

CVHI 2009



EURO ASSIST VHI-6

**Conference and Workshop on Assistive Technologies for Vision
and Hearing Impairment
Past Successes and Future Challenges**

**20th – 23rd April, 2009
Wroclaw, Poland**

BOOK OF ABSTRACTS AND PROGRAMME

M.A. Hersh (ed.)





FOREWORD

Welcome to the sixth event in the international conference series on Assistive Technologies and Rehabilitation Engineering. We are thankful for support from the European Commission Sixth Framework IST eInclusion Priority as part of the CWST Project. This year's conference emphasises Past Successes and Future Challenges and we are fortunate to have secured a full and interesting programme.

There is increasing recognition across the countries of the European Union of the importance of social inclusion for disabled people and the role of assistive technology in overcoming the infrastructural and other barriers still faced by disabled people. This change is due to a number of factors, including campaigning by organisations of disabled people and their increasing assertiveness in demanding their rights. The assistive technology community has also played an important role, despite its relatively small size. However, much still remains to be done. Assistive technology is still a relatively new research area. It is also a very exciting one and involves multi- and interdisciplinary work, the application of new and existing technologies and the solution of important social problems.

A wide range of issues are discussed in the papers of this CVHI event. They include telephony for deaf and hearing impaired people, mobility and orientation technology for blind and visually impaired people, hearing aids and communication technologies, end-user involvement in design, access to education, facilities and services, sign language representation and translation, internet and document accessibility and accessing technical and other information. The conference includes two panel discussions. The first considers the present and future prospects of assistive technology from the perspectives of the deaf, blind and deafblind communities in Poland. The second discusses the advantages and disadvantages of elearning for deaf people. The keynote speech discusses audiovisual speech processing. The Conference is preceded by a day of Tutorial Sessions on researching end user requirements with application to wayfinding technologies, ICT for deaf users in developing regions with a South African case study, and the design of assistive technology to support independent travel for blind and visually impaired people. The emphasis in the tutorials is on gaining an overview and understanding of the fundamentals in these three important areas.

Prof Jerzy Buzek, former Prime Minister of Poland, has very kindly agreed to be the Patron of this CVHI event.

I would like to thank all the people who helped in the run-up to the event. Particular and heartfelt thanks are due to Ms Vi Romanes who has run the CVHI Secretariat since the start of CVHI and has been responsible for many of the arrangements for all the CVHI Conferences and worked tirelessly in various capacities to ensure their success. She retired at the end of last year and I am sure all CVHI participants will

join with me in best wishes to her for a happy retirement. Further heartfelt thanks are due to Ms Lucy Whiteley who has very ably succeeded her. Grateful thanks are also due to Prof Mike Johnson for support and advice along the way and to Dr Barbara Leporini who has contributed her expertise to create and design an accessible and beautiful CD of the conference proceedings, as well as Peter McKenna for help with the art work. Particular thanks are also due to Ms Hanny Pasterny and CRIS (Centre for the Development of Social Initiatives) for their support and help with the local arrangements. We would like to thank all the anonymous referees for participating in the peer review process which helps to ensure the all-important scientific quality of the event. Thanks are also due to the staff at the Hotel Jana Pawła II, Wrocław.

To conclude, we hope you enjoy the conference if you are attending and if not, we hope that you find the papers published here interesting and full of future research potential.

Information about future CVHI events will be made available on the web site http://www.elec.gla.ac.uk/Events_page/CVHI/cvhi/ or can be obtained by contacting the conference secretariat on cvhi@elec.gla.ac.uk.

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European Commission Support and Bursaries

This CVHI Conference Series is supported by the European Commission. The first three conferences were supported by the Research Directorates Human Potential Programme: High Level Scientific Conference. The support was awarded to Dr. Marion Hersh (University of Glasgow, Scotland) and Professor Michael Johnson (University of Strathclyde, Scotland) who are key organisers of the Conference series. These three conferences have already taken place; the first was in Italy in 2001 having as its theme *Support Technologies for Independent Living and Working*. The second was in 2002 in Granada, Spain with the theme, *Accessibility, Mobility and Societal Integration* and again in Granada, Spain in 2004 the theme was *State-of-the-Art and New Challenges*.

The Current financial support from the European Commission is from the Sixth Framework IST Programme eInclusion Priority as part of the CWST Project. Two previous CVHI events have taken place as part of the CWST Project. The first took place in Kufstein in 2006 with the theme of *Technology for Inclusion*. The second returned to Granada, Spain in 2007 with the theme *Assistive Technology for All Ages*. Other events in CWST include the AAATE and ICCHP conferences.

An important part of the European Commission support is the provision of bursaries for young researchers and disabled researchers. In the first three conferences this support only covered European researchers, but it has now been extended, though the focus is still on European researchers. Support for disabled researchers who do not meet the age conditions is also new to the three conferences which form part of the CWST Project.

