



to support EU eInclusion and eAccessibility

CVHI Tutorial 2007

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Assistive Technology for All Ages

28th – 31th August, 2007

Hotel Alixares, Granada, Spain

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1 EXECUTIVE SUMMARY

The "*Conference on Vision and Hearing Technologies: Assistive Technology for all Ages*" (CVHI) is a tutorial organised as a conference like event which invites students and young researchers to participate in the field of AT and eInclusion. The main objective of CVHI tutorials is to offer young researchers attractive and high quality events to encourage them to specialise in and work in this field. Experts from around Europe work together with young researchers on state of the art technologies and real problems. Students submit papers beforehand, work on the topics in co-operation with experienced international experts and prepare them for publication.

Besides offering events for experts and all stakeholders in the field, there is also a strong need to support the development of the next generation of experts in eInclusion. Due to the specialised and interdisciplinary nature of eInclusion, there is a need to help young researchers and practitioners enter into international co-operation early in their careers. CWST supports this by providing an attractive opportunity for highly skilled and motivated young researchers to learn from and co-operate with outstanding experts.

Young researchers are given access to and get to know an interesting and forward looking field of R&D in an attractive environment. Working together with outstanding experts enables them to make an important contribution to determining and initiating the new engineering, technological and fundamental science R&D required to resolve the most pressing problems in eInclusion. CVHI also encourages the development of new R&D collaborations and the cross-fertilisation of ideas across the interdisciplinary field of social science, medicine, human factors, design, communications, engineering.

The most important outcomes and results of CVHI 07 are:

- The participation of 25 young and disabled researchers.
- The provision of high level training in both assistive technology and conference participation, including chairing sessions and producing accessible PDF documents, for the young researchers.
- A keynote panel discussion on Assistive Technology and Social Inclusion for Deaf and Hearing Impaired People from Ethnic and Other Minority Groups in British Sign Language and English (with interpretation).
- A keynote speech on Making the Case for Accessibility New Directions, New Possibilities with a presenter from an SME
- Tutorial sessions on Neuro-Cognitive Processing and Sensory Impairment: Lessons for the Design of Assistive Technology; Assistive Technology for Deafblind People: Current State-of-the-Art, Design and End-User Issues; and Assistive Listening for Hearing Impaired People: Fundamentals, Technology and Algorithms
- Workshop on Multimodal Access to Mathematics: the LAMBDA System
- The presentation of their current research projects by the young researchers.
- Developments in accessible CD production. In particular the conference template included instructions on producing accessible PDF documents. The experiences of producing this accessible CD have been written up and submitted for presentation at ICCHP 08.
- A grant proposal to one of the UK Research Councils on representing emotional and other features of speech in subtitles.

2 PREPARING THE TUTORIAL

The preparation of the tutorial started with discussions between the University of Glasgow and the organisers of AAATE 07.

2.1 Tutorial office

The tutorial office was situated at the University of Glasgow and very ably staffed by Ms. Vi Romanes.

2.1.1 Budget: Sponsoring, price building, reservations, contracts, accounting

No sponsorship was sought or obtained.

Ms Vi maintains records of all payments to reimburse travel costs to young researchers and invited speakers. Dr. Marion Hersh has records of all other payments. The original budget was produced by Dr. Marion Hersh. Accounting is carried out by Dr. Marion Hersh with support from Ms. Vi Romanes and the University of Glasgow Finance Office.

A block reservation of 70 rooms was made at the Conference hotel Alixares in Granada. No deposit was required.

2.1.2 Registration, payment

Registration fee was 250 € for the conference event and 125 € for the tutorial day. The late registration fees were respectively 350 € and 175 €.

A registration form was available for downloading from the web site, with payment to be sent by credit card or cheque to the tutorial office. Payment could also be made at the conference registration desk by completing the credit card section of the registration form for processing in the tutorial office.

2.1.3 Budgeting, Use of the European Commission Funding

Budgeting was done via the established offices at the University of Glasgow.

The main uses of the European Commission funding were to support young and disabled researchers and invited speakers, as well as to provide necessary assistive technology and interpretation support:

- **Young Researchers**

25 young and disabled researchers were supported. Just under 30%, seven of these researchers, were female and five were disabled. Three of the disabled researchers were under the age of 35 and two was over this age and supported as disabled researchers. One of the female researchers was over the age of 35, but had taken a very extended career break. Another of the female researchers was slightly over this age, but had moved into assistive technology research recently. Taking these into account, allowed both researchers to be considered as researchers at the start of their careers in assistive technology and associated areas. Two of the young researchers were also the support assistants and accompanying people of blind researchers who travelled with them. The young researchers were of 12 different nationalities and currently working in 13 different countries. They included two young researchers working in another European country. Four Central and Eastern European countries and eight Western European countries were represented. For the first time there was a group of young researchers from North Africa. The percentages of female and disabled

researchers amongst those supported were lower than last year, but for the first time the group of young researchers included a Deaf researcher whose first language was a sign language.

- **Invited Tutorial Speakers**

Financial support in the form of full travel and subsistence costs was provided to the three tutorial presenters, Dr Hersh, who is also the conference organiser, Prof Pissaloux from the University of Paris 6 and Dr Bothe from the University of Denmark. The European Commission funding therefore provided conference participants, particularly young researchers, with high level training in the following three important topics: Neuro-cognitive processing and sensory impairment and its relevance to the design of assistive technology; Assistive technology for deafblind people; and fundamentals, technology and algorithms relating to assistive listening for hearing impaired people.

- **Invited Keynote Speaker**

Full travel and subsistence costs were provided to Ms Marlowe of Tec Access in the USA. Tec Access is a small firm which is a leading provider of professional IT/Web accessibility and usability testing, consulting, and training services to commercial, government, and educational organizations. Therefore the use of European Commission funding gave conference participants, particularly young researchers, a very useful opportunity to understand accessibility and usability issues from commercial and policy perspectives, as well as introduction to the US perspective on eInclusion.

- **Invited Panel Discussion**

Full travel and subsistence costs were provided to Prof Jemni from the Ecole Supérieure des Sciences et Techniques de Tunis. Therefore the use of European Commission funding gave participants, particularly young researchers the opportunity to learn about an important new research and policy area, the particular issues relating to the design of assistive technology for Deaf and hearing impaired people from ethnic and other minority groups.

- **Invited Workshop**

Full travel and subsistence costs were provided for Dr Bernareggi to the Università degli Studi di Milano. The European Commission funding provided a workshop on theoretical and practical aspects of access to mathematics for blind people, with particular reference to the LAMBDA system.

- **Assistive Technology and Interpretation**

Two British sign language - English interpreters were provided to support a Deaf young researcher for the whole duration of the conference. The funding covered the full costs of travel and subsistence and a small fee to both interpreters. Having two interpreters meant that the interpreters were able to alternate, allowing each interpreter to have a break/recovery period after each short period of interpreting. This is important for health and safety reasons to avoid the risk of repetitive strain injury. The costs of travel and subsistence of companion for one of the blind young researchers, who always travels with a companion and does not use mobility technology, were also covered. In the detailed table of costs, these costs are included against the young researcher's name and not listed separately.

