# Preface

The constantly changing landscape of Assistive Technologies makes it challenging for experts and practitioners to stay apprized of the field's most up-to-date research. That is why Information Science Reference is pleased to offer this three-volume reference collection that will empower students, researchers, and academicians with a strong understanding of critical issues within Assistive Technologies by providing both broad and detailed perspectives on cutting-edge theories and developments in the field. This collection is designed to act as a single reference source on conceptual, technical, and organizational issues, as well as provide insight into emerging trends and future opportunities within the discipline.

*Assistive Technologies: Concepts, Methodologies, Tools, and Applications* is organized into six distinct sections that provide comprehensive coverage of important topics. The sections are (1) Fundamental Concepts and Theories, (2) Tools and Technologies, (3) Utilization and Application, (4) Critical Issues, (5) Organizational and Social Implications, and (6) Emerging Trends. The following paragraphs provide a summary of what readers may expect from this invaluable reference tool.

Section 1, "Fundamental Concepts and Theories", introduces readers to the current state of the art in the field of Assistive Technologies. The opening chapters of this section deal with educational technologies meant to assist students with both physical and cognitive disabilities—a primary focus of this multivolume reference. The first chapter, *Assistive Technology* by Mary Spillane explores the use of technology as "a tool for inclusion" in providing timely access to educational resources for all students. Additional chapters in this section provide an overview of various Assistive Technologies, including human-computer interfaces, internet accessibility, and self-management. Of particular interest are the chapters *POMDP Models for Assistive Technology* by Jesse Hoey, Pascal Poupart, Craig Boutilier, and Alex Mihailidis, which describes a technology for assisting users with cognitive tasks, and *Assistive Technology and Rehabilitation Engineering* by Andrew Y. J. Szeto, which focuses on technologies enabling users to recover from debilitating injury. In all, the chapters in this section present a solid foundation for the more technical chapters in Section Two.

Section 2, "Tools and Technologies", builds on the information presented in the first section to provide readers with an understanding of some of the newest devices and instruments used as Assistive Technologies. *Touch Screens for the Elderly* by Holger Luczak, Christopher M. Schlick, Nicole Jochems, Sebastian Vetter, and Bernhard Kausch explores a user interface for mobile devices that takes into account the limited manual dexterity of elderly and disabled users. Educational applications are also exhibited, such as the devices described in *Automatic Speech Recognition to Enhance Learning for Disabled Students* by Pablo Revuelta, Javier Jiménez, José M. Sánchez, and Belén Ruiz and *What Do You Do With A Digital Pen?* by Judith K. Carlson. While most of the chapters in this section deal primarily with physical disabilities, others, such as *Ways of ICT Usage Among Mildly Intellectually Disabled Adolescents* by Piotr Plichta, investigate cognitive disabilities as well. The final chapter in this section,

*Deepkøver: An Adaptive Intelligent Assistance System for Monitoring Impaired People in Smart Homes* by Mehdi Najjar, François Courtemanche, Habib Hamam, Alexandre Dion, Jérémy Bauchet, and André Mayers presents a holistic view of Assistive Technologies through a tool for assisted living.

Section 3, "Utilization and Application", describes some of the various uses of the Assistive Technologies examined in the previous two sections. The first chapters in this section continue the research presented at the end of Section Two with *Assistive Technologies in Smart Homes* by Tatsuya Yamazaki and *Ubiquitous Computing for Independent Living* by Neil W. Bergmann. Conversely, the central chapters in this section follow a different tack to focus on children rather than the elderly, a primary example being *Collaborative Virtual Learning for Assisting Children with Cerebral Palsy* by Nia Valeria, Marlene Valerie Lu, and Lau Bee Theng. Chapters such as *Teaching Executive Functions, Self-Management, and Ethical Decision-Making through Popular Videogame Play* by Randy Kulman, Gary Stoner, Louis Ruffolo, Stephanie Marshall, Jennifer Slater, Amanda Dyl, and Alice Cheng also evaluate serious games in the context of special education. Finally, the section concludes with *IDTVOS* by Raúl Riesco Granadino and Javier Alfonso Cendón, a business application for assistive communication devices tailored toward disabled users in professional settings.