PROGRAMME

MONDAY 20 April	
10am	Welcome: Marion Hersh, University of Glasgow, Scotland
10.10-12.10	<p>Tutorial Session 1</p> <p>Researching End-User Requirements with Application to Wayfinding Technologies</p> <p>Chair: Claudia Folska Vice-Chair: Edwige Pissaloux</p> <p>Jim Marston Research Unit on Spatial Cognition and Choice, Department of Geography, University of California Santa Barbara, U.S.A.</p>
12.30-13.30	Lunch
13.30-15.30	<p>Tutorial Session 2</p> <p>ICT for Deaf Users in Developing Regions: A South African Case Study</p> <p>Chair: Saduf Naqvi Vice-Chair: James Ohene-Djan</p> <p>Bill Tucker, Department of Computer Science, University of the Western Cape Meryl Glaser, Sign Language Education and Development, South Africa</p>
15.30-16.00	Break
16.00-18.00	<p>Tutorial Session 3</p> <p>Designing Assistive Technology to Support Independent Travel for Blind and Visually Impaired People</p> <p>Chair: Adina Ionescu Vice-Chair: Jim Marston</p> <p>Marion Hersh, Department of Electronics and Electrical Engineering, University of Glasgow, Scotland Edwige Pissaloux, Université Pierre et Marie Curie Institut des Systèmes Intelligents et de Robotique, France</p>
18.15-19.15	Meeting for Young Researchers on Chairing Sessions
19.30-21.30	Evening meal

TUESDAY 21 APRIL	
9.00-9.10	Welcome: Marion Hersh, University of Glasgow, Scotland
9.10 -10.10	<p>Keynote Speech Audio-Visual Speech Processing – Analysis and Synthesis</p> <p>Chair: Zlatica Dolna Vice-Chair: Rüdiger Hoffman</p> <p>Hans-Heinrich Bothe Centre for Applied Hearing Research, Technical University of Denmark, Copenhagen</p>
10.10-10.40	Break
10.40-12.40	<p>Session 1: Orientation and Wayfinding</p> <p>Chair: Loïc Deschamps Vice-Chair: Pawel Strumillo</p> <p>A Remote Guidance System Aiding the Blind in Urban Travel Przemyslaw Baranski, Pawel Strumillo, Michal Bujacz, A. Materka Technical University of Lodz, Poland</p> <p>A Proposed Method for Sonification of 3D Environments Using Scene Segmentation and Personalized Spatial Audio Michal Bujacz, Piotr Skulimowski, G. Wróblewski, A. Wojciechowski, Pawel Strumillo Technical University of Lodz, Poland</p> <p>Beyond Boundaries; The Impact of Sex Differences in Wayfinding Without Sight – Implications for Urban Planning Design and Spatial Cognition Claudia Folska University of Colorado, USA</p> <p>Study of GPS use for Accessibility in the Netherlands Sasja Ras, Kathleen Asjes Dedicon, Netherlands</p> <p>Auditory Orientation Training System for the Blind by using Wide-Range 3-D Sound Yoshikazu Seki Yukio Iwaya², Takeru Chiba², Satoshi Yairi², Makoto Otani² Makoto Oh-uchi³, Tetsuya Munekata⁴, Kazutaka Mitobe⁵, And Akio Honda⁶ ¹National Institute of Advanced Industrial Science and Technology (AIST) ²Tohoku University, ³Tohoku Fukushi University, ⁴National Institute of Special Needs Education, ⁵Akita University, ⁶Iwaki Meisei University, Japan</p>
13.00-14.00	Lunch

14.00-16.00	<p>Session 2: Hearing Aids and Communication Technologies</p> <p>Chair: Kabil Jaballah Vice-Chair: Bill Tucker</p> <p>Simulation of Auditory-Visual Impairments for Studies on Supplementary Technical Communication Devices Sermed Al Hamdani, Hans-Heinrich Boethe Centre for Applied Hearing Research, Technical University of Denmark, Copenhagen</p> <p>Engaging Minority Communities in Deaf Culture and Sign Language Sadaqat Ali, Saduf Naqvi Goldsmiths College, London, UK</p> <p>The Benefit of Speech Enhancement to the Hearing Impaired Nir Fink, M. Furst, C. Muchnik Tel Aviv University, Israel</p> <p>Representing Emotions and the Context in Subtitles Marion Hersh¹, James Ohene-Djan² ¹ University of Glasgow, Scotland; ²Goldsmiths College, London, UK</p> <p>Focussed Stimulation in Auditory Implants Soren Wulf-Kristiansen, Hans-Heinrich Bothe Centre for Applied Hearing Research, Technical University of Denmark, Copenhagen</p>
16.00-16.30	Break

16.30-18.30	<p>Session 3: Assistive Technology for Education</p> <p>Chair: Sasja Ras Vice-Chair: Cristian Bernareggi</p> <p>Speech and Braille Access to Computation Programs: User Experiences Sauro Cesaretti¹, Cristian Bernareggi², Jana Andrejkova³, ¹Università di Urbino, Ancona, Italy; ²Università degli Studi di Milano; ³ Technical University of Kosice, Slovakia</p> <p>Community-based Rehabilitation and Educational Services Adina Ionescu¹, Ileana Hamburg² ¹'Octav Onicescu' National College, Romania; ²Institut Arbeit und Technik, Gelsenkirchen, Germany</p> <p>Benefiting Disabled Students by Developing an Application that Uses Captioning of Multimedia to Enhance Learning for all Students Mike Wald and John-Mark Bell, England Southampton University, UK</p> <p>Hybrid Books – Information Access in Combined Format Svatoslav Ondra Masaryk University, Czech Republic</p> <p>Sign Language Online Interpreting at Masaryk University Christoph Damm Masaryk University, Czech Republic</p>
19.30-21.30	Welcome reception, followed by evening meal