- **Other Costs**

The other costs covered by the European Commission funding are:

- Printing, Conference Proceedings and CDs,
- Registration desk
- Social programme
- Consumables and some administrative costs

A table of all expenditures of Glasgow, Univ. Linz and OCG (paid by fees, by own resources and by CWST) is given in Annex II – expenditures.

2.1.4 Telephone and email support of authors and participants

Telephone and email support was provided to authors and participants by Ms. Romanes from the tutorial office in Glasgow. In addition to answering queries promptly, she also developed an email list which she used to provide authors, participants and other interested parties with information about CVHI.

2.1.5 Public relation

Distribution of information in the OCG Journal, by email newsletter, on several homepages (e.g. CWST, ICCHP, Integriert Studieren, AAATE) by OCG and University of Linz

2.1.6 Management

Prevalance over coordination, organisation, consultancy, financial affairs by University of Linz.

2.1.7 WWW tools and WWW page update

The CVHI web page is http://www.elec.gla.ac.uk/Events_page/CVHI/cvhi/. The information provided on this page included the following:

- General information about CVHI
- Call for papers
- Information on the conference tutorials
- Paper formatting instructions, including information about making the paper accessible.
- Information on the conference bursaries and an application form.
- Registration information and an application form.
- Information about Granada and the conference hotel
- Accommodation reservation form
- Information about the conference social events.

Most of this information has now being moved to the archive section of the conference web site. The conference report and programme will be added.

Information also was provided on CWST page <http://cwst.icchp.org/tutorials.htm> and <http://cwst.icchp.org/cwstevents.htm>

2.1.8 Registration Desk

A registration desk was provided at the back of the conference hall. It was staffed by Mrs Sheena Dinwoodie during the early evening before the start of the event and before the start of the morning and afternoon sessions. In addition to registration, information about other events was available from the registration desk.

2.1.9 Tutorial book and handouts

The tutorial book contained the three tutorials. Unlike the other presentations, the tutorial presenters were not required to use a specified format and could choose whether text of their presentation or the powerpoint presentation was included in the tutorial book. The tutorial book was given to all participants who registered for the tutorial day.

The conference handbook contained brief conference abstracts plus the conference programme. Full versions of all presentations were available on the CD. Two versions of the CD were produced, with and without the tutorials.

2.1.10 Event and local information

CVHI 07 in Granada, Spain is the fifth event in the CVHI Conference Series and the second event funded as part of the CWST Project.

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 Work*. 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.

As 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 three conferences supported through the CWST project.

Granada is a historic city in the south-west of Spain. The Alhambra and the Albayzin, the old Islamic quarter, and its vibrant activity at night make it a particularly attractive city to visit.

The name Granada means pomegranate, the fruit on the city's coat of arms. It is derived from the name of the Jewish quarter, Garnata al Jahud, at the foot of the Alhambra hill. The very early history of Granada was as an Iberian settlement in the Albayzin district. In 711 Muslim forces took it from the Visigoths with the help of the Jewish community.

The Nasrid emirate was set up in Granada after the fall of Cordoba (1236) and Seville (1248) and stretched from the Strait of Gibralta to east of Almeria. It was ruled from the Alhambra palace for 250 years. Granada became one of the richest cities in medieval Europe. The flourishing of the arts and sciences peaked in the fourteenth centuries under the emirs Yusuf I and Mohammed V,

The economy had stagnated by the late fifteenth century and there was rivalry over the succession. A rebellion and civil war was followed by an invasion of the Christian armies. After an eight months siege the city of Granada was surrendered and the Catholic monarchs Isabel and Fernando entered it ceremonially and set up court in the Alhambra for several years. Despite promises of religious freedom, religious persecution occurred and the immediate expulsion of the Jews was followed by that of the Muslims in the seventeenth century.

With the loss of much of its talented population Granada declined until the Romantic movement in the 1830s. This was followed by the restoration of its Islamic heritage and later tourism became important.

The Alhambra was originally a fortress, dating from the ninth century, and was made into a fortress palace complex by the Nasrid emirs in the thirteenth and fourteenth centuries. Only ruins of the adjoining small town remain. The Palacio Nazaries, constructed in the fourteenth century, is probably the most beautiful example of Islamic architecture in Europe. The Alhambra was abandoned in the eighteenth century and used as a barracks during the Napoleonic occupation, narrowly avoiding being blown up. It was declared a national monument in 1870 and has since been heavily restored.

The Alixares Hotel is a four star hotel facing the Alhambra and a 15 minute walk from the centre of Granada. Its facilities include an outdoor swimming pool, a sundeck with sunbeds and a terrace bar and internet access. It is adapted for wheelchair users and people with allergies.

2.1.11 Meals, Refreshment

To facilitate networking, participants were encouraged to eat together in the conference hotel and a particular area of the dining room was reserved to enable participants to sit together. Meals were buffet style to enable participants to have a leisurely meal without missing the start of the afternoon session. There was a range of choices and provision for special diets.

The conference banquet was held at the conference hotel and was a set menu. Unfortunately there was a misunderstanding about the need for vegetarian, vegan and gluten free meals, despite the provision of this information to the conference hotel, and meals had to be fetched from the buffet upstairs.

Refreshments, consisting of fruit, pastries and cold and hot drinks, were provided during the mid-morning and mid-afternoon breaks. These could be consumed either in the foyer area next to the conference room or the veranda area outside the hotel.

2.1.12 Special needs

Ms. Romanes contacted all conference participants in advance of the event to discuss their accessibility requirements and any dietary or other special needs.

Two British sign language - English interpreters were provided to support a Deaf young researcher for the whole duration of the conference. Two interpreters were required to enable them to swap frequently to avoid repetitive strain injury and support the young researcher during meals and in the evenings. In order to reduce costs while maintaining quality two experienced trainer interpreters who have worked extensively with the young researcher were used. Travel and subsistence were covered for the companion for one of the blind young researchers, who always travels with a companion and does not use mobility technology.

One of the blind young researchers chaired two sessions. She was provided with the programme in electronic format, so accessed the programme using a screen reader. During the meeting on chairing sessions her vice chair was briefed on the need to alert her to audience members wishing to ask questions after the presentations. A Deaf researcher who uses British Sign Language (BSL) chaired one of the sessions supported by a BSL interpreter.

2.2 Call for Contributions and Scientific Committee

2.2.1 Call for Papers

A call for papers was issued at the conference web site:
http://www.elec.gla.ac.uk/Events_page/CVHI/cvhi/pages/call-for-papers.php as well as by email newsletters and publication on the homepages of University of Linz and OCG.

2.2.2 Scientific Committee

Marion Hersh Scotland
Michael Johnson Scotland
Edwige Pisseloux France
Rüdiger Hoffmann Germany
Barbara Leporini Italy

José Manuel Pardo Muñoz Spain
Santiago Aquilera Navarro Spain
Gorka Eizmendi Loriz Spain
Cristina Rodriguez Porrero Spain
Yoshikazu Seki Japan
Ger Craddock Ireland
Jurand Czerminski Poland
Harry Knops Netherlands
James Marston USA
Hans Heinrich Bothe Denmark
Constantine Stephanidis Greece
Martin Morandell Austria
Dan Mancas Romania
David Crombie Netherlands
Klaus Miesenberger Austria
Wolfgang Zagler Austria

2.3 WWW tools

2.3.1 WWW page

http://www.elec.gla.ac.uk/Events_page/CVHI/cvhi/

2.3.2 Conference Tool

Reviewing, notification to authors, submission of the final papers, registration and programme development were carried out using email exchange.

