulfone) from intact commercially available protein sources are being studied. Plasma levels of amino acids, especially methionine, methionine sulfoxide, and methionine sulfone are measured to determine whether methionine sulfoxide (or sulfone) is absorbed and/or converted to methionine. Urinary excretion of methionine sulfoxide or methionine sulfone or their acid or alkali-labile derivatives is also determined. Excretion of significant amounts of sulfoxide or sulfone is taken to imply impaired bioavailability.

   Bioavailability to humans of methionine sulfoxide and methionine sulfone has not been measured. Methionine is easily oxidized and sulfoxide and/or sulfone has been found in casein, soy isolates, and milk-based infant formulas, and are probably present in a variety of processed protein foods. Data on bioavailability is therefore urgently needed, especially in connection with the protein nutritional quality of soy or milk-based infant formulas.

SCIENCE AND TECHNOLOGY TO AID THE HANDICAPPED

In Fiscal year 1980, the Science and Technology to Aid the Handicapped program will support fundamental scientific research which may lead to products, treatment methods, or societal and environmental changes of significant benefit to the handicapped. (As defined for purposes of this program, handicapped persons are those who have a physical or mental impairment which substantially limits their vocational, educational, or social activity.) Awards are made on the basis of scientific and technical merit and the probability that the research will be successful in helping to meet high priority needs of the handicapped.

1. Integrated Electro-Mechanical Transducer Systems; John G. Linvill, Stanford University, Department of Electrical Engineering, Stanford, CA 94305; **Award #78-22167 A01;** $55,000 for 12 months beginning February 15, 1980

   This is a continuation of research previously supported under NSF grant ENG 78-22167.

   The electrical properties of polyvinylidene fluoride sheets are examined and used to develop models that characterize devices fabricated with the polymer. Primary device interest centers on tactile sensors that consist of arrays of vibrating plates. Novel methods for using the polymer to stimulate the plates or to serve as the plates themselves are studied. One objective of this research is to develop a planar technology approach to design of the electro-mechanical transducers. This research is also concerned with the design of integrated driver circuits for the transducers.

   One application of this material is to replace the tactile screen currently used in the Optacon, a reading aid for the blind. Use of PVF_2 will enable construction of a device which can be held in one hand, eliminating the need for two-handed coordination and freeing one hand for note-taking.

2. Preparations for Standard Interconnections Workshops; Gregg C. Vanderheiden, University of Wisconsin-Madison, Waisman Center, Madison, WI 53706; **Award #80-06477;** $14,738 for 6 months begining February 1, 1980

   Within the last few years, in response to advancing technology and an increasing attention to the rehabilitation of severely handicapped individuals, there has been a very rapid increase in electronic communication and control aids for individuals having severe and multiple physical physical disabilities. A

large variety of different aids, interfaces, and accessories have been developed to meet the very diverse needs, capabilites, and disabilities of the different handicapped individuals. As might be expected, almost every researcher or manufacturer of these aids chooses a slightly different connector pin-out, voltage convention, or format. As a result, clinicians, handicapped individuals, and rehabilitation personnel have an almost impossible task of finding compatible components for the special needs of the handicapped user.

The program will develop, through national and international cooperation, a common format for connectors for communication and control aids for the severely physically handicapped. The program will define formats for interfaces, intercontroller connections, and accessories. The results will allow aids and devices of various manufacturers and developers to be interchanged and interconnected easily by non-technical personnel. A Standards Workshop will be held at the 1980 International Conference on Rehabilitation Engineering in Toronto in June, 1980.

NATIONAL SCIENCE FOUNDATION
Professional Assistant
Division of Problem-Focused Research
Room 1134A
1800 G Street NW
Washington, D.C. 20550

National Science Foundation
Washington, D.C. 20550

Official Business
PENALTY FOR PRIVATE USE. $300

RETURN THIS COVER SHEET TO ROOM 233, IF YOU DO NOT WISH TO RECEIVE THIS MATERIAL ☐, OR IF CHANGE OF ADDRESS IS NEEDED ☐ (INDICATE CHANGE, INCLUDING ZIP CODE).

Postage and Fees Paid
National Science Foundation

THIRD CLASS
Bulk Rate

Any opinions, findings, conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

REQUEST FOR INFORMATION

☐ I WOULD LIKE TO CONTINUE TO RECEIVE *RECENT AWARDS*
☐ I WOULD LIKE TO RECEIVE ADDITIONAL INFORMATION, INCLUDING NOTIFICATION OF WORKSHOPS SEMINARS, FOR THE FOLLOWING PFR PROGRAMS:
☐ Alternative Biological Sources of Materials
☐ Earthquake Hazards Mitigation
☐ Human Nutrition
☐ Science and Technology to Aid the Handicapped

☐ Check here if your firm is a Small Business

Mailing List Code #_____

NAME_____
(Title) (First) (MI) (Last)

ADDRESS:_____

_____

_____

_____
(Zip Code)

(OR ATTACH YOUR MAILING LABEL HERE)

(NSF 80-40)