

Compendium of Assistive Technology Research

A Guide to Currently Funded Research Projects



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Office of Special Education and Rehabilitative Services

U.S. Department of Education

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Introduction

This compendium presents research on assistive technology funded by the federal government. It includes projects in effect as of Sept. 1, 2003.

General Orientation to Federal Assistive Technology Research Funding

This section identifies agencies that fund assistive technology and describes agency funding mechanisms (such as research centers, field-initiated projects, and other mechanisms), research priorities and funding opportunities. For readers interested in additional information, Web links to agencies and to the funded entities (if available) are included. Descriptions of agency missions and activities were taken directly from agency Web sites.

Summary of Current Research

This section is organized by assistive device category. For each category, specific projects are listed with Web links, where available. For large research centers that are funded for multiple years, we provide detailed descriptions of those centers and their current programs of research.

Cross-Reference Tables

The categories from the previous section are cross-referenced with the following items:

- **Assistive Technology Classifications Systems**
 - International Classification of Functioning, Disability and Health
 - ISO-9999: Technical Aids for Persons With Disabilities—Classification and Terminology
 - National Classification System for Assistive Technology (developed by the National Institute on Disability and Rehabilitation Research and the Research Triangle Institute)

- **Food and Drug Administration Status**

Devices that need approval from the Food and Drug Administration are listed in Title 21 of the U.S. Code of Federal Regulations.

- **MeSH (Medical Subject Headings)**

- **Medicaid and Medicare Payment Status**

- **Agencies Funding the Research**

- **Estimated Number of Manufacturers**

- **Estimated Number of Users**

Purpose of the Compendium

The New Freedom Initiative unveiled by President George W. Bush on Feb. 1, 2001, was designed to build on the *Americans with Disabilities Act of 1990* and support equal access to full participation in American society for citizens with disabilities. The initiative includes four key components:

- Increasing access to assistive and universally designed technologies;
- Expanding educational opportunities;
- Integrating Americans with disabilities into the workforce; and
- Promoting full access to community life.

Under the first component listed above, the New Freedom Initiative directs the Interagency Committee on Disability Research (ICDR) to improve the coordination of federal assistive technology research and development programs. The administration provided funding to the committee so that it could prioritize assistive technology needs in the disability community and foster collaborative projects between federal laboratories and the private sector. This compendium is designed to serve as a basis for the ICDR to identify federal assistive technology research priorities and coordinate funding activities.

How the Compendium Was Developed

We identified federal agencies that fund research on assistive technology and then reviewed their program directories, funding databases and project Web sites to identify currently funded research projects. In deciding which projects to include in the compendium, we were guided by the definition of assistive technology devices contained in section three of the *Assistive Technology Act*:

“Any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities.”

Not included in this report are:

- Implanted devices, including retinal implants;
- Universal design projects;
- Medical technology such as respirators, inhalers and oxygen tanks;
- Functional electrical stimulation; and
- Devices used by medical personnel or therapists in providing treatment.

General Orientation to Federal Assistive Technology Research Funding

This section identifies agencies that fund assistive technology and describes agency funding mechanisms (such as research centers, field-initiated projects and others), priorities and funding opportunities. It begins with a funding program that is supported by multiple agencies and then covers each agency individually. For readers interested in additional information, Web links to agency documents are included. Descriptions of agency missions and activities were taken directly from agency Web sites.

Funding Program Supported by Multiple Agencies

Program: [Innovative Technologies for Enhancing Function for Individuals with Disabilities](#)

Program Announcement Number: PA-02-071

Expiration Date: Jan. 25, 2005

This program encourages small businesses to participate in assistive technology research that facilitates the rehabilitation of individuals with disabilities resulting from injury and disease. The National Institutes of Health (NIH), the National Institute on Disability and Rehabilitation Research (NIDRR) of the U.S. Department of Education's Office of Special Education and Rehabilitative Services (OSERS) and the National Science Foundation (NSF) encourage Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) applications in innovative technologies for enhancing function for individuals with disabilities within their major solicitation topics. The goal of this program is to improve the physical and mental function of individuals with disabilities through new technologies, delivery systems and training techniques.

This program announcement uses the National Institutes of Health SBIR and STTR award mechanisms. The NIH and the NSF participate in the SBIR and STTR programs; NIDRR participates only in the SBIR program. The following agencies participate in the Innovative Technologies program:

- [National Institute of Child Health and Human Development](#)
- [National Institute on Aging](#)
- [National Institute of Biomedical Imaging and Bioengineering](#)
- [National Institute on Deafness and Other Communication Disorders](#)
- [National Eye Institute](#)
- [National Institute of Mental Health](#)
- [National Science Foundation](#)
- [U.S. Department of Education, National Institute on Disability and Rehabilitation Research](#)

Federal Agencies That Fund Assistive Technology Research

National Institute of Standards and Technology

Department of Commerce

As a non-regulatory agency of the U.S. Department of Commerce's Technology Administration, the National Institute of Standards and Technology (NIST) develops and promotes measurements, standards and technology.

Program: [Display Accessibility Technology](#)

Funded by the Convergent Information Systems Division, this program investigates the hardware-related issues that affect the accessibility of displays, working in collaboration with both display manufacturers and accessibility organizations. The goal is to work toward the development of standards and technology that make the display as a human-machine interface more usable by more people. Following are the names of current devices in production:

- [NIST Rotating-Wheel Refreshable Braille Display](#)
- [Refreshable Tactile Graphic Display](#)
- Tactile Graphic Plotter

The Rotating-Wheel Refreshable Braille Display and the Refreshable Tactile Graphic Display are being developed in cooperation with the National Federation for the Blind (NFB). NIST has filed patents and is in discussion with manufacturers to add this technology to their product lines. NIST and the NFB are also working together to test prototype technology developed by NIST, which provides the blind and visually impaired with access to electronic images in the same way that Braille makes words readable.

**Table 1: National Institute of Standards and Technology
Current Projects as of Sep 1, 2003**

Project Title	Institution	End Date
NIST Rotating-Wheel Refreshable Braille Display	NIST/NFB	Ongoing
Refreshable Tactile Graphic Display	NIST/NFB	Ongoing
Tactile Graphic Plotter	NIST/NFB	Ongoing

National Institute on Disability and Rehabilitation Research

Office of Special Education and Rehabilitative Services

Department of Education

[NIDRR](#) funds are used to support rehabilitation research, demonstration projects and related activities—including the training of persons who provide rehabilitation services or who conduct rehabilitation research. NIDRR supports engineering research on technology for

individuals and on systems technology. For example, it has supported hearing aid and wheelchair research at the individual level, including telecommunications and transportation, and has also supported research on the built environment at the systems or public technology level. NIDRR also supports research on ergonomics and interface problems related to the compatibility of various technologies, such as hearing aids and cellular telephones. NIDRR projects can be found in its Program Directory database, maintained by the [National Rehabilitation Information Center](#).

NIDRR supports an extensive research program under the priority area of Technology for Access and Function. Its largest program is the Rehabilitation Engineering Research Center (RERC) program. The RERCs are large center grants funded in the range of approximately \$500,000 to \$1.2 million per year. However, projects on assistive technology can also be found in NIDRR's other research categories, summarized below:

- **Program: Rehabilitation Engineering Research Centers**
RERCs conduct programs of advanced research of an engineering or technical nature designed to apply advanced technology, scientific achievement, and psychological and social knowledge to solve rehabilitation problems and remove environmental barriers. RERCs seek to find and evaluate the newest technologies, products and methods.
- **Program: Disability and Rehabilitation Research Projects**
The Disability and Rehabilitation Research Projects program allows for projects with special emphasis on research, demonstrations, training, dissemination, utilization and technical assistance. Projects may include combinations of these activities.
- **Program: Field-Initiated Projects**
Field-Initiated Projects are designed to encourage eligible applicants to originate valuable ideas for research and demonstration development or knowledge dissemination activities in areas that represent their own interests and are directly related to the rehabilitation of people with disabilities.
- **Program: Small Business Innovative Research**
SBIR grants help support the development of new rehabilitation technology. This two-phase program takes a product from development to market readiness.

Rehabilitation Engineering Research Centers:

[RERC on Information Technology Access](#)

University of Wisconsin-Madison, College of Engineering
Trace Center, Madison, Wis.

End Date: Jun. 11, 2003 (pending renewal)

This RERC covers access by individuals with all types, degrees and combinations of disabilities to a wide range of new and emerging information technologies, including:

- Computers;
- Information transaction machines (e.g., automatic teller machines, kiosks, fare machines, point-of-sale devices and smartcards);
- Home and pocket information appliances (e.g., personal digital assistants);
- Internet technologies;
- Intranets; and
- 3-D and immersive environments.

RERC on Hearing Enhancement

Gallaudet University
Washington, D.C.

End Date: Aug. 1, 2003 (pending renewal)

This RERC develops and evaluates technology to accommodate the needs of people with hearing loss and also disseminates related information in a form that is understandable to consumers, service providers, employers and community leaders. Technology developed or evaluated includes:

- Multichannel and multimicrophone directional hearing aids and fitting procedures for such devices;
- Handheld directional microphones used with behind-the-ear FM hearing aids;
- Electromagnetic interference in hearing aids; and
- Automatic speech recognition as a communication aid for people with hearing loss.

RERC on Prosthetics and Orthotics

Northwestern University
Rehabilitation Engineering Research Program and Prosthetics Research Laboratory
Chicago, Ill.

End Date: Oct. 1, 2003

This center studies human performance as assisted by prosthetic and orthotic systems with the aim of engineering improved prostheses and orthoses through a deeper scientific understanding of their functions. Research and development activities include:

- Development of automated alignment methods for prostheses and orthoses, based on characterization of foot rocker shape during walking;

- Investigations of shock absorption properties of the human locomotor system and of prosthetic-orthotic systems;
- Mechanical considerations for improved crutch ambulation;
- Determination of prosthetic foot roll-over shapes and other characterizations;
- Development of a portable, real-time, 3-D gait evaluation system (3-D Direct Ultrasound Ranging System) that provides estimates of walking quality (outcomes) using a simple technology;
- Development of humeral rotators, particularly for persons with bilateral trans-humeral limb loss; and
- Advancement of design of prosthetic and orthotic components and systems to technology transfer and utilization.

RERC on Improved Technology Access for Land Mine Survivors

Center for International Rehabilitation
Chicago, Ill.

End Date: Nov. 1, 2003

This RERC is active in research, development and demonstration; consumer surveys; education and training; utilization activities; technical assistance; and dissemination relating to improved technology access for land mine survivors. The RERC has developed a vacuum casting system that greatly improves prosthetic socket fabrication.

RERC on Communication Enhancement

Duke University
Durham, N.C.

End Date: Nov. 1, 2003

This center uses innovative communications technologies to benefit researchers, engineers, rehabilitation service providers, developers and users of alternative and augmentative communication (AAC) technologies. Some project titles are:

- [The development of a “Menu-Based” AAC interface for the elderly and other persons with recall memory limitations;](#)
- Improving AAC technologies for young children with significant communication disorders;
- [Evaluating and enhancing communication rate, efficiency and effectiveness;](#)
- [Improving employment outcomes for individuals who require AAC;](#)
- The use of automatic speech recognition as a speech clarifier; and
- The learning experiences of AAC users with AAC technology.

RERC on Wheeled Mobility

University of Pittsburgh

School of Health and Rehabilitation Sciences, Rehabilitation Science and Technology

Pittsburgh, Pa.

End Date: Jan. 1, 2004

This RERC focuses on the following priorities:

- Development and evaluation of strategies to aid therapists and consumers in making informed decisions when prescribing or purchasing new wheelchairs and wheelchair seating systems;
- Development and evaluation of strategies in collaboration with the industry to promote the integration of external devices with powered wheelchairs to ensure their compatibility and usability;
- Development and evaluation of new wheelchair technologies;
- Investigation of the viability of dynamic seating systems;
- Investigation of the factors that contribute to the development of pressure sores, and the development and evaluation of tools (devices and strategies) to prevent them;
- Investigation of the use of voluntary performance standards for wheelchair seating devices and clinical measurement devices and (if appropriate) the development, facilitation and implementation of those standards in collaboration with industry strategies; and
- Development and evaluation of outcome measurement tools for quantifying seating clinic intervention results.

The following research projects are currently being conducted:

- [Investigation of Dynamic Seating for Children with Extensor Thrust](#)
- [Investigation of Dynamic Seating for Comfort](#)
- [Investigation of Biomechanical Factors for Predicting Pressure Ulcer Risk](#)
- [Quantification and Development of a Pressure Index](#)
- [Investigation Outcome Measurement Tools for Seating and Mobility](#)
- [Integration of Electronic External Devices for Powered Mobility Systems](#)
- [Development of Wheelchair Seating Standards](#)
- [Standardized Postural Measures in Support of Quantification of Seating Outcomes](#)
- [Development and Evaluation of Injury Prevention Wheelchair Technologies](#)
- [Enhanced Controls for Powered Wheelchairs](#)

RERC on Telecommunication Access

University of Wisconsin-Madison, College of Engineering
Trace Center, Madison, Wis.

End Date: Sept. 1, 2004

The primary focus of this RERC is to make telecommunications systems directly usable by people with all types and degrees of disability. A secondary focus involves ensuring compatibility with assistive technologies such as teletypewriters (TTYs), assistive listening devices, alternative input devices and devices with alternative displays.

Technologies being addressed include:

- Customer premises equipment of all types, including telephones, video phones, pagers and messaging systems;
- Telecommunication systems and services, including voice mail, interactive voice response systems, etc.;
- Network topologies;
- Telecommunications standards; and
- Next-generation multimedia telecommunication systems, including telecollaboration and virtual meetings.

Smith-Kettlewell RERC

Smith-Kettlewell Eye Research Institute
San Francisco, Calif.

End Date: Aug. 1, 2005

This RERC undertakes projects designed to produce new technology and methods for understanding, assessment and rehabilitation of blindness and visual impairments.