The conference tool still is in development and will at first be adjusted on the needs of the ICCHP conference. After checkout it can be adjusted for the needs of other events. For this reason it could not be used up to now.

3 EVENT

CVHI 07 in Granada, Spain is the fifth event in the CVHI Conference Series and the second event funded as part of the CWST Project.

3.1 Program

3.1.1 Program

Please find enclosed: Annex 1

3.1.2 Social events

- Welcome reception: Wednesday 29 evening
- Group Visit to the Alhambra : Thursday 30 afternoon
- Banquet and Gala Evening in Conference Hotel: Thursday 30 evening

Group social events with their opportunities for networking, making contacts and learning about on-going research in an informal atmosphere, are an important part of CVHI.

The group visit to the Alhambra took place on the third afternoon, after the second morning of regular paper sessions. The Alhambra is a very special place to visit and the visit was much enjoyed by everyone. The guides seemed to have had some experience or training in providing information to

disabled visits and guided the hands of the blind participants to allow them to feel the Arabic lettering on the walls.

The gala banquet took place in the conference hotel. It was much enjoyed, though participants who had been at CVHI in Granada in 2004 missed the special CVHI gâteau.

3.2 Local arrangements

3.2.1 Rooms

The Conference took place in the Hotel Alixares in Granada. It is a four star hotel opposite the Alhambra. Its facilities include a terrace with a view of the fortress, bowling, dances, internet access and complimentary newspapers. It is adapted for wheelchair users and people with allergies.

3.2.2 Presentation technology

All required facilities were available.

3.3 Hotel reservation, booking

The Hotel Alixares has been used previously for CVHI events and therefore a visit to check its accessibility was not necessary.

The choice of location for CVHI is an important factor in its success. The appropriate location should meet the following conditions:

- Appropriate and high standard conference facilities plus sufficient guest rooms for all delegates and accompanying persons, without requiring delegates to share with each other. This encourages networking between delegates. In practice, this specification means a hotel with conference facilities.
- Preferably full accessibility to disabled people. At the minimum no barriers to disabled people.
- Provision of all meals, including special diets. The midday meal should be available as a buffet to enable delegates to return on time for the afternoon sessions.
- A good ambience.
- Attractive spaces, both outside and inside, where delegates can interact together over refreshments.
- An attractive location, either in a small town or sufficiently away from the distractions of a larger town, that delegates are not tempted to miss sessions.
- Reasonable cost, for both guest rooms with full board and meeting rooms with audio-visual facilities. A conference package, if available, is generally financially advantageous.
- Within easy travelling distance by direct rail of linked CWST event, in this case ICCHP 06 and available immediately after this event.

The initial intention was to link CVHI 07 to AAATE 07 which was taking place in San Sebastian in October 2007 by organising it the week after either in the San Sebastian or within easy travelling distance. Details of five hotels in San Sebastian were obtained through the organisers of AAATE 07. Information about other hotels in San Sebastian and the surrounding cities was obtained through a Spanish organisation which investigates conference locations and by web searchers and a further 20+ hotels were contacted. All were unsuitable due to being too small, very expensive and/or inappropriately located.

It was therefore decided to contact the Hotel Alixares in Granada where previous success CVHI events had been organised. Prices were obtained and a booking was made for the end of August. Due to the change of location and the distance between San Sebastian and Granada the date was changed.

3.4 Special needs support

Sign language (BSL) interpretation was provided to one of young researchers and personal travel support was also made available. Other types of support could also be provided on request.

To allow the BSL interpreters to familiarise themselves with the material, particularly the technical terms, they were sent electronic copies of the papers well in advance of the start of the conference. In order to improve the service provided by the interpreters and make it easier for them to do their job, the conference organiser had a discussion of their requirements with them before the start of the conference and made announcements at the start of the tutorial day and the first conference day. These included the importance of only one person speaking at a time and addressing questions to Deaf or other presenters rather than the interpreters. The interpreters also moved their location after the session in order to be better seen by the Deaf young researcher. Towards the ends of the conference the organiser became aware that the lighting conditions were not ideal for the interpreters and that they would have benefited from the curtains being drawn earlier to reduce glare. This highlights the importance of the conference organiser having regular brief discussions with the interpreters about their requirements and whether these are being met. There is also a need for a check list of issues to be considered for conference organisers providing sign language interpretation, but it should be noted that this check list is intended to supplement rather than replace discussion with the interpreters.

The experiences from the conference will be summarized in the CWST event handbook by the University of Linz.

3.5 Evaluation, Quality Control

No formal evaluation was carried out. Positive feedback was given by participants and experts taking part in CVHI 07. This included a feedback meeting for young researchers at the end of the event.

4 SCIENTIFIC REPORT

4.1 Proceedings

Proceeding of the papers and presentations of CVHI 2007 will be made available via the conference web page. Proceedings will be published on the CWST-homepage.

4.2 Conference Topics and Design

The specific features of the CVHI (Conference on Assistive Technology for People with Vision and Hearing and Impairments) are :

- The tutorial sessions by expert speakers
- The significant involvement of young researchers in all aspects of the conference and the high quality training provided to young researchers. This training includes both high level information about specific aspects of assistive technology and training in participating at events.
- The bursaries, initially for young researchers and now also for disabled researchers. The bursaries cover all aspects of attendance at CVHI i.e. travel and subsistence and registration fees.
- The friendly, residential character of the conference, which encourages networking and the development of collaborations.

CVHI '07 was the fifth event in the series. The first event took place in Italy in 2001, with the theme *Support Technologies for Independent Living and Work*. The second was in 2002 in Granada, Spain with the theme, *Accessibility, Mobility and Societal Integration* and the third returned to Granada, Spain in 2004 with the theme was *State-of-the-Art and New Challenges*. The first three events were supported by the Research Directorates Human Potential Programme: High Level Scientific Conference. The fourth event in the series and the first event supported through the CWST project was in 2006 in Kufstein, Austria with the theme *Technology for Inclusion*.

All CVHI events have a common structure, consisting of the following elements:

- Three two-hour tutorials on the first day.
- Keynotes, generally one at the start of each subsequent day. The keynotes include keynote paper presentations, workshops and panel discussions.
- Regular paper sessions in a single track format.
- Group social events. They are an important opportunity for networking between participants.
- Meeting on chairing sessions at the end of the first day.
- Feedback meeting for young researchers at the end of the conference, where they provide feedback to the conference organiser on the event and suggestions for the next event.

The residential nature of the event means that all CVHI events to date have been held in a hotel with conference facilities, sufficient rooms for all delegates and good restaurant so all delegates can eat together. A very few delegates have chosen to stay elsewhere, but the overwhelming majority have stayed in the conference hotels. Buffet meals have been found to work better than a menu in enabling the afternoon session to start on time. The hotels used have all been accessible to wheelchair users, but it has been very difficult to find hotels with the accessibility features required by other groups of disabled people, such as Braille or other tactile markings and audio announcements in the lifts and induction loop or infra-red systems in the lecture rooms.