WEDNESDAY 22 APRIL	
9.00-10.30	<p>Keynote Panel 1</p> <p>Chair: Hanna Pasterny Vice-Chair: Marion Hersh</p> <p>Assistive Technology Current and Future: The Perspectives of the Deaf and Deafblind Communities in Poland</p> <p>Grzegorz Kozlowski President of the Towarzystwo Pomocy Gluchoniewidomym (Society for Supporting Deafblind People)</p> <p>Kajetana Maciejska-Roczán Vice President of Polski Związek Gluchych (Polish Association of Deaf People), Member of Board of European Union of the Deaf</p>
10.30-11.00	Break
11.00-13.00	<p>Session 4: Sign Language Representation and Translation</p> <p>Chair: Sadaqat Ali Vice-Chair: Mike Wald</p> <p>Toward a Descriptive Language for Signs Nour Ben Yahia, Mohammed Jemni Ecole Supérieure des Sciences et Techniques de Tunis, Tunis</p> <p>Linguistic Processing of Text for Automatic Translation into Sign Language Mehrez Boulares, Mohammed Jemni Ecole Supérieure des Sciences et Techniques de Tunis, Tunis</p> <p>Toward Facial Expression Generation for Sign Language Machine Translation Oussama Elghoul, Mohammed Jemni Ecole Supérieure des Sciences et Techniques de Tunis, Tunis</p> <p>Automatic Sign Language Recognition using X3D/VRML Animated Humanoids Kabil Jaballah, Mohammed Jemni Ecole Supérieure des Sciences et Techniques de Tunis, Tunis</p> <p>Emotional Engineering of Digital Representations of Sign Languages – the Importance of Facial Detailing Saduf Naqvi, James Ohene-Djan Goldsmiths College, London, UK</p>
13.00-14.00	Lunch
14.00-18.30	Group Visit

THURSDAY 23 APRIL	
9.00-10.40	<p>Keynote Panel 2</p> <p>E-Learning for Deaf People – Is This the Solution for Accessibility and Inclusion?</p> <p>Chair: Marion Hersh</p> <p>Advantages and Disadvantages of eLearning for Deaf People: The Case of Masaryk University Tomas Sklenak and Lucie Stefkova Masaryk University, Czech Republic</p> <p>The Use of ICT in Training for Deaf People: the Example of Deafax Saduf Naqvi Deafax, UK</p>
10.40-11.10	Break
11.10-13.00	<p>Session 5: Mobility and Orientation for Blind and Visually Impaired People</p> <p>Chair: Barbara Leporini Vice Chair: Yoshikazu Seki</p> <p>An Application for Smartphones Dedicated for the Blind and Visually Impaired Users Piotr Skulimowski, Artur Klepaczko, Pawel Strumillo Technical University of Lodz, Poland</p> <p>A Remote Guidance System Aiding the Blind in Urban Travel Przemyslaw Baranski, Pavel Strumillo, Michal Bujacz, A. Materka Technical University of Lodz, Poland</p> <p>mTransVIP – The System Facilitating Visually Impaired People an Unassisted Use of Urban Traffic Jacek Jelonek Poznan University of Technology, Poland</p> <p>Usage Analysis of a Sensory Substitution System : Report and Perspectives to Conceive a Tactile Interaction Network Loic Deschamps, Katia Rovira, Charles Lenay, Olivier Gapenne Technical University, Compiègne, France</p> <p>Micro Look: Travel Information System for Blind People Lukasz Kulczak and Hanna Pasterny Design Innovation Integration Zone, Katowice, Poland</p>
13.00-14.00	Lunch

14.00-16.00	<p>Session 6: Assistive Technology Provision and Outcomes</p> <p>Chair: Emma Bradburn Vice Chair: Jim Marston</p> <p>ICT and Ambient Intelligence Tools in New EU Countries Zlatica Dolna, Dusan Simsik, Alena Galajdova Technical University of Kosice, Slovakia</p> <p>The Analysis of E-Services and their Accessibility for Elderly People and People with Disabilities Jana Andrejkova, Dusan Simsik, Juraj Bujnak, Zlatica Dolna Technical University of Kosice, Slovakia</p> <p>Using the Comprehensive Assistive Technology (CAT) Model in an Assistive Technology Outcome Procedure with Personal Assistive Technology Profiles Marion Hersh¹, Mike Johnson² ¹University of Glasgow, Scotland, ²University of Strathclyde, Scotland</p> <p>Assistive Awareness Referring to People with Hearing Disabilities Ileana Hamburg¹, Marina Muscan² ¹Institut Arbeit und Technik, Gelsenkirchen, Germany; ²Educational and Professional Development, Romania</p> <p>Experience with New Services for Seniors and People with Disabilities in Slovakia Dusan Simsik, Stanislav Krajnak, Juraj Bujnak, Samer Abdo Al-Rabeei Technical university of Kosice, Slovakia</p>
16.00-16.30	Break

16.30-18.00	<p>Session 7: Access to Information and Education</p> <p>Chair: Jana Andrejkova Vice Chair: Jacek Jelonek</p> <p>Contrapunctus Braille Music Reader: A Free Player for Accessible Music Scores Kathleen Asjes, Neil McKenzie, Sasja Ras Dedicon, Netherlands</p> <p>A Pedagogical Approach to Accessible E-Learning Design Emma Bradburn, Éric Bel University of Teesside, UK</p> <p>Wikipedia, the Open Encyclopaedia: Is it Really Open to Blind Users? Barbara Leporini ISTI-CNR, Italy</p> <p>Accessibility in Design as a Discourse and Praxis Anna Maj¹, Michal Derda-Nowakowski² ¹University of Silesia, Katowice, Poland; ²ExMachina Academic Press, Poland</p>
18.15-19.30	Young Researchers Meeting
19.30-21.30	Evening meal

ABSTRACTS

KEYNOTE SPEECH

Audio-visual Speech Processing – Analysis and Synthesis

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The paper discusses the state-of-the-art in audio-visual speech processing and presents a number of applications of this technology for hearing impaired people, with the potential for application to people with moderate dual sensory impairments in the future.