- **Educational Technology, Including Access to Graphics**
Our series of motivating educational devices for [blind and deaf-blind children](#) includes the Flexi-Formboard, designed to improve a child's skill with geometrical shapes through the use of auditory and tactile feedback. We are developing new tools for auditory and tactile graphics access, such as [Access to Matlab: SKTools](#).
- **Vocational Technology**
To enhance the employability of blind individuals, we have developed many job-related instruments with auditory and tactile output, including microprocessor-based job instrumentation and speech modules for adapting measuring instruments. Other examples include low-cost, simple-to-use computer access systems and auditory instruments to facilitate the interconnection of computers and peripherals by blind operators. Our present focus in this topic area is on

access to visual displays and products found in the workplace as well as in the home and community.

- **Orientation and Mobility**

The RERC also conducts research and development in orientation and mobility for blind and multiply impaired persons. The [Talking Signs](#) project provides a means for a blind pedestrian to locate and “read” signs from a distance, using inexpensive infrared transmitters placed at sign locations. This system holds the promise of revolutionizing wayfinding and accessibility in public areas and facilities, as well as other unfamiliar areas. We are also developing new techniques to enhance wheelchair mobility for blind persons and harnessing [computer vision technology](#) to aid orientation and mobility.

- **Low Vision Tests and Technology**

For persons with low vision, we are exploring various new magnifying and illumination systems, both optical and electronic, and investigating eccentric viewing techniques for reading. In addition, new techniques for improved vision assessment (using tests that relate more closely to the perceived real-world visual problems of the elderly and visually impaired) are being developed and tested ([SKI Study](#)).

- **Deaf-Blind Technology**

To improve communication for the deaf-blind, we are now refining a robotic hand system (known as “Dexter”) capable of performing manual fingerspelling, facilitating telephone communication and computer access, and performing face-to-face communication.

[RERC on Technologies for Children with Orthopedic Disabilities](#)

Los Amigos Research and Education Institute, Inc.
Rancho Los Amigos National Rehabilitation Center
Downey, Calif.

End Date: Nov. 1, 2005

This RERC currently focuses on developing technology for children with orthopedic disabilities, with an emphasis on prosthetics and orthotics. Current project titles include:

- [Easy Feed Hands for the Growing Child](#)
- [Developmental Indicators for Children’s Upper Limb Prosthesis](#)
- [Active Mobile Arm Support](#)
- [Next-Generation Knee-Ankle-Foot-Orthosis Technology](#)
- [Optimized Post-Formable Orthosis for Ankle Stability in Children With Cerebral Palsy](#)

- [Plantarflexion Neuromuscular Stimulation: A Dynamic Retraining Orthosis](#) (“NMES: A Stimulating Idea to Help Decrease Toe Walking”)
- [Evaluation of a Model for Provision of Powered Mobility for Young Children](#)
- [Technology for Play and Socialization for Children With Orthopedic Disabilities](#)

RERC on Technology for Successful Aging

University of Florida
Gainesville, Fla.

End Date: Oct. 1, 2006

The core focus of the “Tech-Aging” RERC is research and development for older persons. Projects focus on the closely related areas of communications, home monitoring and smart technologies. These projects include:

- [Smart Houses](#);
- [Remote Home Health Monitoring](#);
- [Home Monitoring for People Aging With Disability](#);
- [Cognitive Assistance](#); and
- [Smart Phone](#).

RERC on Mobile Wireless Technologies for Persons with Disabilities

Georgia Centers for Advanced Telecommunications Technology
Georgia Institute of Technology
Atlanta, Ga.

End Date: Oct. 1, 2006

With an overall goal of promoting independence and autonomy for people with disabilities, this RERC has two primary aims: a) to ensure equitable access to mobile wireless products and services by people with disabilities of all ages and abilities; and b) to investigate promising applications of mobile wireless technologies. These projects include:

- **[Universal Control and Multimodal Interfaces](#)**
This project will develop and test prototypes of mobile wireless devices designed for universal control applications and develop a prototype multimodal wireless device.
- **[Wearable Captioning Device](#)**
A wearable device, using mobile wireless technology that provides text captioning for individuals who are deaf or hard of hearing, will be developed and evaluated during this project.

- **Mobile Wireless Communication Access**
This project will combine mobile wireless technologies with AAC devices to support speech synthesis and independent communication throughout the community.
- **Mobile Wireless Technology as Cognitive Prosthetics**
This development project explores three applications of mobile wireless technologies to support community reentry for people who have cognitive impairments resulting from acquired brain injury. These applications include time management, wayfinding in the community, and prompting and cueing to initiate and sustain engagement in activity.

- **RERC on Wheelchair Transportation Safety**

University of Pittsburgh
School of Rehabilitation and Health Sciences
Department of Rehabilitation Science and Technology
Pittsburgh, Pa.

End Date: Nov. 1, 2006

This center improves the safety of wheelchair users who remain seated in their wheelchairs while using public and private motor vehicle transportation. The RERC tasks investigate and develop new wheelchair tie-down and occupant restraint system technologies, including wheelchair-integrated restraints and universal docking concepts that enable wheelchair users to secure and release their wheelchairs independently and quickly, and use an effective occupant restraint system without the need for assistance. These projects include:

- **Wheelchair Accidents Investigation;**
- **Side and Rear Impact;**
- **Universal Securement Interface;**
- **Seating System Crashworthiness;**
- **Integrated Occupant Restraints;** and
- **Industry Standards.**

RERC on Recreational Technologies and Exercise Physiology Benefiting Persons with Disabilities

University of Illinois at Chicago
Chicago, Ill.

End Date: Nov. 1, 2007

Faculty from the University of Colorado have partnered with the University of Illinois at Chicago to focus on improving the health, wellness and quality of life of people with disabilities by promoting and facilitating increased participation in physical activity and recreation. This RERC promotes the recreational opportunities available to people with disabilities through a series of research, development and training

projects. The two main engineering projects administered through the University of Colorado are: 1) [Virtual Electronic Environments to Facilitate Exercise Participation and Adherence](#); and 2) [Adaptive Exercise Machine Control for Persons with Disabilities](#).

[RERC on Spinal Cord Injury: Technologies to Enhance Mobility and Function for Individuals with Spinal Cord Injury](#)

Los Amigos Research and Education Institute, Inc.
Downey, Calif.

End Date: Nov. 1, 2007

This research and development program is focused on the need to maintain mobility for as long as possible to enhance independent function. A survey of the user population identifies the areas of greatest need. An active Mobile Arm Support for adults allows greater independence for those with limited arm function. The shoulder-preserving wheelchair, gait-training robotic assist device and adaptive exercise equipment are all specifically geared to preserve or enhance mobility in individuals with spinal cord injury. A project on optimized wheelchair suspension keeps people mobile by increasing comfort and reducing tissue loading.

**Table 2: National Institute on Disability and Rehabilitation Research
Current Projects as of Sep 1, 2003**

Project Title	Institution	End Date
Disability and Rehabilitation Research Projects		
Mental Retardation and Technology	Beach Center on Disability University of Kansas Lawrence, Kan.	Oct 1, 2006
Think and Link: E-mail for Individuals with Cognitive Disabilities	Western Oregon University Eugene, Ore.	Oct 1, 2006
Assistive Technology and Cognitive Disabilities	Brain Injury Association of America, Inc. Alexandria, Va.	Nov 1, 2006
Wayfinding Technologies for People With Visual Impairments: Research and Development of an Integrated Platform	Sendero Group, LLC Davis, Calif.	Dec 1, 2006
Assistive Technology in the Community	Washington University School of Medicine, Occupational Therapy St. Louis, Mo.	Jan 1, 2007

**Table 2: National Institute on Disability and Rehabilitation Research
Current Projects as of Sep 1, 2003 (con't)**

Project Title	Institution	End Date
Field-Initiated Projects		
Optimizing Posture, Trunk Control and Reach of Wheelchair Users	Georgia Institute of Technology Center for Assistive Technology and Environmental Access Atlanta, Ga.	Oct 1, 2003
Access to Digital Television	National Center for Accessible Media WGBH Educational Foundation Boston, Mass.	Aug 1, 2004
The Braille Power Reader Program	Science Applications International Corporation Arlington, Va.	Aug 1, 2004
The Development of a Tool to Enhance Communications Between Blind and Sighted Mathematicians, Students and Teachers: A Global Translation Appliance	University of South Florida Lakeland, Fla.	Oct 1, 2004
Automatic Generation of Optimal Tactile Graphics	University of Delaware Electrical and Computer Engineering Department Newark, Del.	Sep 1, 2005
Factors Affecting Directional Hearing Aid Performance in Children	Vanderbilt University School of Medicine Nashville, Tenn.	Sep 1, 2005
ABC-Link: A Web-Based Literacy Assessment Tool for Students With Significant Disabilities	University of North Carolina-Chapel Hill Allied Health Sciences Chapel Hill, N.C.	Oct 1, 2005
The Efficacy of Computer and Sense Wear Technologies for Promoting Health in Adults With Fibromyalgia: A Randomized Clinical Trial	University of Pittsburgh Pittsburgh, Pa.	Oct 1, 2005
SBIR Phase II		
NutraNet: An Internet-Based, Self-Directed Multimedia Software System for Nutritional Education, Planning and Implementation for Individuals With Mental Retardation	AbleLink Technologies, Inc. Colorado Springs, Colo.	Sep 17, 2003

**Table 2: National Institute on Disability and Rehabilitation Research
Current Projects as of Sep 1, 2003 (con't)**

Project Title	Institution	End Date
Pocket Compass: A Palmtop Computer-Based Intelligent Aid for Individuals With Mental Retardation to Increase Independence and Self-Determination in Decision Making	AbleLink Technologies, Inc. Colorado Springs, Colo.	Sep 17, 2003
QwikClick: An Intelligent Scanning Keyboard That Maximizes the Capability of Single-Switch Users	CreateAbility Concepts, Inc. Fort Collins, Colo.	Sep 17, 2003
Gesture Recognition System for Personal Computing Applications	Future of Technology and Health Iowa City, Iowa	Sep 17, 2003
Pocket Voyager: Making Palmtop Computers Accessible to Individuals With Mental Retardation	AbleLink Technologies, Inc. Colorado Springs, Colo.	Sep 17, 2004
A Low-Cost, High-Performance Physical Activity Monitor	Barron Associates, Inc. Charlottesville, Va.	Sep 17, 2003
TalkTiles: A Multi-Sensory Language Development Tool and Communication Aid	Intelligent Automation, Inc. Rockville, Md.	Sep 20, 2003
Virtual Interview Exercises for Workplace Success (VIEWS)	Vcom3D, Inc. Orlando, Fla.	Sep 1, 2004
Development of an Audio/Tactile Accommodation for Delivery of Standardized Math Tests to Students Who Are Blind or Visually Impaired	Touch Graphics Brooklyn, N.Y.	Sep 1, 2004
Online Instruction Tools for Teaching Mathematical Problem Solving to Learning-Disabled Students	Learnimation New York, N.Y.	Sep 30, 2004

Office of Special Education Programs

Office of Special Education and Rehabilitative Services
Department of Education

Programs:

Special Education—Research and Innovation to Improve Services and Results for Children With Disabilities

Special Education—Technology and Media Services for Individuals With Disabilities

Notice: [Inviting Applications for Fiscal Year \(FY\) 2003](#)

On July 28, 2003, the Office of Special Education Programs announced FY 2003 grant funding under three programs authorized by the *Individuals with Disabilities Education Act*, as amended. Two of these programs provide funding for educational assistive technology:

- **Special Education—Research and Innovation to Improve Services and Results for Children With Disabilities**
The purpose of this program is to produce and advance the use of knowledge to improve the results of education and early intervention for infants, toddlers and children with disabilities.
- **Special Education—Technology and Media Services for Individuals With Disabilities.** The purpose of this program is to: a) improve results for children with disabilities by promoting the development, demonstration and use of technology; b) support educational media activities designed to be of educational value to children with disabilities; and c) provide support for some captioning, video description and cultural activities.

**Table 3: Office of Special Education Programs
Current Projects as of Sep 1, 2003**

Project Title	Institution	End Date
The Computer Reader/Word Processor as a Compensatory Aid for Middle School Students With Learning Disabilities	Prince George’s County Board of Education Upper Marlboro, Md.	Sep 30, 2003
Assistive Technology in the Schools	Williamsville Central School District Williamsville, N.Y.	Dec 31, 2003
The Cornerstones Project, Phase II	National Center for Accessible Media Boston, Mass.	Dec 31, 2003
The Development of Software to Ensure Access to Science Text Through the Strategic eTutor	University of Kansas Lawrence, Kan.	Jul 1, 2004
The Virtual History Museum: Technology Tools and Environments to Support Historical Understanding of Students With Disabilities	Michigan State University East Lansing, Mich.	Aug 15, 2004
University of Kentucky Assistive Technology Research Institute	University of Kentucky Lexington, Ky.	Sep 30, 2004
Enhancing Academic Achievement and Transition Outcomes Through Technology	Ohio State University Columbus, Ohio	Sep 30, 2004

**Table 3: Office of Special Education Programs
Current Projects as of Sep 1, 2003 (con't)**

Project Title	Institution	End Date
Anchoring Problems in Technology-Rich Environments to Enhance the Math Skills of Adolescents With Disabilities	University of Wisconsin Madison, Wis.	Jun 30, 2005
Teaching Blind Children to Cross Streets in Virtual Reality	Oregon Research Institute Eugene, Ore.	Sep 30, 2006
Research Institute on the Use of Technology in Early Intervention	Thomas Jefferson University Philadelphia, Pa.	Dec 31, 2006

Rehabilitation Services Administration

Office of Special Education and Rehabilitative Services
Department of Education

New Funding Opportunity: Special Demonstration Program of Projects for Orthotic and Prosthetic Research

Application Closing Date: Aug. 27, 2003

The purpose of this program is to provide one-time funding in response to the *Department of Education Appropriations Act of 2001*, as enacted by section G of the Consolidated Appropriations Resolution for FY 2003, for one or more projects designed to improve the quality of applied orthotic and prosthetic research and to help meet the increasing demand for provider services.

Office of the Assistant Secretary for Planning and Evaluation

Department of Health and Human Services

The Office of the Assistant Secretary for Planning and Evaluation of the Department of Health and Human Services funded three research projects that deal with issues related to assistive technology.