Before deciding on a venue, the conference organiser and chair has visited potential venues. In addition to investigating that suitable facilities were available, she has used the opportunity to make the conference hotels aware of the wider issues of accessibility to disabled people. Other important features of a suitable conference hotel for CVHI include a good standard of facilities, friendly staff and reasonable cost. It should be located either in a small town or away from the centre of a city, so that the delegates attend all the conference sessions rather than investigating local attractions. Another important feature is the availability of social space, generally in the form of a bar, where delegates can sit and network in the evening.

4.3 Tutorials

The three tutorial sessions have the following aims:

- To provide high-level research training to young researchers and continuing education for more experienced researchers.
- To provide an introduction and subject overview of important topics in assistive technology from different disciplinary and interdisciplinary perspectives.
- To make young and more experienced researchers aware of the current state of the art and the need for future developments in these topics.

4.3.1 Neuro-Cognitive Processing and Sensory Impairment: Lessons for the Design of Assistive Technology

This tutorial was presented by Prof Edwige Pissaloux, who is a professor in the Laboratoire de Robotique at Paris 6 University in France. Her main research interests include visual perception of

space and its integration into assistive system for visually impaired people, seniors and people with neuro-cognitive space-processing impairments. She is the European Editor-in-Chief of the IJIG and the REE journals. She is an expert referee on several regional, national, European and internal research and university boards and chaired the HANDICAP 2006 national conference. In her free time she gives violin classes for blind people.

The tutorial covered the following topics

- Space and its perception: This included a classification of the bioreceptors involved in space and a discussion of their properties, as well as the role of the different types of receptors in space perception. Different representations of external space and theories of sensory data acquisition were also considered. Assistive systems used to support space perception, including Bach-y-Rita's matrix of tactile stimulators and the intelligent glasses and TactiPad developed at the University of Paris 6, were discussed.
- Representations of space: this included discussion of four human spaces, namely the body, reachable, external and symbolic spaces, and different types of space coding and reference frames. Internal and external representations were also considered, as was the way the different brain structures, such as place cells, special view cells and cortical columns, support spatial perception.
- Techniques and tools for investigating the brain: The methods covered included methods of observation, invasive and non-invasive methods and brain computer or direct neural interfaces. The main characteristics of the different technologies were considered and the possibilities of augmenting human perception and using this approach to derive new assistive devices were discussed.
- The design of assistive devices for visually impaired people: Design principles for devices to support perception and the conditions to be satisfied by useful assistive devices were considered. A number of systems which translate visual environmental data into another type of perceptual feedback were discussed briefly, including Bach-y-Rita's electro-tactile stimulation and monocular vision system, the GuideCane and Ultracane, the Intelligent Glasses with TactiPad, Trekker and Navworks. The use of a brain interface to restore sight was considered, as well as systems that use peripheral vision, such as Visar.

4.3.2 Assistive Technology for Deafblind People: Current State-of-the Art, Design and End-User Issues

This Tutorial was presented by Dr Marion Hersh, who is a senior lecturer at the University of Glasgow in Scotland. In addition to being the CVHI conference organiser and chair, she has coauthored two books on assistive technology. Together with her students she has developed a number of assistive systems for people with sensory impairments. The coauthor of the tutorial, Dr Michael Johnson, is an emeritus professor at the University of Strathclyde, with personal experience of the limitations of currently available assistive technology for deafblind people.

The tutorial covered the following topics:

- Modelling the deafblind community.
- The Comprehensive Assistive Technology (CAT) model: This model is based on the four components of context, person, activities and assistive technology. The person and activities components of the model were used to structure the presentation.
- Description of the deafblind community. This was based on the person component of the CAT model, which led to discussion of personal characteristics and impairments, preferences and skills, including the different communication approaches used by different groups of deafblind people and attitudes of the general population of deafblindness. The information presented was summarised and used to determine some of the factors which affect the accessibility barriers experienced by deafblind people.

- **Communication and access to information:** This included an overview of some of the assistive devices developed to support interpersonal communication by deafblind people, including Ralph, the Handtapper, the Glasgow Glove and the Screen Braille Communicator. There was also a discussion of the use of assistive devices and systems, such as hearing aids and assistive listening systems derived for hearing impaired people and low vision aids and audio transcription derived for visually impaired people by deafblind people. Access to telecommunications, computer technology and the internet were also considered.
- **Mobility:** This included a discussion of the importance of tactile interfaces for deafblind end-users, the main principles of some of the obstacle avoidance and orientation and navigation devices developed for blind and visually impaired people and their suitability for deafblind people. The accessibility of physical environments and the use of environmental information and navigation systems were also considered.
- **Daily living, education and employment and recreation:** This included the assistive technology available to support people with single or dual sensory impairments in a wide variety of activities in these categories. It was noted that most of the devices and support systems have been developed specifically for blind and visually impaired or deaf and hearing impaired people and there is very little aimed specifically at deafblind people. Thus, for instance, there are separate sports organisations and sports adaptations for both blind and deaf people, but nothing specifically for deafblind people.
- **Research and development of assistive technology for deafblind people:** The assistive technology and context components of the CAT model were used to structure the discussion. The recognition of the need for assistive technology in some national legislation and the availability of funding were considered. The relatively neglected state of assistive technology for profoundly deafblind people, the very high benefits to the individual and the small market size were noted. The importance of the design interface and the availability of a choice or combination of sensory modalities, as well as ease and intuitiveness of use and documentation and training designed specifically for deafblind people were also discussed.

One of the distinctive features of this tutorial was the inclusion of practical exercises. Participants were divided into groups to work on a practical exercise of designing a device or piece of equipment for deafblind people, supported by the assistive technology component of the CAT model. This gave participants insight into some of the issues involved in designing assistive technology for deafblind people. It also provided a useful change of pace in the tutorial session.

4.3.3 Assistive Listening for Hearing Impaired People: Fundamentals, Technology and Algorithms

The presenter of this tutorial was Prof Hans-Heinrich Bothe, an associate professor in electronics and signal processing at the Technical University of Denmark. His main research interests include pulsed neural networks, audio-visual signal processing, rehabilitation technologies for disabled people and neuro-fuzzy methods for signal processing. Prof Bothe is the author of books on Neuro-Fuzzy Methods and Fuzzy Logic published by Sprinter Verlag and a coeditor of the Proceedings of the second International Computer Science Conventions Symposium on Neural Computation 1999.

The tutorial covered the following topics:

- **Introduction:** This considered the types and causes of hearing loss and availability of different approaches to improving hearing.
- **Basic acoustics:** This included consideration of sound waves, the measurement of sound pressure and the audible and speech signal frequencies. The representation of speech signals, reflection and reverberation, including quarter wave and Helmholtz resonance and psychoacoustics, as well as the impact of hearing impairment on the perception of different frequencies, were also discussed.