Audio-visual speech processing comprises an analysis and a synthesis component. The process involves filming the speaker and recording a speech signal. The movements of the head involved in articulating speech or expressing emotion are modelled in the context of the speech signal, often using visual features. The models can be optimized and evaluated for naturalness and/or intelligibility using the recorded data or field tests after the data has been implemented in a synthesis system. The analysis process needs to consider i) the prediction of facial and head motion ii) naturalness of the 3D image, iii) representation of the speech signal in the case of unrestricted vocabulary, iv) synchronization of the audio and visual components

Audio-visual speech synthesis is concerned with the design and creation of realistic avatars with animated faces or heads on a computer screen. The animations are usually synchronized with the corresponding speech signal with the intention of giving users the impression that they are communicating with a 'talking head'. The combination of artificial intelligence with the avatar's response to the user's voice or text input could produce a 'thinking head'.

Audio-visual speech synthesis systems have a number of actual and potential applications. In particular, they are being used to train people with abrupt onset profound deafness in lipreading and to improve their communication skills. This type of aid could also be used to improve the oral communication skills of deaf schoolchildren.

Further applications are in speech acquisition by deaf children and in literacy improvement for deaf children who can lipread. The speech acquisition application makes use of the fact that young children often copy the facial and lip movements of parents and teachers. The literacy improvement application makes use of the correlation between written text and articulatory facial movements.

Keywords: audio-visual, analysis, synthesis, applications.

SESSION 1: ORIENTATION AND WAYFARING

A Remote Guidance System Aiding the Blind in Urban Travel

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This paper presents tests of a remote guidance system for the blind. The idea behind the system is to relay a video stream from a camera carried by a blind person to a remote operator who can provide assistance based on the video and the GPS position of the blind user. The remote operator helps the blind traveller with short spoken instructions. The connection is established over the GSM network using High-Speed Downlink Packet Access data transfer. The aim of the paper is to present the performance of the system in an urban area. The study includes discussion about communication link reliability, GPS accuracy and camera resolution. Three tests were conducted: guiding the user in a university campus and helping him to cross the street and locate a tram. Tests shows that the system is useful and has great potential, albeit subject to further improvements.

Keywords: electronic travel aids for the blind, navigation, remote assistance

A Proposed Method for Sonification of 3D Environments Using Scene Segmentation and Personalized Spatial Audio

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This paper proposes a method for auditory representation of 3D scenes for use in an electronic aid for the blind, under development at the Technical University of Lodz, Poland. The assumption of the sound coding method is that the observed scene can be segmented into objects of specific categories, such as walls, doors, surface discontinuities, generic obstacles etc., after which each object is assigned an individual sound source that reflects its parameters (type, size) as well as its position in respect to the user (direction, distance). Each sound source is filtered using head related transfer functions (HRTFs) to create the illusion that it originates from the location of its corresponding obstacle.

The study spans a number of fields, from the very technical research on stereovision, scene segmentation, spatial audio filtering, sound synthesis, and psychoacoustics, to a more subjective assessment of how effective and tiring the proposed sound coding methods are. The system is tested using virtual reality by a number of sighted and blind volunteers. Task completion times, accuracy of environment observation and a number of surveys are the methods of assessment.

Keywords: electronic travel aid, mobility, sonification, spatial sound, HRTF, stereovision

Beyond Boundaries: The Impact of Sex Differences in Wayfinding Without Sight – Implications for Urban Planning Design and Spatial Cognition

Claudia L. Folska

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Nearly all animal species on the planet must engage in wayfinding behaviour for their very survival. People without sight are no exception. While much is known about how normal or fully able-bodied people navigate independently through the built environment, far less is known as to how people without sight navigate. Discovering what methods of learning are used to wayfind will shed light on how the blind acquire knowledge, how they use their cognitive maps and how they apply that knowledge to new circumstances related to the spatial aspects of urban environments. This quantitative exploratory research is aimed at understanding what factor(s) may contribute to successful wayfinding for individuals without sight. Specifically, are there sex differences in wayfinding abilities among people without sight? Substantial research supports the notion that there are significant differences between males and females in spatial abilities, with males outperforming females. An extensive literature review reveals no documentation of sex differences among individuals without sight. This study examines what mechanisms and systems are in play as people who are blind learn, modify and augment travel routes in their built environment.

Keywords: gender, blind, wayfinding, spatial cognition

Study of GPS use for Accessibility in the Netherlands

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This paper provides an overview of different Location Based Services (LBS) in the Netherlands. These LBS can refer to the location of the user or an object. Global Positioning Systems (GPS) are part of the LBS and guides people who are blind or have low vision to navigate to and within a location.

Keywords: accessibility, usability, Location Based Services, Global Positioning Systems, navigation.

Auditory Orientation Training System for the Blind by Using Wide-Range 3-D Sound

Yoshikazu Seki¹

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⁵ Akita University, and ⁶ Iwaki Meisei University.

We improved our previous auditory orientation training system (AOTS 1.0) by using new 3-D sound technology with wide-range positioning. Our new training system has the following features: (i) All HRTF simulations are conducted by CPU in mobile PC while the previous system simulated them by expensive DSPs (digital signal processors) in external devices. (ii) The listener's head position and orientation are measured by the gyro, terrestrial magnetism sensor, acceleration sensor, and GPS (global positioning system), that can be connected to a PC via USB while the previous system employed the expensive magnetic 6DOF sensor. These two features reduce the price of our system. The education/rehabilitation facilities which already have a PC should pay only a few hundred euros for GPS and other sensors. The software of our new system can be distributed at a low price and even, hopefully, free of charge.