**Table 4: Office of the Assistant Secretary for Planning and Evaluation
Current Projects as of Sep 1, 2003**

Project Title	Institution	End Date
Monitoring Trends in Elderly Disability and the Use of Assistive Devices	Urban Institute Washington, D.C.	Jul 2004
Lexicon of Technologies in Long-Term Care Settings	Polisher Research Institute North Wales, Pa.	Aug 2004
Development of an Assistive Technology and Environmental Assessment Instrument for National Surveys	Polisher Research Institute North Wales, Pa.	Aug 2004

National Institute on Aging

National Institutes of Health
Department of Health and Human Services

The [National Institute on Aging](#) conducts and supports biomedical, social and behavioral research; provides research training; and disseminates research findings and health information on aging processes, diseases and other special problems and needs of older people.

For More Information:

National Institute on Aging, *Guide to Research and Training Programs*, July 2003
(<http://www.nia.nih.gov/NR/rdonlyres/3BDD4836-0339-4BA0-8F58-C21ACBFE4194/4018/niaguide.pdf>, last accessed April 14, 2005)

National Institute on Aging, *Strategic Plan: FY 2001–2005*

(<http://www.nia.nih.gov/AboutNIA/StrategicPlan/>, last accessed April 14, 2005)

**Table 5: National Institute on Aging
Current Projects as of Sep 1, 2003**

Project Title	Institution	End Date
Early Detection of Falls With Multidimensional Sensors	Integrated Biomedical Systems Essex Junction, Vt.	Dec 31, 2003
Enhancing Function of Frail Elders by Modifying the Home	Thomas Jefferson University Philadelphia, Pa.	May 31, 2004
A New Power Supply for Electric Wheelchairs and Scooters	Lynntech, Inc. College Station, Tex.	Jan 31, 2005
Finding the Right Wheels—Improving Wheelchair Provision	Duke University Durham, N.C.	None Listed

National Institute on Deafness and Other Communication Disorders

National Institutes of Health
Department of Health and Human Services

The [National Institute on Deafness and Other Communication Disorders](#) conducts research on assistive devices. Extramural research is managed and coordinated by three branches: a) Hearing and Balance-Vestibular Branch; b) Voice, Speech, Language, Smell and Taste Branch; and c) Clinical Trials Branch.

**Table 6: National Institute on Deafness and Other Communication Disorders
Current Projects as of Sep 1, 2003**

Project Title	Institution	End Date
I-Talk: Eye Controlled, Direct Selection AAC Device	Enkidu Research, Inc. Lockport, N.Y.	Sep 25, 2003
A Wireless Voice Link-Module for the Hearing Impaired	Audiological Engineering Corporation Somerville, Mass.	Sep 30, 2003
Confidential ASL Access for Medical Consultation	Vcom3d, Inc. Orlando, Fla.	Nov 30, 2003
A Device Enabling Deaf and Hearing People to Communicate	Scomm, Inc. Sedalia, Mo.	Dec 31, 2003
Hearing Aids Based on Models of Cochlear Compression	Becs Technology, Inc. St. Louis, Mo.	Dec 31, 2003
One-Hand Control of a Speech Synthesizer	Sensimetrics Corporation Somerville, Mass.	Mar 31, 2004
Electromagnetic Noise Canceling System for Hearing Aids	Oval Window Audio Nederland, Colo.	Mar 8, 2004
Inexpensive Hearing Device Based on Ear Canal Geometry	Hearing Components, Inc. Maplewood, Minn.	Apr 14, 2004
New Test for Predicting Hearing Aid Use	University of Tennessee Knoxville, Tenn.	Aug 31, 2004
Optimizing Amplification for Infants and Young Children	Father Flanagan's Boys' Home Boys Town, Neb.	Aug 31, 2004
Frametalker: An Utterance-Based Augmentative Device	Enkidu Research, Inc. Lockport, N.Y.	Aug 31, 2004
Personalizing Speech Output for Communication Devices	Agoranet, Inc. Newark, Del.	Apr 30, 2005
Hearing Loss and Prosthesis Simulator	Sensimetrics Corporation Somerville, Mass.	Jun 30, 2005
Wearable Programmable Tactile Speech Aid for Deaf People	Coulter Associates, Inc. Vienna, Va.	Aug 31, 2005

National Eye Institute

National Institutes of Health
Department of Health and Human Services

Program: Visual Impairment and Its Rehabilitation

One of the goals of this program is to develop assistive devices, environmental modifications and rehabilitation strategies to minimize the impact of visual impairments in everyday life. Another goal is to reduce disability and societal limitations among visually impaired persons. This research focus includes the development of new devices, the application of advanced technologies to visual or sensory substitution aids, and the continuous development and exploitation of new technologies, including communication, information and computer technology. In addition to developing assistive devices, it is essential that the research in this area addresses how to optimize training in the effective use of devices. Other issues central to research in this area are cost, accessibility, cosmetics, personal acceptance of visual rehabilitation devices and ease of use.

For More Information: *Vision Research—A National Plan: 1999–2003*

(<http://www.nei.nih.gov/resources/strategicplans/neiplan/>, last accessed April 14, 2005)

**Table 7: National Eye Institute
Current Projects as of Sep 1, 2003**

Project Title	Institution	End Date
Navigating Without Vision—Basic and Applied Research	University of California Santa Barbara, Calif.	May 31, 2004
Visible Light Audio Information Transfer System	Talking Lights, LLC Boston, Mass.	Jun 30, 2004
Indoor Orientation and Wayfinding Aid for Vision Loss	Charmed Technology Atlanta, Ga.	Jul 31, 2004
Smart Power Assistance Module for Manual Wheelchairs	AT Sciences Pittsburgh, Pa.	Aug 31, 2004
A Smart Telescope for Low Vision	Blindsight Corporation Cambridge, Mass.	Aug 31, 2004
Reading Enhancement for Patients With Visual Field Loss	Harvard University Medical School Boston, Mass.	Dec 31, 2004
Remote Access Graphing Calculator—Visually Impaired	Automated Functions, Inc. Falls Church, Va.	Apr 30, 2005
Accessible Graphing Scientific Interactive Calculator	Automated Functions, Inc. Falls Church, Va.	Jun 30, 2005

**Table 7: National Eye Institute
Current Projects as of Sep 1, 2003 (con't)**

Project Title	Institution	End Date
Haptic Display of Space Through Portable Nav Aids	Sensimetrics Corporation Somerville, Mass.	Aug 31, 2005
Engineering Approaches to Low Vision Rehabilitation	Schepens Eye Research Institute Boston, Mass.	Sep 29, 2005

National Center for Medical Rehabilitation Research

National Institute of Child Health and Human Development
National Institutes of Health
Department of Health and Human Services

The [National Center for Medical Rehabilitation Research](#) is a component of the National Institute of Child Health and Human Development. The center's mission is to foster development of the scientific knowledge needed to enhance the health, productivity, independence and quality of life of people with disabilities. This is accomplished by supporting research on enhancing the functioning of people with disabilities in daily life. A primary goal of the center is to bring the health-related problems of people with disabilities to the attention of America's best scientists to capitalize on the advances occurring in the biological, behavioral and engineering sciences.

The [Research Plan](#) for the National Center for Medical Rehabilitation and Research includes seven cross-cutting areas in which increased research effort is needed. The development of improved assistive technology is one of those priority areas.

New Funding Opportunity: HD-03-023 [Innovations in Powered Mobility Devices: SBIR and STTR](#)

Letter of Intent Receipt Date: Sept. 23, 2003
Application Receipt Date: Oct. 23, 2003

This request for application (RFA) solicits applications to address the development of a new generation of powered mobility devices that are safe, stable, comfortable and affordable. A key aspect of this RFA is to encourage applicants to consider paradigm shifts to improve transport devices such as wheelchairs and scooters through improved design, use of materials and state-of-the-art technology. Research areas appropriate for this include, but are not limited to, reducing weight, improving power supply and advancing designs to improve portability.

New Funding Opportunity: HD-03-014 [Innovative Technologies for Pediatric Critical Care and Rehabilitation \(SBIR and STTR\)](#)

Letter of Intent Receipt Date: Sept. 15, 2003
Application Receipt Date: Oct. 15, 2003

This RFA encourages applicants to take advantage of the SBIR AND STTR programs for multidisciplinary research projects aimed at developing technology to enhance the function of children with critical illnesses and residual disabilities. The initiative is intended to be broad and open to all relevant research ideas. Proposals to develop technologies and devices, as well as assessment tools and strategies to minimize functional disability after a critical illness of childhood, are within the scope of this initiative.

**Table 8: National Center for Medical Rehabilitation Research
Current Projects as of Sep 1, 2003**

Project Title	Institution	End Date
Electric Heavy-Duty Work Hand	Motion Control, Inc. Salt Lake City, Utah	Nov 14, 2003
MUSE WebPads: Providing Museum Visitors Universal Access	Information In Place, Inc. Bloomington, Ind.	Feb 28, 2004
Two-Speed Manual Wheelchair Wheel	Magic Wheels, Inc. Seattle, Wash.	Feb 28, 2004
Ear Device Enabling Hands-Free Wheelchair Control	Think-A-Move, LLC Cleveland, Ohio	Feb 29, 2004
Anthropomorphic Loading Device for Seat Cushion Testing	Beneficial Designs, Inc. Minden, Nev.	Feb 29, 2004
A Communication Device for the Speech Impaired	Kibitzer Rockville, Md.	Mar 31, 2004
Biomechanics of the UE in Wheelchair Propulsion	Mayo Clinic Rochester, Minn.	May 31, 2004
Lightweight Durable Wheelchair From Engineering Resin	Turbo Wheelchair Company, Inc. Roswell, Ga.	May 31, 2004
Advanced Biofidolic Lower Extremity Prosthesis Research	Sparta, Inc. Laguna Hills, Calif.	May 31, 2004
HipGrip Pelvic Stabilization Device for Wheelchair Users	Beneficial Designs, Inc. Minden, Nev.	Jun 30, 2004
Development of Auto-Docking Wheelchair Securement	Kinedyne Corporation Lawrence, Kan.	Jun 30, 2004
An Improved Lever Drive Wheelchair Transmission	Green Technologies, Inc. West Fork, Ark.	Jul 31, 2004
FlexRim Low Impact Wheelchair Pushrim	Beneficial Designs, Inc. Minden, Nev.	Aug 31, 2004
A Universal Canoe Seating System	Beneficial Designs, Inc. Minden, Nev.	Aug 31, 2004

**Table 8: National Center for Medical Rehabilitation Research
Current Projects as of Sep 1, 2003 (con't)**

Project Title	Institution	End Date
Safety-Sensing Independence-Enhancing Wheelchair	Activmedia Robotics, LLC Peterborough, N.H.	Nov 30, 2004
An Improved Prosthetic Bioactuator	ADA Technologies, Inc. Littleton, Colo.	Nov 30, 2005
RCT on Preventing Pressure Ulcers With Seat Cushions	University of Pittsburgh Pittsburgh, Pa.	May 31, 2008

Department of Veterans Affairs

Program: Rehabilitation Research and Development Service

An intramural program, the Rehabilitation Research and Development Service is dedicated to the well-being of veterans through a full spectrum of research—from approved rehabilitation research projects through evaluation and technology transfer to final clinical application. The Department of Veterans Affairs' (VA) Rehabilitation Research and Development Service emphasizes and funds research in the following broad priority areas:

- Prosthetics, Orthotics and Orthopedic Rehabilitation;
- Neurological Dysfunction and Spinal Cord Injury Restoration and Rehabilitation or Medical Complications;
- Geriatric Rehabilitation;
- Visual and Hearing Impairment Rehabilitation;
- Rehabilitation Engineering; and
- Rehabilitation Outcomes.

In addition to areas already funded, encouraged areas of new emphasis include, but are not limited to: a) Technologies for Successful Aging; and b) Innovative Approaches to Prosthetic Development.

For More Information: *Rehabilitation Research and Development Centers Handbook* (<http://www.vard.org/handbook/1203-4.pdf>, last accessed April 14, 2005)

Centers of Excellence:

The Rehabilitation Research and Development Service funds the Centers of Excellence, which are the sites of rehabilitation research focused on finding research solutions for the needs of veterans with disabilities. Currently funded centers that are conducting research on assistive technology are described below.

- **Center for Aging Veterans With Vision Loss**
Researchers at the Atlanta center work to improve the function, independence and quality of life for aging veterans with visual disabilities and those acquiring visual disabilities. The center focuses on vision, cognition and mobility research and the interaction among these areas. Research goals include the understanding of the mechanisms underlying impairments and disabilities and the application of this

understanding to the design, testing and evaluation of rehabilitative interventions. The center is affiliated with Emory University and has relationships with the University of Georgia, Georgia Tech and Georgia State.

- **Center for Mobility**

Researchers at the Center for Mobility study neurologic and orthopedic impairments to restore and enhance muscle coordination in persons who have had a stroke or who have sustained a spinal cord injury. One goal is to restore and enhance musculo-skeletal function and integrity in persons with osteoporosis, arthritis or spinal cord injury. Another goal of the Palo Alto center is to promote the development of assistive technologies to help people with disabilities to be as functional and independent as possible. Researchers are also investigating: a) obstacle avoidance training by utilizing computer-simulated environments; b) the development of an assistive robot for effective health care delivery; and c) differential pressure walking assistance. The center is affiliated with Stanford University and collaborates with other institutions in areas of relevance to the center's mission.

- **Center for Wheelchair and Related Technology**

Pittsburgh investigators focus on the design, development and evaluation of new technologies to improve the mobility of physically impaired individuals. They have made important contributions toward the design of wheelchairs, seating systems, transportation systems and novel approaches to the delivery of assistive technology. The center has been a leader in the establishment and implementation of international standards. Rehabilitation engineering and biomechanics are important strengths of the center, as are its capabilities in conducting multisite studies of assistive technology. Through improved design and prescription, investigators expect to reduce the incidence of pressure sores, enhance the understanding of wheeled mobility needs, reduce the incidence of repetitive upper extremity strain injuries, increase access to wheelchair and seating experts, expand and improve on clinical knowledge, and develop better wheelchair designs and related technologies.

- **Center for Limb Loss and Prosthetic Engineering**

Investigators here study amputation prevention, lower limb prosthetic improvement and patient outcome measurements. One of the first to routinely test aging veterans for diabetes—the leading cause of non-traumatic lower limb loss—the center has long been a resource for veterans with limb-at-risk and amputation-related problems. The center nurtures a community of clinical and basic scientists to better understand lower limb mechanics and its effect on disease, prosthetic engineering innovations, and the treatment of secondary disabilities after amputation. The center measures functional treatment outcomes, tracks the positive impact of innovation and disseminates research results. Collaborative research is conducted with the departments of Orthopedics and Rehabilitation Medicine at the University of Washington and the Prosthetics Research Study Group.