Section 4, "Critical Issues", analyzes the impact of Assistive Technologies, both in terms of potential benefits and possible disadvantages to users. The primary tools evaluated in this section are speech recognition software and gaze control systems. *On the Use of Speech Technologies to Achieve Inclusive Education for People with Intellectual Disabilities* by Ana Pérez Pérez, Zoraida Callejas Carrión, Ramón López-Cózar Delgado, and David Griol Barres investigates methods of assisting individuals with speech disorders, while *Safety Issues and Infrared Ligh*t by Fiona Mulvey, Arantxa Villanueva, David Sliney, Robert Lange, and Michael Donegan cautions against the overuse of eye trackers. Similar to other sections in this multivolume reference, Section Four also includes chapters with a special education focus, such as *Supports for and Barriers to Implementing Assistive Technology in Schools* by Susanne Croasdaile, Sharon Jones, Kelly Ligon, Linda Oggel, and Mona Pruett, which explores some of the many ways teachers and administrators can make their classrooms more inclusive.

Section 5, "Organizational and Social Implications", examines Assistive Technologies with respect to how they impact the lives of intellectually and physically disabled individuals. The primary topic covered in this section is education, with chapters such as *Web-Based Experimentation for Students with Learning Disabilities* by Venkata Chivukula and Michael Shur, *Assistive Technology in Higher Education* by Susan B. Asselin, and *Coping with Accessibility and Usability Challenges of Online Technologies by Blind Students in Higher Education* by Samuel Muwanguzi and Lin Lin. Additional chapters evaluate the use of technology in special educational settings from preschool through higher education, including didactic games, software aids, dialog systems, lecture capture, and more. A latter chapter, *Assistive Technologies and Environmental Design Concepts for Blended Learning and Teaching for Disabilities within 3D Virtual Worlds and Learning Environments* by Noha Saleeb and Georgios A. Dafoulas, is indicative of this section as a whole, describing the use of online, virtual technologies to create an inclusive environment for students with disabilities.

Section 6, "Emerging Trends", details some of the latest developments in Assistive Technologies, innovative software and tools that enable disabled individuals to function independently in society. This section covers a diverse range of topics, from facial pattern recognition technologies to brain-computer interfaces to smart homes. Chapters such as *Model-based Approaches for Scanning Keyboard Design* by Samit Bhattacharya and *Unconstrained Walking Plane to Virtual Environment for Non-Visual Spatial Learning* by Kanubhai K. Patel and Sanjay Kumar Vij explore some of the advanced tools used to mitigate

the impact of physical limitations on disabled users' access to technology, and *Design of and Experimentation with a Walking Assistance Robot* by Zhang Lixun, Bai Dapeng, and Yi Lei assists individuals in overcoming those physical limitations in everyday activities. The final chapter, *New Communication Technologies for Inclusive Education in and outside the Classroom* by Ana Iglesias, Belén Ruiz-Mezcua, Juan Francisco López, and Diego Carrero Figueroa ties this section to the pervasive themes evident throughout this multivolume reference through its exploration of Assistive Technologies in education.

As a comprehensive collection of research on current findings related to the development of interdisciplinary technologies, *Assistive Technologies: Concepts, Methodologies, Tools, and Applications* provides researchers, administrators, and all audiences with a complete understanding of the latest advances, applications, and concepts in Assistive Technologies. Although the primary organization of the contents in this multi-volume work is based on its six sections, offering a progression of coverage on the important concepts, technologies, applications, critical concerns, social issues, and emerging trends, the reader can also identify specific content by utilizing the extensive indexing system found at the end of each volume. Given the vast number of issues concerning usage, successes and failures, policies, strategies, and applications of Assistive Technologies in countries around the world, *Assistive Technologies: Concepts, Methodologies, Tools, and Applications* addresses the demand for a resource that encompasses the most pertinent research on the technologies being employed to globally bolster the knowledge and implementation of Assistive Technologies.