Keywords: orientation and mobility, blindness, auditory orientation, sound localization, obstacle perception, head-related transfer function

SESSION 2: HEARING AIDS AND COMMUNICATION TECHNOLOGIES

Simulation of Auditory-Visual Impairments for Studies on Supplementary Technical Communication Devices

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The goal of our project is to assemble and implement existing simulation/emulation methods and to design and implement new algorithms for the most frequent auditory and visual impairments in one common user interface, which can generate likely perceptual effects for any input signal. In the first step, we put a large emphasis on 'hearing with hearing-disorders', such as age-related hearing-loss and noise-induced hearing-loss. In the second step, the auditory perception system is supplemented with a system that emulates different visual impairments such as, retinitis pigmentosa, age-related macular degeneration, or glaucoma. It is planned to present the distorted visual signal on TFT-controlled glasses and the audio signal on headphones. In this project, we present the visual impairment on a computer screen, i.e. in a reduced visual sub-field and the correlated sound on loudspeakers.

Keywords: audition, vision, audio-visual impairment, impairment simulation

Engaging Minority Communities in Deaf Culture and Sign Language

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This paper presents work that has engaged with deaf Muslim communities in London. The work focuses on the need and importance of family consultation to understand the concerns about the needs of deaf children from the parents' perspective. Our approach has positively combined the concerns raised but also the support needs of deaf children. This had allowed us to engage with the families to support them in terms of deaf awareness and to assure them that their child has the ability to learn and function in society. The paper shows the aims of our work and its achievements.

Keywords: ethnic, deaf, community, sign language, communication

The Benefit of Speech Enhancement to the Hearing Impaired

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Decreased speech intelligibility in background noise is a common complaint of most hearing impaired in comparison to quiet conditions. Speech enhancement algorithms widely used in hearing aids are often used with some success to improve speech intelligibility for the hearing impaired. It is clear from the literature that not all hearing impaired benefit from speech enhancement algorithms. From the literature it is not clear whether speech enhancement techniques are useful to either normal-hearing or hearing-impaired. Our results have shown a trend suggesting that with the assistance of speech-enhancement techniques and an ear model comprising outer-hair cell functionality, the speech intelligibility of normal hearing becomes worse as the signal-to-noise ratio is lowered. In a similar task, hearing impaired, and particularly those who use cochlear implants, have shown a significant improvement in speech intelligibility.

Keywords: Speech intelligibility, noise, hearing-impairment, speech enhancement, ear model

Representing Emotions and the Context in Subtitles

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The use of subtitles has made television and other audiovisual media accessible to deaf people. However, they generally lack information about the speakers' emotions and manner of speaking, the atmosphere and other contextual features. This paper describes a proposal for a new subtitling system which will include information on emotions and other contextual features, as well as options for personalisation. The approaches to representing emotions and other contextual features include the use of a library of video clips of the faces of Deaf signers expressing emotions and atmospheric paintings and other graphics and the use of font size, colour and type. The discussion of the new subtitling system is structured by the Comprehensive Assistive Technology (CAT) model and includes consideration of end-user involvement at all stages of the design and development.

Keyword: subtitles, deaf, emotions, contextual features

Focussed Stimulation in Auditory Implants

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This work is concerned with auditory neural implants with specific application to cochlear implants. Such devices activate the auditory nerve array by pulsed current injection through the tissue of the basilar membrane and the inner hair cells. A number of problems with 'electrical hearing' arises with the most obvious ones being a reduction in available frequency channels to resolve the incoming sound, and electrical channel aliasing effects or crosstalk due to electrode proximity and stimulation methods. The aim of our project is to reduce the inter-channel crosstalk by employing a new electrode stimulation method known as *phased array stimulation*. The first part of the project concerns the design and implementation of a simulation system for cochlear implant sound perception, which will later be evaluated by normal hearing persons. The second part concerns design and implementation of a sharpening processor, which employs manipulation of individual electrode stimulation currents in order to achieve electrical field focusing. The mathematics behind this idea resembles spatial impulse responses. The final part conducts speech intelligibility tests using the outputs of the simulation system to reveal if any difference with or without employment of the sharpening processor can be detected. The project is ongoing.

Keywords: cochlear implants, focused stimulation, phased array stimulation.

SESSION 3: ASSISTIVE TECHNOLOGY FOR EDUCATION

Speech and Braille Access to Computation Programs: User Experiences

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This paper addresses accessibility issues in symbolic and numerical computation programs by illustrating user experiences and by introducing a software prototype to improve speech and Braille access to the Mathematica software.

Keywords: accessibility, mathematics, blind, computation software, speech, Braille

Community-based Rehabilitation and Educational Services

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This paper refers to community-based rehabilitation services and also to the use of the new technologies in training people with visual and hearing impairments. The accessibility of web-based training is discussed. Some projects which promote the use of the new forms of e-learning in order to provide additional educational opportunities for disabled people and to support their social integration into the knowledge-based economy are also presented.

Keywords: accessibility, community, rehabilitation, e-learning, new technologies, educational services

Benefiting Disabled Students by Developing an Application that Uses Captioning of Multimedia to Enhance Learning for all Students

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Although manual captioning can increase the accessibility of multimedia for deaf students, it is rarely provided in educational contexts in the UK due to the cost and shortage of highly skilled and trained stenographers. Speech recognition has the potential to reduce the cost and increase the availability of captioning if it could satisfy accuracy and readability requirements. This paper discusses how developing an application that uses captioned multimedia can enhance learning for all students and how finding ways to improve the accuracy and readability of automatic captioning can encourage its widespread adoption to benefit disabled students greatly.