- **Auditory pathway:** An overview of the main features of the auditory pathway was presented. There was more detailed consideration of the cochlea and the inner and outer hair cells and their role in frequency selection. Unimpaired hearing and conductive and sensorineural hearing impairments, their causes and impacts on the audiogram and loudness recruitment were considered.
- **Hearing aids:** Analog, digitally programme and fully digital hearing aids, as well as behind the ear, in the ear, in the ear canal and body worn hearing aids were introduced. A number of signal processing features, available particularly in fully digital hearing aids were presented, including non-linear gain, multichannel and multi-stage compression, feedback suppression and adaptive directional microphones, were discussed.
- **Cochlear implants:** The functions and components of a cochlea implant were considered and represented in block diagram form. A particular example of a cochlea implant was presented. Design rules and the position of the implanted electrode array and adaptive directional sensitivity were discussed.
- **Auditory neroprotheses:** This included a brief comparison with cochlea implants with regards to their performance and suitability to different groups of people. The functioning of auditory brainstem implants was also discussed.
- **Cortical and biohybrid prostheses:** This included discussion of the conditions to be met for satisfactory performance and discussion of a number of different types of prostheses, including Brindles and Lewin's cortical device and biohybrid implant techniques.

4.4 Keynotes

4.4.1 Making the Case for Accessibility New Directions, New Possibilities

This paper, written jointly with her colleague Paul Spicer, was presented by Dana Marlowe of Tec Access in the USA. It provided a USA and business perspective on the importance and benefits of designing technology to be accessible.

The presentation noted that disabled people are the world's fastest growing minority group, with disabled people being 10-20% of the population in most countries and at least 39 million disabled people in Europe. Other topics covered included the resulting market opportunities and the definition of the market as well as how it was supported by legislation in many countries.

It included discussion of the results of a recent survey by Tec Access of the opinions and experiences of disabled people working with businesses, government and schools. The survey found that there was a lack of knowledge of the needs of disabled people and how to interact with them, employees lacked appropriate training, most people knew very little if anything about assistive technology and practical support and assistive devices, in areas such as shopping, were generally not available. There was also a discussion of best practice and case study examples were presented of several companies that provided examples of best practice.

The presentation also covered a number of key recommendations for developing a successful plan to promote accessibility, as well as the importance of knowledge of assistive technology and the needs of disabled people.

4.4.2 Multimodal Access to Mathematics: the LAMBDA System Workshop

The workshop was presented by Dr. Christian Barnareggi of Università degli Studi di Milano and Sauro Cesaretti of the Unione Italiana Ciechi (Italian Union of Blind People), Verona. It had two main

components, a powerpoint presentation and a practical demonstration of the use of the LAMBDA system to represent mathematics by Dr Bernareggi and Mr Cesaretti, both of whom are blind. The presentation discussed the role of the AScience thematic network supported by the eContentPlus Programme which aims at setting up a working group on improving the access of visually impaired students to university science courses. The working group aims to produce guidelines to support blind students on such courses and is currently sharing information about best practice.

The practical demonstration of the LAMBDA system included writing and processing mathematics expressions for a Braille display and speech synthesiser; using the linear representation of mathematics expressions and the MathML viewer to support communication between blind and sighted mathematicians and writing mathematics in mainstream programmes to produce documents to be edited in the LAMBDA system.

4.4.3 Assistive Technology and Social Inclusion for Deaf and Hearing Impaired People from Ethnic and Other Minority Groups

This keynote panel discussion takes an innovative look at the important, but neglected question of developing assistive technology for Deaf and hearing impaired people from minority groups, particularly those who do not speak English. Following on from the success of the panel discussion at CVHI 2006, this panel discussion again involved both Sign Language, in this case British Sign Language (BSL) and English with interpretation. The three panellists gave different perspectives on the issues involved.

Dr Mohammed Jemni from the Ecole Supérieure des Sciences et Techniques de Tunis spoke about the experiences of Deaf and hearing impaired people in the Arab countries. In particular spoke about the measures, including the use of assistive technology and computer system, to try and ensure equal access to education for Deaf and hearing impaired people in mainstream schools and the development of a national Arabic Sign Language Dictionary. He illustrated his presentation with video clips of some Arabic signs, which many of the participants tried to imitate.

Mr Sadaqat Ali, a doctoral student at the University of Reading spoke from the perspective of a Deaf Black user of assistive technology. He discussed the importance of taking into account cultural difference and language needs and understanding the backgrounds and identity issues of Black and ethnic minority Deaf people when designing assistive technology and in order to promote self-esteem and counter isolation.

Dr Axel Plinge from the Institut für Arbeitsphysiologie at the Universität Dortmund spoke to a presentation put together by Dr James Ohene-Djan from Goldsmiths College, London on adaptive inclusive software design for people with sensory impairments. He focused on educational software and the importance of tailoring the user interface and the educational material to take account of the learning needs, cultures and experiences of different students.

The panel presentations were followed by a very lively and wide ranging question and answer session with the audience.

4.5 Regular Papers

The regular papers were organised into seven different sessions and covered a wide range of topics and disciplinary perspectives in the interdisciplinary research area of assistive technology for people with sensory impairments. Each presentation was followed by questions and the young researcher chairs were very successful in ensuring that papers did not overrun.

4.5.1 Orientation and Mobility Systems for Visually Impaired People

This session comprised four papers:

- Terrain analysis for blind wheelchair users: computer vision algorithms for finding curbs and other negative obstacles. This two-authored paper from the Smith-Kettlewell Eye Research Institute in San Francisco was presented by Dr James Coughlan. He discussed the use of computer vision algorithms for sensing terrain features, in particular curbs, holes and drop-offs, to aid wheelchair navigation.
- Texture based Text Detection in Natural Scene Images – A Help to Blind and Visually Impaired Persons. This paper was presented by Guillaume Tatur on behalf of the two authors from the Université Pierre et Marie Curie Paris 6, France.
- Experiments of virtual navigation as a step in the development of a navigation tool for blind people. This multi-authored paper was presented by Guillaume Tatur Université Pierre et Marie Curie Paris 6, France. The paper discusses the representation of external space, the use of a virtual navigation paradigm in space integration from tactile snapshots and rules for the design of indoor experimental environments to be used in virtual navigation.
- Body mounted vision system for visually impaired outdoor and indoor wayfinding assistance. This multi-authored paper was presented by Dr Sylvie Treuillet from the University of Clermont-Ferrand, France. This paper presents an algorithm for the instantaneous and accurate localisation of the user based on a body mounted single camera. Localisation and heading estimates are computed from images as the trip progresses along a memorised path. The results of testing an initial portable prototype for outdoor and indoor use were presented and showed that the algorithm could be used effectively in keeping in walker in a narrow navigation corridor.

4.5.2 Access to Education and Employment

This session comprised four papers:

- Improving social life and communication of people with disabilities by using Internet facilities. This multi-authored paper was presented by Attila Kürtösi from Széchenyi István University in Hungary. This paper discusses a number of European initiatives supported by the Socrates Programme to provide support for disabled people to use new technologies. A proposal for improving existing software for searching for information and use in communication by disabled people is made.
- Towards a methodology for educating students with special educational needs. This multi-authored paper was presented by Gonzalo Mariscal from SETIAM – CETTICO, Fundación General UPM in Spain. The paper discusses improvements to the curriculum to better support people with special educational needs and an improved definition and use of accessible multimedia tools in education. The paper also presents a framework to support teachers and the developers of multimedia educational tools for educating students with special educational needs and the application of this framework in Proyecto Aprender (Project Learn).
- Socially inclusive e-learning models in companies. This multi-authored paper was presented by Thorsten Busse from the Institut Arbeit und Technik in Germany. This paper discusses the different factors that affect the development of socially inclusive eLearning models to aid disabled people in improving their working lives and to facilitate their integration into small and medium sized firms and other organisations. This is illustrated through the use of two examples of international cooperation projects on developing and implementing eLearning models for disabled people working in small and medium sized firms.