- **Center for Rehabilitative Auditory Research**

The National Center for Rehabilitative Auditory Research, located at the Portland VA Medical Center, serves as a multidisciplinary, multisite resource that is dedicated to improving the rehabilitation of veterans with hearing disabilities. The National Center

for Rehabilitative Auditory Research is the only VA research center dedicated to addressing the needs of veterans with hearing impairment and tinnitus.

**Table 9: VA Rehabilitation Research and Development
Current Projects as of Sep 1, 2003**

Center of Excellence	Current Research	End Date
Center for Wheelchair and Related Technology	<ul style="list-style-type: none"> • Dynamic Force Distribution at the Body-Seat Interface During Wheelchair Propulsion; • Ability to Propel a Manual Wheelchair and Length of Use in Multiple Sclerosis; • Evaluation of the Comprehensiveness/Effectiveness of Wheelchair Seating; and • Application of a Commercial Datalogger to Electric-Powered Wheelchairs for Rehabilitation Research. 	Sep 2004
Center for Limb Loss and Prosthetic Engineering	Improve prosthetic design by comparing suspension systems, measuring the effect of impact-absorbing prosthetic shanks in below knee prostheses and investigating the development of a powered prosthesis.	Sep 2007
Center for Mobility	A Robot for the Vocational Independence of People With Tetraplegia	Sep 2007
Center for Aging Veterans With Vision Loss	A Robotic Walker for Frail Elderly With Vision Impairment	Sep 2003
Center for Rehabilitative Auditory Research	Effect of Individualized Counseling on Hearing Aid Acceptance	Sep 2004

National Science Foundation

New Funding Opportunity: [NSF 03-587: Research in Disabilities Education](#)

Posted: Aug. 5, 2003

Proposal Deadline: Apr. 16, 2004

Within the Division of Human Resource Development, the Research in Disabilities Education (RDE) program is committed to increasing the number of persons with disabilities who are engaged in science, technology, engineering and mathematics careers by:

- Encouraging needed changes in academic and professional climates;
- Developing awareness and recognition of the needs and capabilities of students with disabilities;
- Promoting the accessibility and appropriateness of instructional materials, media and educational technologies; and
- Increasing the availability of student enrichment resources, including mentoring activities.

The RDE program will supersede the Program for Persons With Disabilities. For FY 2004, the RDE program supported awards for:

- Demonstration, Enrichment and Information Dissemination (RDE-DEI);
- Focused-Research Initiatives (RDE-FRI); and
- Regional Alliances for Persons With Disabilities in Science, Technology, Engineering and Mathematics education (RDE-RAD).

Assistive technology research at the National Science Foundation is funded through five programs across three divisions, in addition to the SBIR program.

The [Program for Persons With Disabilities](#) is now known as the Research in Disabilities Education program. Although several engineering and biomedical programs seek to develop better assistive technology, and all National Science Foundation programs are encouraged to fund activities for making education and research opportunities appropriate for all students (including those with disabilities), the RDE program has a unique focus with its two overarching objectives: a) to develop and implement strategies to promote full inclusion of students with disabilities throughout the educational continuum; and b) to increase the number of individuals with disabilities entering careers in science, technology, engineering and mathematics.

The [Universal Access](#) program conducts research that is fundamental to the design of systems that mediate between computers and humans, with a special emphasis on advancing computer technology so that all people can possess the skills needed to fully harness the power of computing. Research areas of interest include:

- Human language technology and multimodal environments;
- Graphical and multimedia interfaces;
- Use of gesture, movement, touch and sound in the interface;
- Highly interactive intelligent interfaces;
- Virtual and augmented reality;
- Immersive environments;
- Wearable computing;
- Computer-supported collaboration; and
- New input and output devices.

The [Human-Computer Interaction](#) program supports research that is fundamental to the design and evaluation of systems that mediate between computers and humans, which will lead to the creation of new user interface software and technology.

The [Information Technology Research](#) program is waiting on a new program publication. The [Research to Aid Persons With Disabilities](#) program supports the development of technologies for new and improved devices or for software for persons with disabilities. Undergraduate engineering design projects are also supported, especially those that provide prototype “custom-designed” devices or software for persons with mental and physical disabilities. The University of Connecticut at Storrs prepares an annual review of these senior design projects.

Table 10: National Science Foundation Programs by Directorate	
Directorate	Funding Program
Directorate for Education and Human Resources Division of Human Resource Development	Until FY 2004, Program for Persons With Disabilities For FY 2004, Program for Research in Disabilities Education
Directorate for Computer and Information, Science and Engineering Division of Information and Intelligent Systems	Human-Computer Interaction Universal Access Information Technology Research
Directorate for Engineering Division of Bioengineering and Environmental Systems	Research to Aid Persons With Disabilities
Directorate for Engineering Division of Design, Manufacturing and Industrial Innovation	SBIR

Table 11: National Science Foundation Current Projects as of Sep 1, 2003		
Project Title	Institution	End Date
Program: Human-Computer Interaction		
A Computational Architecture for Tracking Cognitive Processes	Drexel University Philadelphia, Pa.	Jun 30, 2007
Program: Universal Access		
Textual Information Access for the Visually Impaired	University of Maryland College Park, Md.	Feb 29, 2004
Tactile Glove for Computer Graphics for Blind	University of Wisconsin Madison, Wis.	Feb 29, 2004
Toward the Automated Tactilization of Graphical Images	University of Washington Seattle, Wash.	Jun 30, 2004

**Table 11: National Science Foundation
Current Projects as of Sep 1, 2003 (con't)**

Project Title	Institution	End Date
VIDI: Visual Information Dissemination for Visually Impaired Individuals	University of Massachusetts Amherst, Mass.	Jul 31, 2004
Rendering Algorithms for Tactile and Haptic Display of Multidimensional Data	University of Delaware Newark, Del.	Aug 31, 2004
Customized Interfaces for Assistive Technology	University of Pennsylvania Philadelphia, Pa.	Aug 31, 2004
Making Dysarthric Speech Intelligible	Oregon Health and Science University Portland, Ore.	Sep 30, 2004
A User Modeling Method for Individuals With Disabilities	University of Pittsburgh Pittsburgh, Pa.	Jul 31, 2007
Web Accessibility for Low-Bandwidth Input	University of California-Berkeley Berkeley, Calif.	Aug 31, 2005
Trainable Visual Aids for Object Detection and Identification	Johns Hopkins University Baltimore, Md.	Sep 30, 2005
Using Handhelds to Help People With Motor Impairments	Carnegie Mellon University Pittsburgh, Pa.	Mar 31, 2006
Multi-Touch 2-D Tactile Human Computer Interface Design and Optimization for Individuals With Physical Disabilities	University of Delaware Newark, Del.	Apr 30, 2006
Video-Based Computer Interfaces for People With Severe Disabilities	Boston University Boston, Mass.	Jul 31, 2006
Program: Information Technology Research		
Digital Imaging Techniques for the Simulation and Enhancement of Low Vision	Cornell University Ithaca, N.Y.	Sep 31, 2004
Community Access for the Brain Injury Population	University of Oregon Eugene, Ore.	May 31, 2006
Customizable Audio User Interfaces for the Visually Impaired and the Sighted	University of Maryland College Park, Md.	Aug 31, 2007

**Table 11: National Science Foundation
Current Projects as of Sep 1, 2003 (con't)**

Project Title	Institution	End Date
Program: Research to Aid Persons With Disabilities		
Wearable Low Vision Aids Based Upon Retinal Light Scanning Technologies	University of Washington Seattle, Wash.	Sep 30, 2003
Optimal Impact Protection for Disabled Persons in Vehicles	University of Virginia Charlottesville, Va.	Jul 31, 2006
An Annual Review of Engineering Senior Design Projects to Aid Persons With Disabilities	University of Connecticut- Storrs Storrs, Conn.	Jul 31, 2008
Research in Disabilities Education		
Transcending the Digital Divide	University of California Santa Barbara, Calif.	Dec 31, 2003
Haptic Interfaces for Spatial Learning	University of Colorado- Boulder Boulder, Colo.	Mar 31, 2004
Universal Virtual Laboratory (UVL)	Temple University Philadelphia, Pa.	Apr 30, 2004
Integrated Accessible Microscopical Workstation for Students With Disabilities	Purdue University West Lafayette, Ind.	Oct 31, 2004
Non-Visual Browsing of the World Wide Web: Tables, Frames and Forms	New Mexico State University Las Cruces, N.M.	Oct 31, 2004
SBIR		
The Use of Gestural Interface and Robotics Technology to Facilitate Language Development	AnthroTronix, Inc. College Park, Md.	Jan 31, 2005

Summary of Current Research

This section is organized by assistive technology device categories, using the classification developed by www.rehabtool.com to assist consumers in selecting the appropriate products. Within each category table, research projects are listed in chronological order by expiration date. Below is a summary of the full listings that follow.

Assistive Technology Categories

Communication

- Speech and Augmentative Communication Aids
- Writing and Typing Aids

Computer Access

- Alternative Input Devices
- Alternative Output Devices
- Accessible Software

Education and Learning

- Cognitive Aids
- Early Intervention Aids

Environmental

- Environmental Controls and Switches

Hearing and Listening

Mobility and Transportation

- Ambulatory Aids
- Scooters and Power Chairs
- Wheelchairs
- Vehicle Conversions

Prosthetics and Orthotics

Recreation and Leisure

- Sports Aids
- Toys and Games
- Travel Aids

Seating and Positioning

Vision and Reading

Communication

This category lists information on products and equipment designed to help persons with speech disabilities or writing difficulties to communicate. In its simplest form, augmentative communication can be a page with pictures or letters of the alphabet to which a person points. It can also involve highly sophisticated speaking computers with on-screen communication boards and auditory or visual scanning. Common subcategories include:

- Speech and Augmentative Communication Aids**
 AAC uses alternative methods of communicating needs, feelings, ideas and perceptions through the use of electronic and nonelectronic devices that provide a means for expressive and receptive communication for persons with limited or no speech. It includes communication boards, speech synthesizers, text-to-speech software and hardware, head wands, light pointers, mouth sticks, signal systems, and telephony equipment.
- Writing and Typing Aids**
 This includes tactile, Braille, note-taking and spelling devices, word prediction-completion software, and modified and portable typewriters. It does not generally include products intended to facilitate computer access and usage (see the Computer Access category).

Agencies Funding Research:

- National Center for Medical Rehabilitation Research
- National Institute on Deafness and Other Communication Disorders
- National Institute on Disability and Rehabilitation Research
- National Science Foundation

**Table 12: Communication
Current Projects as of Sep 1, 2003**

Project Title and Funding Agency	Institution	End Date
TalkTiles: A Multi-Sensory Language Development Tool and Communication Aid <i>National Institute on Disability and Rehabilitation Research</i>	Intelligent Automation, Inc. Rockville, Md.	Sep 20, 2003
I-Talk: Eye Controlled, Direct Selection AAC Device <i>National Institute on Deafness and Other Communication Disorders</i>	Enkidu Research, Inc. Lockport, N.Y.	Sep 25, 2003
Improving AAC Technologies for Young Children with Significant Communication Disorders <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Communication Enhancement Duke University Durham, N.C.	Nov 1, 2003

**Table 12: Communication
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
The Development of a “Menu-Based” AAC Interface for the Elderly and Other Persons With Recall Memory Limitations <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Communication Enhancement Duke University Durham, N.C.	Nov 1, 2003
Evaluating and Enhancing Communication Rate, Efficiency and Effectiveness <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Communication Enhancement Duke University Durham, N.C.	Nov 1, 2003
The Use of Automatic Speech Recognition as a Speech Clarifier <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Communication Enhancement Duke University Durham, N.C.	Nov 1, 2003
The Learning Experiences of AAC Users With AAC Technology <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Communication Enhancement Duke University Durham, N.C.	Nov 1, 2003
Confidential ASL Access for Medical Consultation <i>National Institute on Deafness and Other Communication Disorders</i>	Vcom3d, Inc. Orlando, Fla.	Nov 30, 2003
A Device Enabling Deaf and Hearing People to Communicate <i>National Institute on Deafness and Other Communication Disorders</i>	Scomm, Inc. Sedalia, Mo.	Dec 31, 2003
A Communication Device for the Speech Impaired <i>National Center for Medical Rehabilitation Research</i>	Kibitzer Rockville, Md.	Mar 31, 2004
One-Hand Control of a Speech Synthesizer <i>National Institute on Deafness and Other Communication Disorders</i>	Sensimetrics Corporation Somerville, Mass.	Mar 31, 2004
Frametalker: An Utterance-Based Augmentative Device <i>National Institute on Deafness and Other Communication Disorders</i>	Enkidu Research, Inc. Lockport, N.Y.	Aug 31, 2004

**Table 12: Communication
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Personalizing Speech Output for Communication Devices <i>National Institute on Deafness and Other Communication Disorders</i>	Agoranet, Inc. Newark, Del.	Apr 30, 2005
Making Dysarthric Speech Intelligible <i>National Science Foundation</i>	Oregon Health and Science University Portland, Ore.	Sep 30, 2004
A Robotic Fingerspelling Hand (“Dexter”) for Deaf-Blind Persons <i>National Institute on Disability and Rehabilitation Research</i>	Smith-Kettlewell RERC Smith-Kettlewell Eye Research Institute San Francisco, Calif.	Aug 1, 2005
Mobile Wireless Communication Access <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Mobile Wireless Technologies for Persons With Disabilities Georgia Institute of Technology Atlanta, Ga.	Oct 1, 2006

Computer Access

This category lists information on hardware and software products that enable persons with disabilities to access, interact with, and use computers at home, work or school. These products include modified or alternate keyboards, switches activated by pressure, touch screens, special software, and voice-to-text software. Common subcategories are:

- **Alternative Input Devices**
 - Alternative and adaptive keyboards
 - Expanded keyboards
 - Key guards
 - Alternative and ergonomic mouse-pointing systems
 - Head-operated pointing devices
 - Eye gaze pointing devices
 - Mouth-tongue pointing devices
 - Morse code input devices
 - Brain-actuated pointing devices
 - Switches
 - Touch screens
 - Voice-input systems
 - Speech-to-text software
 - Voice recognition-voice command software
 - Dictation software
 - On-screen keyboards
 - Cursor enlargement software

- Ergonomic computer-based equipment
- **Alternative Output Devices**
This includes computer-based output devices that generally enable blind and vision-impaired persons to use or interact with a computer. These devices include Braille display-output devices, Braille embosser-printers, screen reading software, screen magnification/enlargement software and large-print monitors.
- **Accessible Software**
This subcategory includes software applications adapted for children and adults with disabilities, operating system accessibility options and accessible Web browsers.