Keywords: accessibility, speech recognition

Hybrid Books – Information Access in Combined Format

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The paper summarizes the development of Hybrid book as format of structured documents and related applications that combines naturally spoken audio recordings and digital text and enables reading of both components in synchronized way. The project is realized at Teiresias Support Centre, Masaryk University and two editions of Hybrid books have been developed and published – a book completely stored on a physical media, and a book available online as a web application. It has been developed in respect to requirements of primary target groups of readers – firstly, blind and visually impaired students and secondly, other readers with/without disabilities.

Keywords: Hybrid book, talking book, accessibility, blind, visually impaired

Sign Language Online Interpreting at Masaryk University

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The paper deals with our experiences we have made in the last years finding an application that allows us involve Sign Language interpreters at the distance for our courses within Support Centre for Students with Special Needs at Masaryk University. The paper introduces shortly our causation having interpreters available online and type of courses we consider to be suitable for the method, and describes the combination of technology utilized and other technical arrangement. The paper also summarizes requirements of online interpreting for organization of the course, teacher, students and interpreter and opens necessary tasks to solve in the future.

Keywords: deaf, sign language, interpreting, video conference, accessibility, education of deaf

SESSION 4: SIGN LANGUAGE REPRESENTATION AND TRANSLATION

Toward a Descriptive Language for Signs

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The paper proposes an interactive manipulation of complex human figures by means of a descriptive language based on inverse kinematics. The objective is to improve human–computer communication, to generate precise movements, and to control and maintain the balance of the virtual character. This approach, through several analytic and numerical resolution methods, has been developed to manipulate robots. These methods have been applied to the virtual character to better monitoring and to ensure a realistic animation in real time.

Keywords: sign language, descriptive language, avatar, inverse kinematics

Linguistic Processing of Text for Automatic Translation into Sign Language

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The linguistic processing of input text is a crucial step in automatic translation into sign language. However, when this treatment is not realized, the system will use a word-by-word translation. This naive method is not efficient and generates many ambiguities like lexical and semantic-cognitive ambiguities which give a wrong sign modelling.

In this paper, we propose a new approach which removes the syntactic and lexical ambiguities and makes the sign more significant by adding facial expression and abstract representation according to the syntax of specified sign language. Furthermore, the linguistic processing prepares a more adapted form of initial text for a better translation into sign language.

Keywords: sign language, semantic-cognitive, facial expression, lexical ambiguities, abstract representation

Toward Facial Expression Generation for Sign Language Machine Translation

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Contrary to popular belief, the structure of signs exceeds the simple combination of hand movements and shapes. Furthermore, sign significance resides, not in hand-shapes, position, movement, orientation or facial expression but in the combination of all five. In this context, our aim is to create a generator of signs which support these five parameters. We have developed in previous works a new gesture generator (Jemni, Elghoul 2008), that does not support facial animation. In order to complete this work, we present in this paper our approach used to add an automatic real-time face expression generator to the WebSign gesture generator.

Keywords: sign language, facial expression, 3D animation, virtual character

Automatic Sign Language Recognition using X3D/VRML Animated Humanoids

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Making new information and communication technologies available and accessible to deaf people is still a new and difficult challenge. Before making these technologies accessible, we have to understand and develop some reliable tools that lead to integration of disabled people, especially the deaf. For instance, understanding Sign Language (SL) would help us learn what deaf people's needs are and how to maintain a productive relationship together.

In this paper, we propose a method that can automatically recognize Sign Language from Web3D worlds which is based on standard X3D/VRML nodes and can be run by any X3D/VRML browser. In this context, many systems are using avatar technology and Web3D standard to produce accessible web contents such as Vsign[9], Esign[4] and Websign[5] and our project aims to produce an efficient tool that processes and automatically recognizes Sign Language in contents generated by these (or similar) systems. Extensible 3D (X3D) can show animated objects (such as avatars) from different viewpoint perspectives in hierarchical way that properly organizes geometry, appearance, animation and event rooting. All data in X3D/VRML based scenes is structured as nodes.

In this paper, we consider the problem of automatically deriving a written text from an X3D/VRML animated signing avatar (or humanoid character) and propose a method that is efficient for Web3D worlds. Our approach is able to start from Web3D scene nodes, recognize all the avatar skeleton joints with corresponding rotations and finish by generating a word (or a sentence) that corresponds to the recognized joints motion.

Keywords: sign language, X3D/VRML, gesture recognition, web3D scenes, H-Anim, virtual reality

Emotional Engineering of Digital Representations of Sign Languages – The Importance of Facial Detailing

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Examining the human computer interaction needs of deaf users of software systems has established that users seek out a combination of linguistic and symbolic characteristics in an attempt to create an emotional context within which a positive user experience can be realised. This paper aims to present some of the extensive research into system-design for sign language users. The rules were established through a series of empirical studies and feedback from the user group. For the purposes of this paper one of the rules will be examined in detail.

Keywords: digital representations of sign language, system design

**KEYNOTE PANEL 2:
E-LEARNING FOR DEAF PEOPLE – IS THIS THE SOLUTION FOR
ACCESSIBILITY AND INCLUSION?**

**Advantages and Disadvantages of eLearning for Deaf People:
The Case of Masaryk University**

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The paper deals with the relationship between ICT and the Deaf. It presents e-learning in Deaf education with a focus on e-learning assisted language instruction of Deaf students of Masaryk University. It refers to several language courses (in Czech and English) taught at the University and deals with their specifics related to Deaf students' needs. Based on a research conducted among Deaf students of languages at the University, the paper discusses advantages and disadvantages of the use of ICT in language education of the Deaf.