- Incorporating accessibility within pedagogical environments. This multi-authored paper was presented by Benjie Marwick Johnstone from DEDICON, The Netherlands. The paper discusses the i-Maestro project that aims to develop a unified model for music education which is accessible to disabled and older people. This will include improvement of symbolic music representation to support music education and the production of guidelines on implementing music tuition courseware in the standard tools and models for distance learning.

4.5.3 Assistive Technology for Independence

This session comprised four papers:

- Tangible table-top interfaces for Patients in Rehabilitation. This multi-authored paper was presented by Martin Tomitsch from Vienna University of Technology, Austria. The paper discusses the use of tangible tabletop interfaces in rehabilitation. Three concepts for these interfaces derived from theory and the results of two focus groups are presented and five general conditions which are important for the acceptance of these systems in rehabilitation are considered.
- E-voting – a key to independence for all. This paper was presented by Erik Loide and Ülle Lepp from Estonian Foundation for the Visually Impaired, Estonia. The paper addresses the experience of the use of an eVoting system in Estonia. The results of a pilot study of the usability of e-Voting environments for visually impaired people in the parliamentary elections in March 2007 are discussed.
- The Ambient Intelligence and the Assistive Technologies for Elderly, Visually and Hearing Impaired Users in Slovakia. This multi-authored paper was presented by Alena Galajdová and Jana Andrejková from Technical University of Košice, Slovak Republic. The paper discusses the main activities, goals and the approach used in the international project Mainstreaming on Ambient Technology (MonAMI). The main aim of this project is mainstreaming accessibility to consumer goods and services, including public services, through applied research and development and the use of advanced technologies to support equal access, independent living and participation for all in the Information Society.
- Biomimetic space-variant sampling in a vision prosthesis improves the user's skill in a localization task: This multi-authored paper was presented by Mr Barthelomy Durette from Grenoble, France. The paper discusses the results of an experiment to test whether the use of a 'retina-like' sampling pattern can improve the efficiency of a visual prosthesis. This involved testing the ability of subjects wearing a visual-auditory substitution system to point at visual targets.

4.5.4 Improving the Accessibility of Complex Content

This session comprised four papers:

- An accessible and usable E-Book as an educational tool: how to get it? This paper was presented by Dr Barbara Leporini from ISTI – C.N.R., Italy. The paper discusses the Scienza e Tecnologia per Libri Accessibili Elettronici (S.T.E.L.A.E) project (Science and Technology for Accessible e-books). The role of e-text in learning and accessibility and usability issues associated with e-texts are considered. A semi-automatic tool which is being developed for the conversion of e-books to an accessible and usable format is presented.
- Haptic and aural graphs exploration for visually impaired users. This multi-authored paper was presented by Dr Lorenzo Mosca from the Politecnico di Milano, Italy. The paper presents an innovative approach to the haptic and aural exploration of graphs of mathematical functions. The application uses a Latex file that describes the function and its domain and a cheap AudioTact™ device connected to the output of the PC.

- This multi-authored paper was presented by Dr Cristian Bernareggi from Università degli Studi di Milano, Italy. The paper discusses the ASceince Project for enhancing access to scientific resources and materials for blind and visually impaired university students. It also evaluates a number of the existing tools for accessing mathematics, such as the LAMBDA system, MathPlayer and the Universal Maths Conversion Library and considers the importance of taking into account national characteristics in both Braille code and speech output in national languages.
- E-learning platform for interactive access to multimedia materials in Daisy format. This paper was presented by Dr Piotr Brzoza Silesian University of Technology, Poland. It discusses a multimedia system for accessible distance education. The system comprises a multimedia browser, which is accessible to visually impaired people, and a content distribution streaming server integrated with an e-learning management system, which allows interactive online access to materials stored in DAISY 3 format.

4.5.5 Access to Multi-Media for Hearing Impaired People

This session comprised four papers:

- A device for reading aloud subtitles from television and cinema. This two author paper was presented by Simon Nielsen from the Technical University of Denmark, Denmark. The paper introduces SubPal a new text to speech device which can be connected to a television or video camera. It has been designed to read aloud the subtitle content in the video stream through a multilingual speech synthesizer. User and technical requirements of the speech synthesizer are considered and a best candidate synthesizer is evaluated.
- OCR-algorithm for detection of subtitles in television and cinema. This two author paper was presented by Morten Jønsson from the Technical University of Denmark, Denmark. This paper describes the OCR (optical character recognition) algorithm used as a module in SubPal. A binary image is created from sampling of the television signal (PAL) and analysed using the OCR algorithm for generating text-strings that can be passed on to a speech synthesis box.
- Emotional subtitles: A system and potential applications for Deaf and hearing impaired people This multi-authored papers was presented by Dr James Ohene-Djan from Goldsmiths College, London at the end of Session 1 as the presenter unfortunately had to leave the conference early. The paper introduces a system that demonstrates the presentation of subtitles that depict the emotions behind the words. The system also gives viewers the ability to personalise and adapt their interaction with the subtitles.
- A system for control of hearing instrument selection and adjustment based on evaluation of correct transmission of speech elements and features. This two author paper was presented by Dr Axel Plinge from the Institut für Arbeitsphysiologie at the Universität Dortmund. The paper discusses an independent means of optimising speech intelligibility in modern digital hearing aids using mostly off-the-shelf hardware and dedicated hardware. This system enables a PC-literate hearing impaired person to independently check their own speech reception when using a hearing aid. It could also be used to improve the adjustment of the hearing aid parameters.

4.5.6 Sign Language and Access to Information for Deaf People

This session comprised four papers:

- The need to develop deaf friendly materials for young Black Minority Ethnic Deaf experiencing identity issues. This multi-authored paper was presented by Sadaqat Ali from the University of Reading, England. This paper discusses the initial findings of research into the make-up of Black and ethnic minority (BME) Deaf people and initial guidelines for working with this particular community. This is particularly important as interpreters are often unfamiliar with BME culture and the culture and language needs of BME Deaf people.
- End-user involvement in assistive technology design for the deaf – are artificial forms of sign language meeting the needs of the target audience? This paper was presented by Saduf Naqvi

from the University of London, England. The paper considers a novel approach to the study of digital representations of sign language in order to identify the linguistic components of British Sign Language that are missing from these systems. Experimental results are discussed and the requirement for future research and the involvement of the Deaf community are considered.

- **Joining Hands: Developing A Sign Language Machine Translation System with and for the Deaf Community.** This two-authored paper was presented by Sara Morrissey from Dublin City University, Ireland. The development of an automatic machine translation system for translating spoken languages into signed languages is considered. The paper discusses the involvement of Deaf colleagues and members of the D/deaf community in Ireland in the research, including the translation of English text into Irish Sign Language (ISL), advice on ISL grammar and linguistics and the use of native ISL signers to evaluate the translated output.
- **Design Implications for a Ubiquitous Ambient Sound Display for the Deaf.** This two-authored paper was presented by Martin Tomitsch from Vienna University of Technology, Austria. The paper discusses a study of the requirements of deaf people for detailed information about environmental sounds and the results of a workshop at which deaf people were enthusiastic about the use of the ceiling for such displays. The conclusions of the study are being used in the design of a prototype system.