Agencies Funding Research:

- National Science Foundation
- National Institute on Disability and Rehabilitation Research

Table 13: Computer Access Current Projects as of Sep 1, 2003		
Project Title and Funding Agency	Institution	End Date
Gesture Recognition System for Personal Computing Applications <i>National Institute on Disability and Rehabilitation Research</i>	Future of Technology and Health Iowa City, Iowa	Sep 17, 2003
QwikClick: An Intelligent Scanning Keyboard That Maximizes the Capability of Single-Switch Users <i>National Institute on Disability and Rehabilitation Research</i>	CreateAbility Concepts, Inc. Fort Collins, Colo.	Sep 17, 2003
NutraNet: An Internet-Based, Self-Directed Multimedia Software System for Nutritional Education, Planning and Implementation for Individuals With Mental Retardation <i>National Institute on Disability and Rehabilitation Research</i>	AbleLink Technologies, Inc. Colorado Springs, Colo.	Sep 17, 2003
Transcending the Digital Divide <i>National Science Foundation</i>	University of California Santa Barbara, Calif.	Dec 31, 2003
Information Technology Access for Adults With Cognitive Disabilities: Participatory Development of a Model for Software Accessibility, Training and Support <i>National Institute on Disability and Rehabilitation Research</i>	Eugene Research Institute Eugene, Ore.	Sep 1, 2004

**Table 13: Computer Access
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Pocket Voyager: Making Palmtop Computers Accessible to Individuals With Mental Retardation <i>National Institute on Disability and Rehabilitation Research</i>	AbleLink Technologies, Inc. Colorado Springs, Colo.	Sep 17, 2004
Nonvisual Browsing of the World Wide Web: Tables, Frames and Forms <i>National Science Foundation</i>	New Mexico State University Las Cruces, N.M.	Oct 31, 2004
Access to Visual Displays and Products Found in the Workplace <i>National Institute on Disability and Rehabilitation Research</i>	Smith-Kettlewell RERC Smith-Kettlewell Eye Research Institute San Francisco, Calif.	Aug 1, 2005
Web Accessibility for Low-Bandwidth Input <i>National Science Foundation</i>	University of California Berkeley, Calif.	Aug 31, 2005
Using Handhelds to Help People With Motor Impairments <i>National Science Foundation</i>	Carnegie Mellon University Pittsburgh, Pa.	Mar 31, 2006
Multi-Touch 2-D Tactile Human Computer Interface Design and Optimization for Individuals with Physical Disabilities <i>National Science Foundation</i>	University of Delaware Newark, Del.	Apr 30, 2006
Video-Based Computer Interfaces for People With Severe Disabilities <i>National Science Foundation</i>	Boston University Boston, Mass.	Jul 31, 2006
Think and Link: E-mail for Individuals With Cognitive Disabilities <i>National Institute on Disability and Rehabilitation Research</i>	Western Oregon University Eugene, Ore.	Oct 1, 2006
A Computational Architecture for Tracking Cognitive Processes <i>National Science Foundation</i>	Drexel University Philadelphia, Pa.	Jun 30, 2007
A User Modeling Method for Individuals With Disabilities <i>National Science Foundation</i>	University of Pittsburgh Pittsburgh, Pa.	Jul 31, 2007

Education and Learning

This category lists information regarding education resources. Common sub-categories include cognitive and early intervention aids. Some cognitive software focuses on:

- Categorization
- Matching
- Association
- Reasoning
- Decision making
- Problem solving
- Memory skills
- Perceptual skills
- Talking word processing
- Word prediction-completion software;
- Cognitive retraining
- Rehabilitation tools

Agencies Funding Research:

- National Eye Institute
- National Institute on Disability and Rehabilitation Research
- Office of Special Education Programs
- National Science Foundation

**Table 14: Education and Learning
Current Projects as of Sep 1, 2003**

Project Title and Funding Agency	Institution	End Date
Pocket Compass: A Palmtop Computer-Based Intelligent Aid for Individuals With Mental Retardation to Increase Independence and Self-Determination in Decision Making <i>National Institute on Disability and Rehabilitation Research</i>	AbleLink Technologies, Inc. Colorado Springs, Colo.	Sep 17, 2003
The Computer Reader/Word Processor as a Compensatory Aid for Middle School Students With Learning Disabilities <i>Office of Special Education Programs</i>	Prince George's Board of Education Upper Marlboro, Md.	Sep 30, 2003
Assistive Technology in the Schools <i>Office of Special Education Programs</i>	Williamsville Central School District Williamsville, N.Y.	Dec 31, 2003
The Cornerstones Project, Phase II <i>Office of Special Education Programs</i>	National Center for Accessible Media Boston, Mass.	Dec 31, 2003
Haptic Interfaces for Spatial Learning <i>National Science Foundation</i>	University of Colorado Boulder, Colo.	Mar 31, 2004
Universal Virtual Laboratory (UVL) <i>National Science Foundation</i>	Temple University Philadelphia, Pa.	Apr 30, 2004

**Table 14: Education and Learning
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
The Development of Software to Ensure Access to Science Text Through the Strategic eTutor <i>Office of Special Education Programs</i>	University of Kansas Lawrence, Kan.	Jul 1, 2004
The Virtual History Museum: Technology Tools and Environments to Support Historical Understanding of Students With Disabilities <i>Office of Special Education Programs</i>	Michigan State University East Lansing, Mich.	Aug 15, 2004
Virtual Interview Exercises for Workplace Success (VIEWS) <i>National Institute on Disability and Rehabilitation Research</i>	Vcom3D, Inc. Orlando, Fla.	Sep 1, 2004
Development of an Audio-Tactile Accommodation for Delivery of Standardized Math Tests to Students Who Are Blind or Visually Impaired <i>National Institute on Disability and Rehabilitation Research</i>	Touch Graphics Brooklyn, N.Y.	Sep 1, 2004
University of Kentucky Assistive Technology Research Institute <i>Office of Special Education Programs</i>	University of Kentucky Lexington, Ky.	Sep 30, 2004
Enhancing Academic Achievement and Transition Outcomes Through Technology <i>Office of Special Education Programs</i>	Ohio State University Columbus, Ohio	Sep 30, 2004
Online Instruction Tools for Teaching Mathematical Problem Solving to Learning-Disabled Students <i>National Institute on Disability and Rehabilitation Research</i>	Learnimation New York, N.Y.	Sep 30, 2004
The Development of a Tool to Enhance Communications Between Blind and Sighted Mathematicians, Students and Teachers: A Global Translation Appliance <i>National Institute on Disability and Rehabilitation Research</i>	University of South Florida Lakeland, Fla.	Oct 1, 2004
Integrated Accessible Microscopical Workstation for Students With Disabilities <i>National Science Foundation</i>	Purdue University West Lafayette, Ind.	Oct 31, 2004

**Table 14: Education and Learning
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
The Use of Gestural Interface and Robotics Technology to Facilitate Language Development <i>National Science Foundation</i>	AnthroTronix, Inc. College Park, Md.	Jan 31, 2005
Anchoring Problems in Technology-Rich Environments to Enhance the Math Skills of Adolescents With Disabilities <i>Office of Special Education Programs</i>	University of Wisconsin Madison, Wis.	Jun 30, 2005
Accessible Graphing Scientific Interactive Calculator <i>National Eye Institute</i>	Automated Functions, Inc. Falls Church, Va.	Jun 30, 2005
High-Tech Educational Toys for Blind Children <i>National Institute on Disability and Rehabilitation Research</i>	Smith-Kettlewell RERC Smith-Kettlewell Eye Research Institute San Francisco, Calif.	Aug 1, 2005
ABC-Link: A Web-Based Literacy Assessment Tool for Students With Significant Disabilities <i>National Institute on Disability and Rehabilitation Research</i>	University of North Carolina Chapel Hill, N.C.	Oct 1, 2005
Teaching Blind Children to Cross Streets in Virtual Reality <i>Office of Special Education Programs</i>	Oregon Research Institute Eugene, Ore.	Sep 30, 2006
Mobile Wireless Technology as Cognitive Prosthetics <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Mobile Wireless Technologies for Persons With Disabilities Georgia Institute of Technology Atlanta, Ga.	Oct 1, 2006
Assistive Technology and Cognitive Disabilities <i>National Institute on Disability and Rehabilitation Research</i>	Brain Injury Association of America, Inc. Alexandria, Va.	Nov 1, 2006

Environmental

This category lists information on environmental and structural adaptations that remove or reduce physical barriers for individuals with disabilities. Environmental adaptations usually involve building construction, engineering and architecture; however, they also include environmental controls and switches that can control an entire living environment. Examples include electronic systems that enable someone with limited mobility to control various appliances, lights, telephone and security systems in their room, home or other surroundings. Home examples include environmental control units, electronic appliance switches, switch

mounting systems, home automation systems, signaling and alerting devices, home alarms, television adaptations, smoke alarms, and telephone ringers.

Agencies Funding Research:

- Department of Veterans Affairs
- National Institute on Aging
- National Institute on Disability and Rehabilitation Research
- National Science Foundation

Table 15: Environmental Current Projects as of Sep 1, 2003		
Project Title and Funding Agency	Institution	End Date
Enhancing Function of Frail Elders by Modifying the Home <i>National Institute on Aging</i>	Thomas Jefferson University Philadelphia, Pa.	May 31, 2004
Customized Interfaces for Assistive Technology <i>National Science Foundation</i>	University of Pennsylvania Philadelphia, Pa.	Aug 31, 2004
Smart Houses: Testing the Effectiveness of Current Technology <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technology for Successful Aging University of Florida Gainesville, Fla.	Oct 1, 2006
Home Monitoring for People Aging With Disability <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technology for Successful Aging University of Florida Gainesville, Fla.	Oct 1, 2006
Early Detection of Falls With Multidimensional Sensors <i>National Institute on Aging</i>	Integrated Biomedical Systems Essex Junction, Vt.	Dec 31, 2003
Cognitive Assistance <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technology for Successful Aging University of Florida Gainesville, Fla.	Oct 1, 2006
Smart Phone <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technology for Successful Aging University of Florida Gainesville, Fla.	Oct 1, 2006
Universal Control and Multimodal Interfaces National Institute on Disability and Rehabilitation Research	RERC on Mobile Wireless Technologies for Persons With Disabilities Georgia Institute of Technology Atlanta, Ga.	Oct 1, 2006

**Table 15: Environmental
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Low-Cost, High-Performance Physical Activity Monitor <i>National Institute on Disability and Rehabilitation Research</i>	Barron Associates, Inc. Charlottesville, Va.	Sep 17, 2003
A Robot for the Vocational Independence of People With Tetraplegia <i>Department of Veterans Affairs</i>	VA Center of Excellence on Mobility Palo Alto, Calif.	Not Available

Hearing and Listening

This category lists information on products designed to assist persons who are deaf and hearing-impaired. It includes assistive listening devices, hearing aids, infrared/personal amplification systems, audio and FM loop systems, FM amplification systems, television amplifiers, television decoders, visual signaling and alerting systems, tactile alerting systems, telephony and accessories, text telephones, telecommunications devices for the deaf and TTY devices, adapted phones, and so on. This does not generally include products intended to facilitate computer access and usage (see the Computer Access category).

Agencies Funding Research:

- National Institute on Deafness and Other Communication Disorders
- National Institute on Disability and Rehabilitation Research
- Department of Veterans Affairs

**Table 16: Hearing and Listening
Current Projects as of Sep 1, 2003**

Project Title and Funding Agency	Institution	End Date
Multichannel and Multimicrophone Directional Hearing Aids: Fitting Procedures and Evaluation of Current and Emergent Technology <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Hearing Enhancement Gallaudet University Washington, D.C.	Aug 1, 2003 (pending renewal)
A Wireless Voice Link-Module for the Hearing-Impaired <i>National Institute on Deafness and Other Communication Disorders</i>	Audiological Engineering Corporation Somerville, Mass.	Sep 30, 2003
Hearing Aids Based on Models of Cochlear Compression <i>National Institute on Deafness and Other Communication Disorders</i>	Becs Technology, Inc. St. Louis, Mo.	Dec 31, 2003

**Table 16: Hearing and Listening
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Electromagnetic Noise Canceling System for Hearing Aids <i>National Institute on Deafness and Other Communication Disorders</i>	Oval Window Audio Nederland, Colo.	Mar 8, 2004
Inexpensive Hearing Device Based on Ear Canal Geometry <i>National Institute on Deafness and Other Communication Disorders</i>	Hearing Components, Inc. Maplewood, Minn.	Apr 14, 2004
Access to Digital Television <i>National Institute on Disability and Rehabilitation Research</i>	National Center for Accessible Media WGBH Educational Foundation Boston, Mass.	Aug 1, 2004
New Test for Predicting Hearing Aid Use <i>National Institute on Deafness and Other Communication Disorders</i>	University of Tennessee Knoxville, Tenn.	Aug 31, 2004
Optimizing Amplification for Infants and Young Children <i>National Institute on Deafness and Other Communication Disorders</i>	Father Flanagan's Boys' Home Boys Town, Neb.	Aug 31, 2004
Hearing Loss and Prosthesis Simulator <i>National Institute on Deafness and Other Communication Disorders</i>	Sensimetrics Corporation Somerville, Mass.	Jun 30, 2005
Wearable Programmable Tactile Speech Aid for Deaf People <i>National Institute on Deafness and Other Communication Disorders</i>	Coulter Associates, Inc. Vienna, Va.	Aug 31, 2005
Factors Affecting Directional Hearing Aid Performance in Children <i>National Institute on Disability and Rehabilitation Research</i>	Vanderbilt University School of Medicine Nashville, Tenn.	Sep 1, 2005
Wearable Captioning Device <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Mobile Wireless Technologies for Persons With Disabilities Georgia Institute of Technology Atlanta, Ga.	Oct 1, 2006
Effect of Individualized Counseling on Hearing Aid Acceptance <i>Department of Veterans Affairs</i>	Rehabilitative Auditory Research Portland, Ore.	Not Available

Mobility and Transportation

This category provides information on products that help persons with mobility impairment to move within their environment and that give them independence in personal transportation. It includes standing and walking aids; transfer aids; stair lifts; walkers; scooters; wheelchairs and three-wheeled chairs; adapted bicycles and tricycles; car seats and beds; stretchers; patient chairs; ramps; recliners; strollers; travel chairs; wheelchair trays; driving controls; seat belts; vehicle conversions; patient and wheelchair lifts; wheelchair loaders and carriers; and wheelchair restraint systems. Common subcategories are:

- **Ambulatory Aids**—This includes canes, cane accessories, crutches, walkers, walker accessories, etc.
- **Scooters and Power Chairs**
- **Wheelchairs**
- **Vehicle Conversions**—This includes car-top carriers, custom cars and vans, adaptive driving control, hand-controls, child restraint systems, ramps, lifts, etc.