Keywords: Deaf, sign language, education, university, e-learning, ICT, Moodle, videoconferencing

SESSION 5: MOBILITY AND ORIENTATION FOR BLIND AND VISUALLY IMPAIRED PEOPLE

An Application for Smartphones Dedicated for the Blind and Visually Impaired Users

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This communication demonstrates an application dedicated to the blind and visually impaired users of mobile phones. Unlike other supporting tools (like screen-readers), the proposed solution comprises of a set of programs designed in cooperation with the target users and suited to their specific needs.

Keywords: mobile devices, visually impaired support, smart phones, image processing, Symbian

A Remote Guidance System Aiding the Blind in Urban Travel

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This paper presents tests of a remote guidance system for the blind. The idea behind the system is to relay a video stream from a camera carried by a blind person to a remote operator who can provide assistance based on the video and the GPS position of the blind user. The remote operator helps the blind traveller by short spoken instructions. The connection is established over the GSM network using High-Speed Downlink Packet Access data transfer. The aim of the paper is to present the performance of the system in an urban area. The study includes discussion about communication link reliability, GPS accuracy and camera resolution. Three tests were conducted: guiding the user in a university campus and helping him to cross the street and locate a tram. Tests shows that the system is useful and has great potential, albeit further improvements are necessary.

Keywords: electronic travel aids for the blind, navigation, remote assistance

***mTransVIP* – The System Facilitating Visually Impaired People an Unassisted Use of Urban Traffic**

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The task of the *mTransVIP* system is to provide visually impaired people with information about the bus line or tram number coming to the stop. Additionally, a visually impaired person is given information about next stops during a ride. A passenger is equipped with a GPS receiver and mobile phone with an installed application which plays back acoustic statements. All necessary information about the location of all buses and trams in the city is obtained from the vehicles fleet monitoring system of municipal transport company.

Keywords: visually impaired persons, passenger information system, GPS localization.

Usage Analysis of a Sensory Substitution System : Report and Perspectives to Conceive a Tactile Interaction Network

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The Tactos system of perceptual supplementation allows for tactile reading of shapes and spatial organisation of objects on computer screens. The aim of the present project is to extend the use of this device to situations of distal tactile interaction via the Internet network. Here we report the initial results of an analysis of patterns of use in context, in order to test the material and functional possibilities provided by this extension. Two blind adolescents, with different levels of expertise in using Tactos, have tested various technical possibilities and various contents. It appears that the use of new effectors is possible if a certain level of proficiency has been reached in the use of the stylus and the graphic tablet. Similarly, the question of recourse to bimodality is posed in order to improve the acquisition of reference points in space. Finally, the passage to a “group” situation seems to be necessary for the use of the device to give rise to shared meanings and the creation of norms.

Keywords: visual deficiency, tactile perception, perceptual supplementation, interactive design

Micro Look: Travel Information System for Blind People

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The Micro Look system uses existing mobile phone technology to provide a description of a blind person's surroundings and potential obstacles and to read documents, notice boards, maps and signs. The image from a camera on a special pair of glasses worn by the user and the sound from a microphone on the glasses are sent by the mobile phone connected to the glasses to a workstation. The workstation operator receives the image and sound, including the user's voice and can respond to questions and send back information which the user receives via earphones.

Keywords: information, mobile phone, camera.

SESSION 6: ASSISTIVE TECHNOLOGY PROVISION AND OUTCOMES

ICT and Ambient Intelligence Tools in New EU Countries

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In this paper we describe the main results of international workshop and forum of experts from new EU countries (countries that entered EU during last 6 years). The meeting of the professionals involved in different areas of ICT services for people with impairment and elderly people took place in Herlany, Slovakia in June 2008. The main objective is to inform about the state-of-the-art of ICT development and ambient intelligence tools in home care of elderly persons and people with impairments in selected EU countries. The analysis of recent situation is specially related to services that offer elderly people and people with impairments better quality of life, increase their autonomy, safety, education, health care and supporting daily life activities. Thanks to networking of cooperating parties (Czech Republic, Hungary, Estonia, Latvia, Lithuania, Romania) that participated on workshop we gained an overall picture about situation of ICT in new EU countries.

Keywords: ICT, accessibility to services, people with impairment, elderly population

The Analysis of E-Services and their Accessibility for Elderly People and People with Disabilities

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The elderly population and people with disabilities often face obstacles when using mainstream technologies. Technologies and services available on the market for general use are not always accessible for everybody. Application of User centred approach, Design for All rules and use of Assistive technologies help to make IT tools accessible and avoid the barriers. Our research is done within Mainstreaming on AMBient Intelligence (MonAMI) project that started in 2006. Main task is to test various services as ambient intelligence, solutions for autonomy, home automation, safety and security, e-accessibility tools. Realization of testing is done in the Feasibility and Usability centre at Technical university of Kosice that is being built as a result of the project. This document describes a methodology of work, service description, deployment and testing divided into the phases. The initial phase was devoted to existing, second phase involves derived and extended and the third part is focused on the new developed e-services.