4.5.7 Telephony and Other Services for Hearing Impaired People

This session comprised three papers:

- **Sign language MMS to make cell phones accessible to the deaf and hard-of-hearing community.** This multi-authored paper was presented jointly by Oussama El Ghouli, Nour Ben Yahia, Mehrez Boulares from the Ecole Supérieure des Sciences et Techniques de Tunis, Tunis. The paper discusses WebSign, which is a web application using avatar technology. The system inputs text in a natural language and outputs real-time and on-line interpretation in sign language implemented by a 3D model. A new component called MMS Sign has been added to WebSign to permit the creation of an animation sequence in MMS format. The input text can be introduced via a Web interface or SMS and can be received and presented on mobile phones that support 3GP video format.
- **Telephone and Hearing Impaired – New Approaches for Increasing the Telephone Speech Quality for Hearing Impaired Users.** This paper was presented by Jan Krebber from the Technische Universität Dresden, Germany. The paper draws on interviews and the lessons learned from previous research presented at CVHI 2006 to discuss the requirements of hearing impaired telephone users. New approaches and recommendations as well as the requirements of telephony standards to support hearing impaired users are also considered.
- **Household sound identification for people with hearing disabilities.** This paper was presented by Héctor Lozano Peiteado from Robotiker - Tecnalia, Spain. This paper discusses the classification of household sounds to be used in an application to aid hearing impaired people in recognising everyday sounds. The results of a study to determine the best acoustical parameters by adapting training and evaluation techniques using GMM models with a varying number of Gaussian components was considered.

4.6 Meetings for Young Researchers

4.6.1 Meeting on Charing Sessions

The high level training provided by the conference to young researchers includes training in conference participation as well as assistive technology. As well as the opportunity to present papers and obtain constructive feedback from experienced researchers, young researchers are given the opportunity to chair sessions. Each session was chaired by a young researcher, supported by an

experienced co-chair. In the process of choosing session chairs, as well as matching the research interests of the young researcher to the session, most of disabled young researchers attending the conference were given the opportunity to chair a session, as they are likely to have fewer opportunities to do this than non-disabled researchers. The chairs of the tutorial sessions were chosen to be young researchers with previous experience of chairing sessions, as they took place before the meeting on chairing sessions.

A meeting on chairing sessions was held at the end of the first day after the three tutorials. It was attended by both young researchers and some of the co-chairs. It was open to all young researchers, not just those chairing sessions. It started with a brief presentation by Dr Hersh on what successful chairing involves and the potential problems. This was followed by a question and answer session, which led to discussion between all present. There were also a number of questions and general discussion on what was involved in a good presentation.

One of the young researcher chairs is blind and uses an electronic version of the conference programme with a screen reader. The support required from her co-chair, particularly in alerting her to people wanting to ask questions in the question session at the end of a presentation was discussed.

4.6.2 Feedback Meeting

This meeting was held at the end of the conference. It took place outside in the enclosed hotel courtyard and the informality was conducive to some useful discussion and suggestions. It was attended by the young researchers and a few experienced researchers and chaired by Dr. Hersh.

Comments about CVHI 07 were positive. Many of the young researchers were very appreciative of the opportunity to present their work, to mix with other researchers and to learn what was taking place across the whole field. This was particularly pertinent for the young researchers from Eastern Europe. The young researchers also liked the fact that all the presentations were in a single track rather than parallel sessions being used.

A number of suggestions for topics for future CVHI conferences were made, as well as a request for more sessions on assistive technology for deaf and hearing impaired people and something on assistive technology for deafblind people in CVHI 07. These suggestions are being taken into account in preparing the programme for CVHI 09.

There was a request for the abstracts to be sent to the participants in advance of the conference to enable them to be better prepared for the conference and therefore obtain even greater benefits. There were also requests for more workshops and discussion sessions, as well as brain storming sessions, very short blue presentations on blue skies ideas, more demonstration areas and more hands-on experience. There were also several requests for more frequent breaks. All these ideas will be taken into account in the organisation of CVHI 09. However there are a number of constraints, relating to the overall time length of the event, the importance of giving the young researchers to opportunity to present their work and listen to the work of more experienced presenters, while providing a varied programme. The possibility of extending CVHI 09 by half a day will also be investigated. In views of the comments about it being too hot, participants will probably appreciate CVHI 09 being earlier in the year and in Poland, though hopefully they will not find it too cold.

A Deaf young researcher stated that he had problems seeing some of the overheads due to them being blocked by chairs and columns. The sign language interpreters noted that the sessions had been too long for them, the need for more breaks and the fact that the room was too bright. This highlights the importance of checking that the room is correctly set up and that there are no accessibility problems or irritating features with participants and interpreters at the start of the event,

as well as on several occasions subsequently. Adding in more breaks would only be feasible if participants were disciplined enough to return on time after each break. Another possibility would be employing a third interpreter in order to reduce the length of time spent interpreting by each interpreter.

One of the blind young researchers stated that the conference was a good opportunity for young disabled researchers and suggested a short course on writing a good paper in English. The inclusion of a presentation on writing papers in English after the tutorial sessions in CVHI 09 will be investigated. The conference organiser will also draw up a short paper giving some pointers on writing papers in English, which will be made available on the web.

4.7 Other Contributions

In addition to the benefits to participants CVHI 07 has had a number of concrete outcomes, of which Dr Hersh is aware of the following:

- The submission of project proposal to one of the UK research councils in the area of the representational of emotional and other conceptual features for Deaf and hearing impaired people and involving the Universities of Glasgow and London.
- Advances in accessible content processing with regards to the production of an accessible CD. This included the inclusion of instructions for producing accessible PDF files in the conference template. A paper on the experience of producing an accessible CD and the problems encountered has been submitted to ICCHP.
- Brief guidelines and a check list for conference organisers employing sign language interpreters.
- Development of contacts between Goldsmiths College, London and Ecole Superieure des Sciences et Techniques de Tunis with the view to develop international collaborative work to support and learn from the Tunisian Deaf community.

5 Conclusions

This was a very successful event. A conference size of 40-60 participants has been found to facilitate networking between researchers and there have already been a number of positive outcomes of this. There were a number of important presentations, both of finalised and ongoing work. High quality training was provided to the young researchers both in assistive technology and conference participation. The financial support from the European Commission was very important, particularly in enabling the participation of a large number of young researchers, the tutorial presenters and the keynote speakers. It also enabled the accessibility needs of disabled researchers to be met and in particular the provision of British Sign Language interpreters, without which the participation of a Deaf young researcher would not have been possible.