Agencies Funding Research:

- National Eye Institute
- National Institute on Aging
- National Institute on Disability and Rehabilitation Research
- National Center for Medical Rehabilitation Research
- Department of Veterans Affairs
- National Science Foundation

**Table 17: Mobility and Transportation
Current Projects as of Sep 1, 2003**

Project Title and Funding Agency	Institution	End Date
Ambulatory Aids		
A Robot for the Vocational Independence of People With Tetraplegia <i>Department of Veterans Affairs</i>	VA Center of Excellence on Vision Impairment and Aging Atlanta, Ga.	Not Available
Scooters and Power Chairs		
Enhanced Controls for Powered Wheelchairs <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheeled Mobility University of Pittsburgh Pittsburgh, Pa.	Jan 1, 2004
Integration of Electronic External Devices for Powered Mobility Systems <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheeled Mobility University of Pittsburgh Pittsburgh, Pa.	Jan 1, 2004

**Table 17: Mobility and Transportation
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Ear Device Enabling Hands-Free Wheelchair Control <i>National Center for Medical Rehabilitation Research</i>	Think-A-Move, LLC Cleveland, Ohio	Feb 29, 2004
Application of a Commercial Datalogger to Electric-Powered Wheelchairs for Rehabilitation Research <i>Department of Veterans Affairs</i>	VA Center of Excellence on Wheelchair and Related Technology Pittsburgh, Pa.	Sep 2004
Safety-Sensing, Independence-Enhancing Wheelchair <i>National Center for Medical Rehabilitation Research</i>	Activmedia Robotics, LLC Peterborough, N.H.	Nov 30, 2004
A New Power Supply for Electric Wheelchairs and Scooters <i>National Institute on Aging</i>	Lynntech, Inc. College Station, Tex.	Jan 31, 2005
Evaluation of a Model for Provision of Powered Mobility to Young Children <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technologies for Children With Orthopedic Disabilities Rancho Los Amigos National Rehabilitation Center Downey, Calif.	Nov 1, 2005
Finding the Right Wheels—Improving Wheelchair Provision <i>National Institute on Aging</i>	Duke University Durham, N.C.	Not Available
Manual Wheelchairs		
Two-Speed Manual Wheelchair Wheel <i>National Center for Medical Rehabilitation Research</i>	Magic Wheels, Inc. Seattle, Wash.	Feb 28, 2004
Biomechanics of the UE in Wheelchair Propulsion <i>National Center for Medical Rehabilitation Research</i>	Mayo Clinic Rochester, Minn.	May 31, 2004
Lightweight Durable Wheelchair From Engineering Resin <i>National Center for Medical Rehabilitation Research</i>	Turbo Wheelchair Company, Inc. Roswell, Ga.	May 31, 2004

**Table 17: Mobility and Transportation
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
An Improved Lever Drive Wheelchair Transmission <i>National Center for Medical Rehabilitation Research</i>	Green Technologies, Inc. West Fork, Ark.	Jul 31, 2004
Smart Power Assistance Module for Manual Wheelchairs <i>National Eye Institute</i>	AT Sciences Pittsburgh, Pa.	Aug 31, 2004
FlexRim Low-Impact Wheelchair Pushrim <i>National Center for Medical Rehabilitation Research</i>	Beneficial Designs, Inc. Minden, Nev.	Aug 31, 2004
Dynamic Force Distribution at the Body-Seat Interface During Wheelchair Propulsion <i>Department of Veterans Affairs</i>	VA Center of Excellence on Wheelchair and Related Technology Pittsburgh, Pa.	Sep 2004
Optimized Wheelchair Suspension <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technologies to Enhance Mobility and Function for Individuals With Spinal Cord Injury Los Amigos Research and Education Institute, Inc. Downey, Calif.	Nov 1, 2007
Shoulder-Preserving Wheelchair <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technologies to Enhance Mobility and Function for Individuals With Spinal Cord Injury Los Amigos Research and Education Institute, Inc. Downey, Calif.	Nov 1, 2007
Ability to Propel a Manual Wheelchair and Length of Use in Multiple Sclerosis <i>Department of Veterans Affairs</i>	VA Center of Excellence on Wheelchair and Related Technology Pittsburgh, Pa.	Not Available
Vehicle Conversions		
Development and Evaluation of Injury Prevention Wheelchair Technologies <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheeled Mobility University of Pittsburgh Pittsburgh, Pa.	Jan 1, 2004

**Table 17: Mobility and Transportation
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Development of Auto-Docking Wheelchair Securement <i>National Center for Medical Rehabilitation Research</i>	Kinedyne Corporation Lawrence, Kan.	Jun 30, 2004
Optimal Impact Protection for Disabled Persons in Vehicles <i>National Science Foundation</i>	University of Virginia Charlottesville, Va.	Jul 31, 2006
Wheelchair Accidents Investigation <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheelchair Transportation Safety University of Pittsburgh Pittsburgh, Pa.	Nov 1, 2007
Side and Rear Impact <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheelchair Transportation Safety University of Pittsburgh Pittsburgh, Pa.	Nov 1, 2007
Universal Securement Interface <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheelchair Transportation Safety University of Pittsburgh Pittsburgh, Pa.	Nov 1, 2007
Seating System Crashworthiness <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheelchair Transportation Safety University of Pittsburgh Pittsburgh, Pa.	Nov 1, 2007
Integrated Occupant Restraints <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheelchair Transportation Safety University of Pittsburgh Pittsburgh, Pa.	Nov 1, 2007
Industry Standards <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheelchair Transportation Safety University of Pittsburgh Pittsburgh, Pa.	Nov 1, 2007

Prosthetics and Orthotics

This category lists information on the replacement, substitution or augmentation of missing or malfunctioning body parts with artificial limbs or other orthotic aids. It includes splints, braces, foot orthosis, helmets, restraints and supports.

Agencies Funding Research:

- National Center for Medical Rehabilitation Research
- Department of Veterans Affairs
- National Institute on Disability and Rehabilitation Research

**Table 18: Prosthetics and Orthotics
Current Projects as of Sep 1, 2003**

Project Title and Funding Agency	Institution	End Date
Development of a Portable, Real-Time, 3-D Single Marker Gait Evaluation System <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003
Clinical Collaboration to Improve Upper-Limb Prosthetic Fittings <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003
Development of Outcome Measures for Prosthetics and Orthotics Users <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003
Energy Considerations of Ambulation <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003
Factors Affecting Reach Using a Trans-Humeral Prosthesis <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003
Foot Rocker Mechanisms and Walking Surface Interactions <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003
Leg Adaptations to Changing Environmental Conditions During Gait <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003
Proof of Concept Project: Fast Prototyping of Orthoses and Ultra-Lightweight Leg Prostheses <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003
Prosthetic Arm Design and Simulation System <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003

**Table 18: Prosthetics and Orthotics
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Shock Absorption of the Locomotor Mechanism <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003
Upper-Limb Prosthetics: Humeral Rotation Mechanisms <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Prosthetics and Orthotics Northwestern University Chicago, Ill.	Oct 1, 2003
Vacuum-Casting System for Improved Prosthetic Socket Fabrication <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Improved Technology Access for Land Mine Survivors Chicago, Ill.	Nov 1, 2003
Electric Heavy-Duty Work Hand <i>National Center for Medical Rehabilitation Research</i>	Motion Control, Inc. Salt Lake City, Utah	Nov 14, 2003
Advanced Biofidolic Lower Extremity Prosthesis Research <i>National Center for Medical Rehabilitation Research</i>	Sparta, Inc. Laguna Hills, Calif.	May 31, 2004
Easy Feed Hands for the Growing Child <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technologies for Children With Orthopedic Disabilities Rancho Los Amigos National Rehabilitation Center Downey, Calif.	Nov 1, 2005
Active Mobile Arm Support <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technologies for Children With Orthopedic Disabilities Rancho Los Amigos National Rehabilitation Center Downey, Calif.	Nov 1, 2005
Next-Generation Knee-Ankle-Foot-Orthosis Technology <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technologies for Children With Orthopedic Disabilities Rancho Los Amigos National Rehabilitation Center Downey, Calif.	Nov 1, 2005

**Table 18: Prosthetics and Orthotics
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
<p>Optimized Post-Formable Orthosis for Ankle Stability in Children With Cerebral Palsy <i>National Institute on Disability and Rehabilitation Research</i></p>	<p>RERC on Technologies for Children With Orthopedic Disabilities Rancho Los Amigos National Rehabilitation Center Downey, Calif.</p>	Nov 1, 2005
<p>Plantarflexion Neuromuscular Stimulation: A Dynamic Retraining Orthosis (“NMES: A Stimulating Idea to Help Decrease Toe Walking”) <i>National Institute on Disability and Rehabilitation Research</i></p>	<p>RERC on Technologies for Children With Orthopedic Disabilities Rancho Los Amigos National Rehabilitation Center Downey, Calif.</p>	Nov 1, 2005
<p>Developmental Indicators for Children’s Upper Limb Prosthesis <i>National Institute on Disability and Rehabilitation Research</i></p>	<p>RERC on Technologies for Children With Orthopedic Disabilities Rancho Los Amigos National Rehabilitation Center Downey, Calif.</p>	Nov 1, 2005
<p>An Improved Prosthetic Bioactuator <i>National Center for Medical Rehabilitation Research</i></p>	<p>ADA Technologies, Inc. Littleton, Colo.</p>	Nov 30, 2005
<p>Improving Prosthetic Design by Comparing Suspension Systems <i>Department of Veterans Affairs</i></p>	<p>VA Center of Excellence on Amputation, Prosthetics and Limb Loss Prevention Seattle, Wash.</p>	Sep 2007
<p>Measuring the Effect of Impact-Absorbing Prosthetic Shanks in Below Knee Protheses <i>Department of Veterans Affairs</i></p>	<p>VA Center of Excellence on Amputation, Prosthetics and Limb Loss Prevention Seattle, Wash.</p>	Sep 2007
<p>Investigating the Development of a Powered Prosthesis <i>Department of Veterans Affairs</i></p>	<p>VA Center of Excellence on Amputation, Prosthetics and Limb Loss Prevention Seattle, Wash.</p>	Sep 2007

**Table 18: Prosthetics and Orthotics
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Active Mobile Arm Support for Adults <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technologies to Enhance Mobility and Function for Individuals With Spinal Cord Injury Los Amigos Research and Education Institute, Inc. Downey, Calif.	Nov 1, 2007

Recreation and Leisure

This category lists information on products that help persons with disabilities to participate in sports, social and cultural events. It includes modified sports equipment for skiing, biking, running and boating; audio descriptions for movies; adaptive controls for video games; adaptive fishing rods; cuffs for grasping paddles or racquets; and seating systems for boats. Common subcategories include:

- **Sports aids**
- **Toys and games**
- **Travel aids**

Agencies Funding Research:

- National Center for Medical Rehabilitation Research
- National Institute on Disability and Rehabilitation Research
- National Science Foundation

**Table 19: Recreation and Leisure
Current Projects as of Sep 1, 2003**

Project Title and Funding Agency	Institution	End Date
MUSE WebPads: Providing Museum Visitors Universal Access <i>National Center for Medical Rehabilitation Research</i>	Information in Place, Inc. Bloomington, Ind.	Feb 28, 2004
A Universal Canoe Seating System <i>National Center for Medical Rehabilitation Research</i>	Beneficial Designs, Inc. Minden, Nev.	Aug 31, 2004
Technology for Play and Socialization for Children With Orthopedic Disabilities <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technologies for Children With Orthopedic Disabilities Rancho Los Amigos National Rehabilitation Center Downey, Calif.	Nov 1, 2005

**Table 19: Recreation and Leisure
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Community Access for the Brain Injury Population <i>National Science Foundation</i>	University of Oregon Eugene, Ore.	May 31, 2006
Adaptive Exercise Equipment <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Technologies to Enhance Mobility and Function for Individuals With Spinal Cord Injury Los Amigos Research and Education Institute, Inc. Downey, Calif.	Nov 1, 2007
Adaptive Exercise Machine Control for Persons With Disabilities <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Recreational Technologies and Exercise Physiology Benefiting Persons With Disabilities (Rec-Tec) University of Illinois Chicago, Ill.	Nov 1, 2007
Virtual Electronic Environments to Facilitate Exercise Participation and Adherence <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Recreational Technologies and Exercise Physiology Benefiting Persons With Disabilities (Rec-Tec) University of Illinois Chicago, Ill.	Nov 1, 2007

Seating and Positioning

This category lists information on products for mobility-impaired persons that provide greater body stability, help them to maintain upright posture, provide trunk and head support, and reduce pressure to the skin. It includes adapted and modular seating, cushions and wedges, contour seats, lumbar support seats, standing tables, positioning belts, braces, wheelchair modifications and cushions, seat lifts, bolster chairs, corner chairs, therapeutic seats, postural support hardware, postural support systems, and pressure monitors.