Keywords: e-services, e-accessibility, ICT, mainstream services and technologies

Using the Comprehensive Assistive Technology (CAT) Model in an Assistive Technology Outcome Procedure with Personal Assistive Technology Profiles

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The paper presents a new six-stage model of the assistive technology provision and outcomes monitoring process. It also introduces the new concept of a Personal Assistive Technology (PAT) profile, which can be drawn up for each assistive technology end-user and can be used to simplify the provision and outcomes monitoring process by providing a means for recording and organising the data obtained. The PAT Profile is based on the Comprehensive Assistive Technology (CAT) model, which is briefly described. The context for discussion is set by a very brief overview of the existing approaches to modelling and classifying both assistive technology and assistive technology outcomes. The conclusions include suggestions for further research and development.

Keywords: assistive technology, modelling framework, end-user studies, AT outcomes, AT profile

Assistive Awareness Referring to People with Hearing Disabilities

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In this paper, assistive awareness that means informing end-users, designers and organizations about assistive technology refers to people with hearing disabilities. Assistive technology has been gaining importance in technological community and in parallel European population is ageing, so an increasing social and institutional awareness is necessary. This paper has three main sections. The first section contains various statistical data on hearing disability and the use of assistive aids by disabled people. The second part presents reasons why disabled people, particularly in employment conditions, do not use assistive aids. The third part is centred on models of an awareness campaign designed to familiarize disabled people with the use of assistive aids to be used in different projects.

Keywords: accessibility statistics, aids, awareness, mass-communication

Experience with New Services for Seniors and People with Disabilities in Slovakia

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Abstract: This paper introduces services that help people with vision and hearing impairment to improve or maintain functions they have. The main aim is to support autonomy of this target group including people whose sensor functions changed during life due to aging, health condition, post-traumatic injuries, impairment and other reasons.

The research is made within the 6th Framework program of e-Inclusion priority of EU initiative with name MonAMI project (“Mainstreaming on AMbient Intelligence“) and contributions are presented in Access centre at Technical university of Kosice. The overall objective of MonAMI is to mainstream accessibility in consumer goods and services, including public services, through applied research and development, using advanced technologies to help ensure equal access, independent living and participation for all in the Information Society.

Keywords: e-services, internet games, interactive communication interface, mainstreaming services and technologies

SESSION 7: ACCESS TO INFORMATION FOR BLIND AND VISUALLY IMPAIRED PEOPLE

Contrapunctus Braille Music Reader: A Free Player for Accessible Music Scores

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Contrapunctus is a European-funded research project which aims to improve access to braille music by European citizens. It harnesses several existing technologies and services, and builds upon these to ensure that a digital process and workflow can be used to provide a rich score format for braille music delivery. This ensures that a score can be delivered in a dynamic format which draws benefit from processing and pre-processing information created by transcriber, reviser, teacher or student for personal use. So far the project has produced two software prototypes; The Braille Music Reader aimed at end users, and the Resonare software aimed at transcribers. This paper provides an overview of the work in the project to date and invites anyone interested to download the software and get involved.

Keywords: accessibility, usability, Braille music, accessible music, talking music, musicXML, BMML

A Pedagogical Approach to Accessible E-Learning Design

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This work focuses on the perspectives that teachers in Higher Education adopt when developing accessible online learning experiences. To date, the research has reviewed various approaches to implementing accessible online learning and the guidance offered to Higher Education teachers. This was found to be mainly targeted toward technical accessibility for developing online resources with less on providing accessible pedagogy. Approaches that do consider the teaching context focus primarily upon learners' needs. A simple model is proposed which places learning as the main aim for developing accessible learning designs and also incorporates the support needs of teachers beside those of the learners. Indeed, initial research has shown that teaching staff require additional help in creating accessible learning experiences and to develop a planned inclusive approach to their teaching.

Keywords: accessibility, pedagogy, inclusive learning, teaching practices, guidelines.

Wikipedia, the Open Encyclopaedia: Is it Really Open to Blind Users?

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Nowadays Web 2.0 applications allow anyone to create, share and edit on-line content, but accessibility and usability issues still exist. In this direction, wikis are becoming increasingly widespread, and offer great benefits in a variety of collaborative environments. To be universally valuable, wiki systems should be easy to use for anyone, regardless of ability. This paper describes obstacles that a blind user may encounter when interacting via screen reader with Wikipedia. For instance, Wikipedia presents many difficulties for the blind, especially when they wish to edit articles. Based on these accessibility issues, our study is aimed at investigating on the W3C ARIA suite as possible solution to simplify the Wikipedia Editing Page when interacting via screen reader. At the end, a user testing conducted by involving a group of blind users is shortly described.

Keywords: wiki, e-Learning, Accessibility, usability, blind users

Accessibility in Design as a Discourse and Praxis

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One of the most important problems in a computer mediated civilisation is the usability of content for people with sensory and physical impairments. Despite their potential for including this group of users, digital communication technologies have exhibited similar barriers and limitations to previous interfaces and communication devices with regards to their range of usability and accessibility. Traditional ergonomics have ensured a degree of comfort in using these devices largely to non-disabled users, though not to all of them. The Internet has revealed the existence of the vast global community of disabled people who want to come out of the ghetto in which society has placed many of them and participate on equal terms in other communities. The Internet offers particular opportunities for doing this, but only if web design takes into account usability and accessibility issues.

The paper analyses several procedures for improving the effectiveness of communication and interaction with the computer in the process of web design. It presents a number of community initiatives for improving accessibility. It also considers the relationship between the accessibility of symbolic and mediated communication and the accessibility of physical space. This gives rise to a new way of thinking about the Internet, communities and the ergonomics of communication which can lead to a new society without communication barriers.

Keywords: Usability, accessibility, internet, ergonomics, communication