5.1 Recommendations to the Commission

Analysis of the CVHI 07 has led to the following recommendations:

1. Guidelines for conference organisers providing sign language interpretation and an updated version of the conference template including information on producing accessible PDF files for inclusion in accessible CDs will be included in the handbook on accessible conference organisation. It is important that this information is provided to conference organisers and that they are aware that, for instance, provision of sign language interpreters is not sufficient unless there are appropriate seating arrangements and room layout and they have sufficient breaks.
2. Targeted training for young researchers on the conference organisation, paper writing and presentation, that covers accessibility and usability, as well as other issues.
3. The need for research to be funded on design for all approaches which take account of the differing and sometimes conflicting needs of different groups of disabled people.

4. The importance of funding research on the disabled people from ethnic and other minority groups with regards to the provision of assistive technology, access to education and employment and their social and cultural needs. The group of Black and minority ethnic Deaf people considered in CVHI 07 has very particular needs resulting from needing access to culture expressed in the oral and sign languages of both the majority and minority cultures. However, this is only one particular example and other groups of minority disabled people also have particular issues which urgently require to be researched.
5. The need for research funding on access to environmental (and other types of) information for visually impaired and hearing impaired people and doing so in ways that do not create barriers to other groups of disabled people, such as people with mental health impairments, epilepsy and/or autistic spectrum conditions or other groups of people who are highly sensitive to noise, light and/or movement. This issue is illustrated by the presentation on ceiling based visualisations of ambient sound, which was enthusiastically received by the Deaf young research, as well as many of the hearing participants, but which would make rooms and public spaces inaccessible for (some) people with epilepsy, mental health impairments and autistic spectrum conditions.
6. The need for research funding on providing better access to the eWorld, information on environmental noise and emotional and contextual features of audio-visual information for hearing impaired and Deaf people.
7. The need for research funding on devices of (great) benefit to small numbers of disabled people, such as communication devices for deafblind people who use a deafblind manual alphabet or finger Braille. There is an associated need for the development of mechanisms for distributing the resulting devices to end-users, particularly when the end-user community is too small for the devices to be commercially viable.

6 Acknowledgement

I would like to thank all the people who helped in the run-up to the event. Particular thanks are due to Ms Vi Romanes at the CVHI 2007 Secretariat, who has worked tirelessly in various capacities to ensure its success. Grateful thanks are also due to Prof Mike Johnson for support and advice along the way, to Dr Barbara Leporini who has contributed her expertise to create and design an accessible and beautiful CD of the conference proceedings and Mrs. Sheena Dinwoodie who staffed the registration desk. We would like to thank all the anonymous referees for participating in the peer review process which ensures the all-important scientific quality of the event. Particular thanks are due to Mr Juanma Lopez also the staff at the Hotel Alixares who have helped smooth the way to successful arrangements for the event.

7 Event Evaluation Form

CVHI 2007 Feedback Questionnaire

A. Data for Statistical Purposes

1. Are you? female male transgender/transsexual
2. Do you consider yourself disabled? yes no

If yes, please provide very brief details

3. What are your main areas of research or other work if you are not involved in research?

4. What is your nationality?
5. What country are you currently working in?
6. Did you receive a Young/Disabled Researchers' Bursary? yes no
7. Did you receive any financial support as an invited speaker? yes no

B. Publicity

8. How did you find out about CVHI 2007?
 - Web site
 - CVHI email list
 - Flyer given out at another conference
 - Personal contact
 - Other
 - If other, please provide details
9. Do you have any comments on the publicity material and/or the web site? If so, please provide details.
10. Do you have any ideas for improving the CVHI publicity material and/or its distribution? If so, please provide details.

C. CVHI Event

11. Do you consider the quality of CVHI 2007 to be

| | | | | |
|-----------|------|--------------|------|-----------|
| Very good | good | satisfactory | poor | very poor |
|-----------|------|--------------|------|-----------|

Please comment on the quality of CVHI 2007?
12. Do you consider the organisation of CVHI 2007 to be?

| | | | | |
|-----------|------|--------------|------|-----------|
| Very good | good | satisfactory | poor | very poor |
|-----------|------|--------------|------|-----------|

Please comment on the organisation of CVHI 2007.
13. Do you consider the location of CVHI 2007 to be

| | | | | |
|-----------|------|--------------|------|-----------|
| Very good | good | satisfactory | poor | very poor |
|-----------|------|--------------|------|-----------|

Please comment on the location of CVHI 2007.

14. How useful overall did you find CVHI 2007?

Very useful useful moderate not very minimal

Please comment on how useful you found CVHI

15. Overall would you describe your benefits from CVHI as

Very significant significant moderate insignificant minimal

16. If you benefited, could you indicate the main areas/ways in which you benefited:

- Professional development
- Personal development
- Extending your knowledge of research in the areas covered by CVHI
- Making contacts with colleagues
- The experience of presenting a paper
- The experience of chairing a session
- Other, please provide details.

Please comment, on the ways in which you benefited

17. Are there topics that you would like to see covered at a future CVHI? If so, please provide details.

18. Any further comments or suggestions?

This questionnaire should be completed anonymously and either returned at the conference, emailed to m.hersh@elec.gla.ac.uk or posted to Dr M Hersh, University of Glasgow, Glasgow, G12 8LT Scotland. The form can also be downloaded from the conference website.

8 Summary

8.1 Outcomes

The most important outcomes and results of CVHI 07 are:

The participation of 25 young and disabled researchers.

The provision of high level training in both assistive technology and conference participation, including charring sessions and producing accessible PDF documents, for the young researchers.

A keynote panel discussion on Assistive Technology and Social Inclusion for Deaf and Hearing Impaired People from Ethnic and Other Minority Groups in British Sign Language and English (with interpretation).

A keynote speech on Making the Case for Accessibility New Directions, New Possibilities with a presenter from an SME

Tutorial sessions on Neuro-Cognitive Processing and Sensory Impairment: Lessons for the Design of Assistive Technology; Assistive Technology for Deafblind People: Current State-of-the-Art, Design and End-User Issues; and Assistive Listening for Hearing Impaired People: Fundamentals, Technology and Algorithms

Workshop on Multimodal Access to Mathematics: the LAMBDA System

The presentation of their current research projects by the young researchers.

Developments in accessible CD production. In particular the conference template included instructions on producing accessible PDF documents. The experiences of producing this accessible CD have been written up and submitted for presentation at ICCHP 08.

The submission of a project proposal to one of the UK research councils in the area of the representational of emotional and other conceptual features for Deaf and hearing impaired people and involving the Universities of Glasgow and London.

Advances in accessible content processing with regards to the production of an accessible CD. This included the inclusion of instructions for producing accessible PDF files in the conference template. A paper on the experience of producing an accessible CD and the problems encountered has been submitted to ICCHP.

Brief guidelines and a check list for conference organisers employing sign language interpreters.

Development of contacts between Goldsmiths College, London and Ecole Superieure des Sciences et Techniques de Tunis with the view to develop international collaborative work to support and learn from the Tunisian Deaf community.

8.2 Additional Value

The European funding provided the following additional value:

Participation of 25 young and disabled researchers.

High quality training for the young and disabled researchers in both the area of assistive technology and academic participation e.g. presenting work and charring sessions.

Support for disabled researchers, for instance through British Sign Language interpreters, to enable their full participation.

Organisation of high quality tutorial sessions

Organisation of a keynote speech, keynote panel with interpretation and a keynote workshop.

Residential organisation of the conference in a high quality hotel which facilitated networking and informal contacts and discussion between participants.