Agencies Funding Research:

- Department of Veterans Affairs
- National Institute on Disability and Rehabilitation Research
- National Center for Medical Rehabilitation Research

**Table 20: Seating and Positioning
Current Projects as of Sep 1, 2003**

Project Title and Funding Agency	Institution	End Date
Optimizing Posture, Trunk Control and Reach of Wheelchair Users <i>National Institute on Disability and Rehabilitation Research</i>	Georgia Institute of Technology Center for Assistive Technology and Environmental Access Atlanta, Ga.	Oct 1, 2003
Investigation of Dynamic Seating for Children With Extensor Thrust <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheeled Mobility University of Pittsburgh Pittsburgh, Pa.	Jan 1, 2004
Investigation of Dynamic Seating for Comfort <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheeled Mobility University of Pittsburgh Pittsburgh, Pa.	Jan 1, 2004
Investigation of Biomechanical Factors for Predicting Pressure Ulcer Risk <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheeled Mobility University of Pittsburgh Pittsburgh, Pa.	Jan 1, 2004
Quantification and Development of a Pressure Index <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheeled Mobility University of Pittsburgh Pittsburgh, Pa.	Jan 1, 2004
Investigation Outcome Measurement Tools for Seating and Mobility <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheeled Mobility University of Pittsburgh Pittsburgh, Pa.	Jan 1, 2004
Development of Wheelchair Seating Standards <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheeled Mobility University of Pittsburgh Pittsburgh, Pa.	Jan 1, 2004
Standardized Postural Measures in Support of Quantification of Seating Outcomes <i>National Institute on Disability and Rehabilitation Research</i>	RERC on Wheeled Mobility University of Pittsburgh Pittsburgh, Pa.	Jan 1, 2004
Anthropomorphic Loading Device for Seat Cushion Testing <i>National Center for Medical Rehabilitation Research</i>	Beneficial Designs, Inc. Minden, Nev.	Feb 29, 2004

**Table 20: Seating and Positioning
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
HipGrip Pelvic Stabilization Device for Wheelchair Users <i>National Center for Medical Rehabilitation Research</i>	Beneficial Designs, Inc. Minden, Nev.	Jun 30, 2004
Evaluation of the Comprehensiveness/Effectiveness of Wheelchair Seating <i>Department of Veterans Affairs</i>	VA Center of Excellence on Wheelchair and Related Technology Pittsburgh, Pa.	Sep 2004
RCT on Preventing Pressure Ulcers With Seat Cushions <i>National Center for Medical Rehabilitation Research</i>	University of Pittsburgh Pittsburgh, Pa.	May 31, 2008

Vision and Reading

This category lists information on products designed to assist the blind and visually impaired. It includes: auditory and speech output devices; reading machines; scanning and document reading systems; optical character recognition systems; electronic book readers; talking equipment (clocks and watches, calculators, etc.); Braille devices; Braille transcription and translation devices; screen magnifiers and enlargers; closed-circuit television for magnifying documents; book holders; manual and electric page turners; large-button phones; speaker phones; large-print books; and audio books. This category does not generally include products intended to facilitate computer access and usage (see the Computer Access Aids category).

Agencies Funding Research:

- National Eye Institute
- National Institute of Standards and Technology
- National Institute on Disability and Rehabilitation Research
- National Science Foundation

**Table 21: Vision and Reading
Current Projects as of Sep 1, 2003**

Project Title and Funding Agency	Institution	End Date
NIST Rotating-Wheel Refreshable Braille Display <i>National Institute of Standards and Technology</i>	NIST National Federation for the Blind Gaithersburg, Md.	Ongoing
Refreshable Tactile Graphic Display <i>National Institute of Standards and Technology</i>	NIST National Federation for the Blind Gaithersburg, Md.	Ongoing
Tactile Graphic Plotter <i>National Institute of Standards and Technology</i>	NIST National Federation for the Blind Gaithersburg, Md.	Ongoing
Wearable Low-Vision Aids Based Upon Retinal Light-Scanning Technologies <i>National Science Foundation</i>	University of Washington Seattle, Wash.	Sep 30, 2003
Textual Information Access for the Visually Impaired <i>National Science Foundation</i>	University of Maryland College Park, Md.	Feb 29, 2004
Tactile Glove for Computer Graphics for the Blind <i>National Science Foundation</i>	University of Wisconsin Madison, Wis.	Feb 29, 2004
Navigating Without Vision: Basic and Applied Research <i>National Eye Institute</i>	University of California Santa Barbara, Calif.	May 31, 2004
Toward the Automated Tactilization of Graphical Images <i>National Science Foundation</i>	University of Washington Seattle, Wash.	Jun 30, 2004
Visible Light Audio Information Transfer System <i>National Eye Institute</i>	Talking Lights, LLC Boston, Mass.	Jun 30, 2004
VIDI: Visual Information Dissemination for Visually Impaired Individuals <i>National Science Foundation</i>	University of Massachusetts Amherst, Mass.	Jul 31, 2004
Indoor Orientation and Wayfinding Aid for Vision Loss <i>National Eye Institute</i>	Charmed Technology Atlanta, Ga.	Jul 31, 2004
Braille Power Reader Program <i>National Institute on Disability and Rehabilitation Research</i>	Science Applications International Corporation Arlington, Va.	Aug 1, 2004
A Smart Telescope for Low Vision <i>National Eye Institute</i>	Blindsight Corporation Cambridge, Mass.	Aug 31, 2004

**Table 21: Vision and Reading
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Rendering Algorithms for Tactile and Haptic Display of Multidimensional Data <i>National Science Foundation</i>	University of Delaware Newark, Del.	Aug 31, 2004
Digital Imaging Techniques for the Simulation and Enhancement of Low Vision <i>National Science Foundation</i>	Cornell University Ithaca, N.Y.	Sep 30, 2004
Reading Enhancement for Patients With Visual Field Loss <i>National Eye Institute</i>	Harvard University Medical School Boston, Mass.	Dec 31, 2004
Remote Access Graphing Calculator—Visually Impaired <i>National Eye Institute</i>	Automated Functions, Inc. Falls Church, Va.	Apr 30, 2005
Access to Matlab: SKTools <i>National Institute on Disability and Rehabilitation Research</i>	Smith-Kettlewell RERC Smith-Kettlewell Eye Research Institute San Francisco, Calif.	Aug 1, 2005
Talking Signs <i>National Institute on Disability and Rehabilitation Research</i>	Smith-Kettlewell RERC Smith-Kettlewell Eye Research Institute San Francisco, Calif.	Aug 1, 2005
Computer Vision Applications for Blind and Visually Impaired Persons <i>National Institute on Disability and Rehabilitation Research</i>	Smith-Kettlewell RERC Smith-Kettlewell Eye Research Institute San Francisco, Calif.	Aug 1, 2005
Optical and Electronic Magnifying and Illumination Systems for Persons With Low Vision <i>National Institute on Disability and Rehabilitation Research</i>	Smith-Kettlewell RERC Smith-Kettlewell Eye Research Institute San Francisco, Calif.	Aug 1, 2005
Haptic Display of Space Through Portable Nav Aids <i>National Eye Institute</i>	Sensimetrics Corporation Somerville, Mass.	Aug 31, 2005
Automatic Generation of Optimal Tactile Graphics <i>National Institute on Disability and Rehabilitation Research</i>	University of Delaware Newark, Del.	Sep 1, 2005
Engineering Approaches to Low-Vision Rehabilitation <i>National Eye Institute</i>	Schepens Eye Research Institute Boston, Mass.	Sep 29, 2005

**Table 21: Vision and Reading
Current Projects as of Sep 1, 2003 (con't)**

Project Title and Funding Agency	Institution	End Date
Trainable Visual Aids for Object Detection and Identification <i>National Science Foundation</i>	Johns Hopkins University Baltimore, Md.	Sep 30, 2005
Wayfinding Technologies for People With Visual Impairments: Research and Development of an Integrated Platform <i>National Institute on Disability and Rehabilitation Research</i>	Sendero Group, LLC Davis, Calif.	Dec 1, 2006
Customizable Audio User Interfaces for the Visually Impaired and the Sighted <i>National Science Foundation</i>	University of Maryland College Park, Md.	Aug 31, 2007

Cross-Reference Tables

This section contains tables that cross-reference the categories from the previous section with the following items:

- **Assistive Technology Classifications Systems**
 - International Classification of Functioning, Disability and Health
 - ISO-9999: Technical Aids for Persons With Disabilities—Classification and Terminology
 - National Classification System for Assistive Technology (developed by NIDRR and the Research Triangle Institute)

- **Food and Drug Administration**

Devices that need approval from the Food and Drug Administration (FDA) are listed in Title 21 of the U.S. Code of Federal Regulations.

- **MeSH**

MeSH (Medical Subject Headings) is the National Library of Medicine’s controlled-vocabulary thesaurus. It consists of sets of terms naming descriptors in a hierarchical structure that permits searching at various levels of specificity. The National Library of Medicine uses the MeSH thesaurus to index articles from 4,600 of the world’s leading biomedical journals for the MEDLINE database.

- **Medicaid and Medicare Payment Status**

This section shows whether Medicaid and Medicare cover the cost of the assistive technology device.

- **Agencies Funding the Research**

This section shows agencies funding research, cross-referenced with the previous categories.

- **Estimated Number of Manufacturers**

The estimated number of manufacturers is provided by ABLEDATA. It includes both U.S. and overseas manufacturers.

- **Estimated Number of Users**

Where available, we list the number of estimated users of a category of assistive technology.

Classification Systems for Assistive Technology

International Classification of Functioning, Disability and Health

The International Classification of Functioning, Disability and Health (ICF) provides a detailed classification with definitions for the following:

- **Body Functions:** Physiological functions of body systems (including psychological functions).
- **Body Structures:** Anatomical parts of the body, such as organs, limbs and their components.
- **Activities:** Execution of a task or an action by an individual.
- **Participation:** Involvement in a life situation.
- **Environmental Factors:** Physical, social and attitudinal environment in which people live and conduct their lives.

The ICF is the international standard for health and disability-related data, and serves as the reference text for the conceptualization of health. Recommended uses for this information includes its use as a:

- **Statistical tool** to collect and record data.
- **Research tool** to measure outcomes (e.g., health outcomes and quality of life) and environmental factors.
- **Clinical tool** to assess needs and match treatments with specific conditions and rehabilitation.
- **Social policy tool** to plan social security systems, compensation systems and policy formulation.

For the purposes of this classification of environmental factors, assistive products and technology are narrowly defined as any product, instrument, equipment or technology adapted or specially designed for improving the functioning of a disabled person.

- **e1151 Assistive Products and Technology for Personal Use in Daily Living**
Adapted or specially designed equipment, products and technologies that assist people in daily living, such as prosthetic and orthotic devices, neural prostheses (e.g., functional stimulation devices that control bowels, bladder, breathing and heart rate), and environmental control units aimed at facilitating individuals' control over their indoor setting (scanners, remote control systems, voice-controlled systems and timer switches).

- **e1201 Assistive Products and Technology for Personal Indoor and Outdoor Mobility and Transportation**

Adapted or specially designed equipment, products and technologies that assist people in moving within buildings and about their environments, such as walking devices, special cars and vans, adaptations to vehicles, wheelchairs, scooters, and transfer devices.

- **e1251 Assistive Products and Technology for Communication**

Adapted or specially designed equipment, products and technologies that assist people in sending and receiving information, such as specialized vision devices, electro-optical devices, specialized writing devices, drawing or handwriting devices, signaling systems and special computer software and hardware, cochlear implants, hearing aids, FM auditory trainers, voice prostheses, communication boards, and glasses and contact lenses.

- **e1401 Assistive Products and Technology for Culture, Recreation and Sport**

Adapted or specially designed equipment, products and technology used for the conduct and enhancement of cultural, recreational and sporting activities, such as modified mobility devices for sports and adaptations for musical and other artistic performances.

ISO-9999: Technical Aids for Persons With Disabilities—Classification and Terminology

This international standard establishes a classification of technical aid for persons with disabilities. It is limited to aids used by individuals. This classification consists of three hierarchical levels: classes, subclasses and divisions. Classes from ISO-9999 are:

- 04-Aids for personal medical treatment
- 05-Aids for training in skills
- 06-Orthoses and prostheses
- 09-Aids for personal care and protection
- 12-Aids for personal mobility
- 15-Aids for housekeeping
- 18-Furnishings and adaptations to homes and other premises
- 21-Aids for communication, information and signaling
- 24-Aids for handling products and goods
- 27-Aids and equipment for environmental improvement, tools and machines
- 30-Aids for recreation

National Classification System for Assistive Technology

This system was developed by NIDRR and the Research Triangle Institute (RTI) in Jun 2000.

The 1994 amendments to the *Technology-Related Assistance for Individuals With Disabilities Act* required the secretary of the U.S. Department of Education to initiate a project that would develop a national classification system for assistive technology devices and services with the goal of obtaining national data through the system. The Research

Triangle Institute, under contract with NIDRR, developed the national classification system. The classification system uses a broad definition of assistive technology to avoid omitting devices or services that might be beneficial to persons with disabilities. This system adopted the definition of assistive technology devices contained in section three of the *Assistive Technology Act*:

“...Any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities.”

The main classification terms are:

- Architectural Elements
- Sensory Elements
- Computers
- Controls
- Independent Living
- Mobility
- Orthotics and Prosthetics
- Recreation, Leisure and Sports
- Modified Furniture and Furnishings
- Services

Table 22: Cross-Reference: Communication

ICF	e1251 Assistive products and technology for communication
ISO 9999	21 Aids for communication, information and signaling 21 10 Output devices for computers, typewriters and electronic equipment 21 10 09 Devices for synthetic speech 21 42 Face-to-face communication aids
NIDRR/RTI	B. Sensory Elements 104 Augmentative Communication Aids
MeSH	Equipment and Supplies E07 Self-Help Devices E07.796 Communication Aids for Disabled E07.796.250
FDA	PART 890—PHYSICAL MEDICINE DEVICES Subpart D—Physical Medicine Prosthetic Devices

Sec. 890.3700 Non-powered communication system.

(a) Identification. A non-powered communication system is a mechanical device intended for medical purposes that is used to assist a patient in communicating when physical impairment prevents writing, telephone use, reading or talking. Examples of non-powered communications systems include an alphabet board and a page turner.

Table 22: Cross-Reference: Communication (con't)

Sec. 890.3710 Powered communication system.

(a) Identification. A powered communication system is an AC or battery-powered device intended for medical purposes that is used to transmit or receive information. It is used by persons unable to use normal communication methods because of physical impairment. Examples of powered communication systems include the following: a specialized typewriter, a reading machine, and a video picture and word screen.

Medicare/Medicaid	Yes. Medicare reimbursement for AAC devices classified as functionally dedicated—including computer and personal assistant-based devices. Most states cover AAC devices under Medicaid.
Agencies	National Center for Medical Rehabilitation Research
Funding	National Institute on Deafness and Other Communication Disorders
Research	National Institute on Disability and Rehabilitation Research National Science Foundation
Estimated Number of Manufacturers	95 Source: ABLEDATA/Communication
Estimated Number of Users	Not available

Table 23: Cross-Reference: Computer Access

ICF	e1251 Assistive products and technology for communication
ISO 9999	21 12 Computers 24 Aids for handling products and goods 24 10 Input devices for computers and electronic equipment
NIDRR/RTI	200 Computer Desktop/Laptop 201 Computer Software 202 Computer Accessories
MeSH	Equipment and Supplies E07 Self-Help Devices E07.796 Communication Aids for Disabled E07.796.250
FDA	Not applicable
Medicare/Medicaid	May be covered as AAC devices. Most states cover AAC devices under Medicaid.
Agencies	National Science Foundation
Funding	National Institute on Disability and Rehabilitation Research
Research	
Estimated Number of Manufacturers	122 Source: ABLEDATA/Computers
Estimated Number of Users	Not Available

Table 24: Cross-Reference: Education and Learning

ICF	e1251 Assistive products and technology for communication
ISO 9999	05 Aids for training in skills 05 12 Aids for training in cognitive skills 05 15 Aids for training in basic skills 05 18 Aids for training in various educational subjects 05 21 Aids for vocational training 05 24 Aids for training in the arts 05 27 Aids for training in social skills
NIDRR/RTI	201.2 Computer-Assisted Instruction/Training Programs
MeSH	Equipment and Supplies E07 Self-Help Devices E07.796 Communication Aids for Disabled E07.796.250
FDA	Not Applicable
Medicare/ Medicaid	No
Agencies Funding Research	National Eye Institute National Institute on Disability and Rehabilitation Research Office of Special Education Programs National Science Foundation
Estimated Number of Manufacturers	33 Source: ABLEDATA/Education
Estimated Number of Users	Not Available

Table 25: Cross-Reference: Environmental

ICF	e1151 Assistive products and technology for personal use in daily living
ISO 9999	24 Aids for handling products and goods 24 12 Environmental control systems
NIDRR/RTI	B. Sensory Elements 101 Auditory Devices 101.2 Signaling Systems D. Controls 300 Environmental Control Systems 301 Timer Switches (Controls) 302 Remote Controls 303 Operating Controls/Devices
MeSH	Equipment and Supplies E07 Self-Help Devices E07.796

Table 25: Cross-Reference: Environmental (con't)

FDA	PART 890—PHYSICAL MEDICINE DEVICES Subpart D—Physical Medicine Prosthetic Devices Sec. 890.3725 Powered environmental control system. (a) Identification. A powered environmental control system is an AC or battery-powered device intended for medical purposes that is used by a patient to operate an environmental control function. Examples of environmental control functions include the following: to control room temperature, to answer a doorbell or telephone, or to sound an alarm for assistance.
Medicare/ Medicaid	No
Agencies Funding Research	Department of Veterans Affairs National Institute on Aging National Institute on Disability and Rehabilitation Research National Science Foundation
Estimated Number of Manufacturers	21 Source: ABLEDATA/Controls
Estimated Number of Users	Not Available

Table 26: Cross-Reference: Hearing Devices

ICF	e1251 Assistive products and technology for communication
ISO 9999	21 45 Hearing aids
MeSH	Equipment and Supplies E07 Sensory Aids E07.814 Hearing Aids E07.814.458
NIDRR/RTI	B. Sensory Elements 101 Auditory Devices 101.1 Hearing Aids
FDA	PART 874—EAR, NOSE, AND THROAT DEVICES Subpart D—Prosthetic Devices Sec. 874.3300 Hearing Aid. (a) Identification. A hearing aid that is a wearable sound-amplifying device that is intended to compensate for impaired hearing. This generic type of device includes the air-conduction hearing aid and the bone-conduction hearing aid, but excludes the group hearing aid or group auditory trainer (Sec. 874.3320), master hearing aid (Sec. 874.3330) and tinnitus masker (Sec. 874.3400).
Medicare/ Medicaid	No

Table 26: Cross-Reference: Hearing Devices (con't)

Agencies	National Institute on Deafness and Other Communication Disorders
Funding	National Institute on Disability and Rehabilitation Research
Research	Department of Veterans Affairs
Estimated Number of Manufacturers	50 Source: ABLEDATA/Deaf
Estimated Number of Users	4,484,000 Source: Russell et al. 1997

Table 27: Cross-Reference: Mobility and Transportation

	Manual Wheelchair	Power Wheelchair
ICF	e1201 Assistive products and technology for personal indoor and outdoor mobility and transportation	e1201 Assistive products and technology for personal indoor and outdoor mobility and transportation
ISO 9999	12 21 03 Manual attendant-controlled 12 21 06 Bimanual rear-wheel driven 12 21 09 Bimanual front-wheel driven 12 21 12 Bimanual level-driven 12 21 15 Single-side-driven non-powered 12 21 18 Foot-driven	12 21 21 Powered attendant-controlled 12 21 24 Electric motor-driven; manual steering 12 21 27 Electric motor-driven; power steering 12 21 30 Combustion motor-driven
NIDRR/RTI	F. Mobility 502 Wheelchair 502.1 – 502.6	F. Mobility 502 Wheelchair 502.7 – 502.8
MeSH	Equipment and Supplies E07 Self-Help Devices E07.796 Wheelchairs E07.796.980	Equipment and Supplies E07 Self-Help Devices E07.796 Wheelchairs E07.796.980
FDA	Part 890—Physical Medicine Devices Subpart D—Physical Medicine Prosthetic Devices Sec. 890.3850 Mechanical wheelchair	Part 890—Physical Medicine Devices Subpart D—Physical Medicine Prosthetic Devices Sec. 890.3860 Powered wheelchair Sec. 890.3880 Special grade wheelchair Sec. 890.3890 Stair-climbing wheelchair
Medicare/Medicaid	Yes	Yes

Table 27: Cross-Reference: Mobility and Transportation (con't)

Agencies	Department of Veterans Affairs	Department of Veterans Affairs
Funding	National Institute on Disability and Rehabilitation Research	National Institute on Disability and Rehabilitation Research
Research	National Center for Medical Rehabilitation Research	National Center for Medical Rehabilitation Research
	National Eye Institute	National Institute on Aging
Estimated Number of Manufacturers	28 Source: RERC on Wheeled Mobility	27 Source: RERC on Wheeled Mobility
Estimated Number of Users	1,564,000 Source: Russell et al. 1997	

Table 27.1: Cross-Reference: Mobility and Transportation

Vehicle Conversions	
ICF	e1201 Assistive products and technology for personal indoor and outdoor mobility and transportation
ISO 9999	12 Aids for personal mobility 12 12 Car adaptations 12 12 18 Car hoists to lift a person seated in a wheelchair into a car 12 12 21 Aids for leading wheelchairs onto or into a car 12 12 24 Equipment for fastening a wheelchair in a car
NIDRR/RTI	F. Mobility 500 Transportation 500.1 Motorized Vehicle Adaptations
MeSH	Equipment and Supplies E07 Self-Help Devices E07.796
FDA	Not Applicable
Medicare/Medicaid	No
Agencies	National Center for Medical Rehabilitation Research
Funding	National Institute on Disability and Rehabilitation Research
Research	National Science Foundation
Estimated Number of Manufacturers	24 Source: ABLEDATA/Transportation
Estimated Number of Users	Not Available

Table 28: Cross-Reference: Prosthetics and Orthotics

	Orthotics	Prosthetics
ICF	e1151 Assistive products and technology for personal use in daily living	e1151 Assistive products and technology for personal use in daily living
ISO 9999	06 Orthoses and prostheses Orthoses (06 03–06 15)	06 Orthoses and prostheses Limb prostheses (06 18–06 27)
NIDRR/RTI	G: Orthotics/Prosthetics (600–609) 600-604 Orthotics	G: Orthotics/Prosthetics (600–609) 605-609 Prosthetics
MeSH	Equipment and Supplies E07 Surgical Equipment E07.858 Orthopedic Equipment E07.858.442 Orthotic Devices E07.858.442.743 Braces E07.858.442.743.319	Equipment and Supplies E07 Prostheses and Implants E07.695 Artificial Limbs E07.695.050
FDA	Part 888—Orthopedic Devices Subpart D—Prosthetic Devices Part 890—Physical medicine devices Sec. 890.3025—Prosthetic and orthotic accessory Sec. 890.3410—External limb orthotic component Sec. 890.3475—Limb orthosis Sec. 890.3490—Truncal orthosis Sec. 890.3610—Rigid pneumatic structure orthosis	Part 888—Orthopedic Devices Subpart D—Prosthetic Devices Part 890—Physical medicine devices Sec. 890.3025—Prosthetic and orthotic accessory Sec. 890.3420—External limb prosthetic component Sec. 890.3500—External assembled lower limb prosthesis
Medicare/Medicaid	Yes	Yes
Agencies Funding Research	National Center for Medical Rehabilitation Research Department of Veterans Affairs National Institute on Disability and Rehabilitation Research	National Center for Medical Rehabilitation Research Department of Veterans Affairs National Institute on Disability and Rehabilitation Research
Estimated Number of Manufacturers	10 Source: ABLEDATA/Orthotics	Four Source: ABLEDATA/Prosthetics
Estimated Number of Users	4,565,000 Source: Russell et al. 1997	

Table 29: Cross-Reference: Recreation and Leisure

ICF	e1401 Assistive products and technology for culture, recreation and sport
ISO 9999	30 Aids for recreation
NIDRR/RTI	H. Recreation/Leisure/Sports
MeSH	Equipment and Supplies E07 Self-Help Devices E07.796
FDA	Not Applicable
Medicare/ Medicaid	No
Agencies Funding Research	National Center for Medical Rehabilitation Research National Institute on Disability and Rehabilitation Research National Science Foundation
Estimated Number of Manufacturers	72 Source: ABLEDATA/Recreation
Estimated Number of Users	Not Available

Table 30: Cross-Reference: Seating and Positioning

ICF	e1201 Assistive products and technology for personal indoor and outdoor mobility and transportation
ISO 9999	18 09 42 Seat cushions and underlays
NIDRR/RTI	F. Mobility 502 Wheelchair 502.12 Wheelchair Accessories 502.12(2) Backrests/Seats/Headrests
MeSH	Equipment and Supplies E07 Self-Help Devices E07.796
FDA	PART 890—PHYSICAL MEDICINE DEVICES Subpart D—Physical Medicine Prosthetic Devices Sec. 890.3920 Wheelchair component. (a) Identification. A wheelchair component is a device intended for medical purposes that is generally sold as an integral part of a wheelchair, but may also be sold separately as a replacement part. Examples of wheelchair components are the following: armrest, narrowing attachment, belt, extension brake, curb climber, cushion, anti-tip device, footrest, hand rim, hill holder, leg rest, heel loops and toe loops.
Medicare/ Medicaid	Yes: Decubitus care cushions/mattresses

Table 30: Cross-Reference: Seating and Positioning (con't)

Agencies	Department of Veterans Affairs
Funding	National Institute on Disability and Rehabilitation Research
Research	National Center for Medical Rehabilitation Research
Estimated Number of Manufacturers	38 Source: ABLEDATA/Seating
Estimated Number of Users	Not Available

Table 31: Cross-Reference: Vision and Reading

ICF	e1251 Assistive products and technology for communication
ISO 9999	21 Aids for communication, information and signaling 21 03 Optical aids 21 06 Opto-electronic aids 21 10 Output devices for computers, typewriters and electronic equipment
NIDRR/RTI	B. Sensory Elements 100 Optical Aids
MeSH	Equipment and Supplies E07 Self-Help Devices E07.796 Communication Aids for Disabled E07.796.250
FDA	PART 886—OPHTHALMIC DEVICES Subpart F—Therapeutic Devices Sec. 886.5540 Low-vision magnifier (a) Identification. A low-vision magnifier is a device that consists of a magnifying lens intended for use by a patient who has impaired vision. The device may be held in the hand or attached to spectacles. Sec. 886.5800 Ophthalmic bar reader (a) Identification. An ophthalmic bar reader is a device that consists of a magnifying lens intended for use by a patient who has impaired vision. The device is placed directly onto reading material to magnify print. Sec. 886.5820 Closed-circuit television reading system (a) Identification. A closed-circuit television reading system is a device that consists of a lens, video camera and video monitor that is intended for use by a patient who has subnormal vision to magnify reading material. Sec. 886.5840 Magnifying spectacles (a) Identification. Magnifying spectacles are devices that consist of spectacle frames with convex lenses intended to be worn by a patient who has impaired vision to enlarge images.

Table 31: Cross-Reference: Vision and Reading (con't)

Sec. 886.5900 Electronic vision aid

(a) Identification. An electronic vision aid is an AC or battery-powered device that consists of an electronic sensor/transducer intended for use by a patient who has impaired vision or blindness to translate visual images of objects into tactile or auditory signals.

Sec. 886.5910 Image intensification vision aid

(a) Identification. An image intensification vision aid is a battery-powered device intended for use by a patient who has limited dark adaptation or impaired vision to amplify ambient light.

Sec. 886.5915 Optical vision aid

(a) Identification. An optical vision aid is a device that consists of a magnifying lens with an accompanying AC or battery-powered light source intended for use by a patient who has impaired vision to increase the apparent size of object detail.

Medicare/ Medicaid	No
Agencies Funding Research	National Eye Institute National Institute of Standards and Technology National Institute on Disability and Rehabilitation Research National Science Foundation
Estimated Number of Manufacturers	97 Source: ABLEDATA/Blind
Estimated Number of Users	527,000 Source: Russell et al. 1997

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